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Enhancing Multiagency Collaboration in Animal Welfare Emergency Management

A dissertation presented in partial fulfilment of the requirements for the degree

of

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2021

He Mauri Karerehe

He Mauri Tangata

He Oranga Taiao

Animal welfare

and the wellbeing of people

leads to a healthy environment.

Abstract

Multiagency collaboration is fundamental to effective emergency management, yet little is known about what impacts collaboration between stakeholders in the human-animal interface in emergencies. This doctoral research sought to address this gap by investigating the issues impacting multiagency collaboration in animal welfare emergency management (AWEM) and by considering if New Zealand's AWEM framework is fit-for-purpose.

An action research and qualitative methods approach was used, incorporating focus groups, semi-structured interviews and document reviews related to three events (2017 Port Hills fire, 2017 Eastern Bay of Plenty floods and 2019 Pigeon Valley fire). Participants included 73 responders from 19 organisations.

Data was analysed using thematic analysis. The data analysis has led to identifying four interrelated themes describing key factors influencing interagency collaboration during emergency response: 1) emergency management context, 2) behaviour in emergencies, 3) the knowledge base of responders and 4) connection, the latter being critical to improving collaboration in AWEM.

The findings highlight how professional silos and a failure to understand the importance of human-animal-environment (h-a-e) interdependencies has resulted in AWEM being largely disconnected from emergency management overall. This thesis proposes the adoption of a One Welfare (OW) framework to develop a transdisciplinary approach to emergency management in which all stakeholders acknowledge the importance of h-a-e interdependencies and work to implement a framework to support this.

This thesis offers five strategies, tested and refined in the local context, to address One Welfare implementation challenges and to ensure that animals are truly integrated into emergency management: legislation and policy changes, including human-animal-

environment interface interactions as business as usual, improving knowledge through interprofessional education and training, incorporating OW champions, and recognising the role of animals as vital conduits into communities.

This is the first known examination of the effectiveness of multiagency collaboration within the New Zealand AWEM framework and the first proposal for OW as a mechanism to integrate animals in all components of the emergency management framework.

An 'Aotearoa One Welfare' approach will support a shift from a focus on individual emergency management domains towards a transdisciplinary approach that acknowledges the interdependencies of the h-a-e interface, a range of knowledge systems (including indigenous knowledge) and, ultimately, optimises outcomes for AWEM in New Zealand.

Preface

From a very early age I have had a love for and connection with animals. I was that child who would run-up to a stranger's dog to give it a hug, or stick my fingers through a crack in the fence where the barking dog was, to give it a pat. My poor mum. I grew up in the city, but always wanted to be out on the land surrounded by animals. I knew how to read animal behaviour from a young age, and this has served me well throughout my life.

On the 16th of February 1983 Victoria and South Australia experienced catastrophic bush fires which became known as "Ash Wednesday". I was living in Melbourne at the time with my family. I was five years old, and I remember it as a very hot but dry summer's day, with schools closed. We had helped our mum wet towels and put them at all the doors to stop the smoke coming into the house and spent a lot of the day in our swimming pool with ash falling down on us. Although we were not directly impacted by the bush fires, I still remember the disruption it caused.

My love for animals evolved into wanting a career that included animals. In the 90s at the age of 16, I started working in veterinary clinics after school and on weekends. I studied and qualified as a veterinary nurse and moved to rural Western Australia to work in a mixed veterinary practice. I looked into applying as a volunteer for the State Emergency Services, but was told this was not a role for women.

After a couple of years in veterinary practice, I decided to change focus and managed an ostrich farm. Part of the farm management practices included bush fire prevention as we were always aware of the risk of bush fires and the devastating consequences it could have on the animals.

After some time as a farm manager, I was lured back into veterinary practice with a role as an emergency and critical care veterinary nurse. I was hooked and I found my niche. The

principal veterinarian commented I could walk into the emergency clinic that was in a state of chaos and in a short period of time I would turn it around into an efficient and orderly machine. I discovered that I had the attributes to work effectively in complex, high-stress uncertain environments.

Fast forward a number of years, with more veterinary tertiary qualifications, teaching experience and various roles in emergency and critical care practices across Australia, a move to New Zealand to the Institute of Veterinary, Animal and Biomedical Sciences at Massey University created opportunities to develop my interest in animal welfare in emergency management. I identified skills and knowledge gap in veterinary emergency response including technical large animal rescue. To address the gap, I developed and led Australasia's first Veterinary Emergency Response Team with numerous national and international deployments as a first responder in disaster events and large animal rescues. My first disaster deployment was to the red zone of the February 2011 Christchurch earthquake to assess and treat the urban search and rescue dogs and police dogs, along with doing an assessment on the impacts on the veterinary infrastructure. I recognised the need for multiagency collaboration and interdisciplinary training during my Masters in Education (Adult Education) thesis, which led to the development of core competencies for AWEM from policy to awareness level.

In 2010, due to my first responder experience and research interest in animal welfare emergency management, I was invited to become the Massey University veterinary representative on the National Animal Welfare Emergency Management (NAWEM) liaison group which was developed in 2006 to advocate for the inclusion of animal welfare in New Zealand's civil defence and emergency management legislative framework. I held the role for a number of years, and it was during this time I was encouraged to embark on my PhD in Emergency Management journey focusing on Animal Welfare Emergency Management.

In December 2015, animal welfare was included in the CDEM legislation, and the Ministry for Primary Industries was appointed as the lead agency for animal welfare. NAWEM was replaced with the National Animal Welfare subfunction group and, as Massey University was not appointed to an animal support service role, it was no longer required to be represented in the group.

In 2016, I was approached by the Ministry for Primary Industries to assist with the implementation of the animal welfare emergency management framework and to take on the national and regional animal welfare emergency management coordinator roles. In these roles, which I held until April 2021, I coordinated the animal welfare response and recovery of over 50 different events of various sizes and scales. Due to my experience in these events and post-event discussions with colleagues, the initial focus of my PhD changed from exploring impacts on lifestyle property animals to examining the animal welfare emergency management framework in New Zealand.

Acknowledgements

I was told by a number of people that embarking on a PhD is a long journey full of many emotions. They were certainly right, and I may have been a little naive as to how I would navigate such a journey whilst working full time and with a young family. There have been many sacrifices as well as mixed feelings. One minute I could feel amazing that I was making a contribution to my field of study and at the same time not sure that I was really making a difference. However, there have been many people who have contributed to this journey that I will be eternally grateful to.

My supervisory team have supported and encouraged me in their own ways. Thank you to David Johnston for the many coffee and breakfast discussions, encouraging me to embark on this journey and for believing in me. To Carol Stewart and Raj Prasanna for your feedback, guidance, asking the hard questions and continuous support. A special thank you to Carol MacDonald who was able to listen to my many ideas and thoughts and capture them in a succinct way. Carol has been invaluable with helping me work through writing challenges due to my dyslexia and she challenged my thinking. The many cups of tea, chats and tears on your couch will always be with me.

Thank you to so many veterinary and emergency management colleagues for encouraging me, asking about my research and giving really important feedback. I also had many friends who would check in and keep me going. You all believed in me when I really needed it the most and told me I had something important to share.

I would like to thank the international and New Zealand emergency management sector for contributing to this research, being willing participants and challenging my thinking. You are all amazing people who know how to look after each other and have an interesting sense of humour, particularly during responses.

During my research and practitioner journey I worked with the community who cried and laughed with me during responses and recovery. Thank you for the many stories you shared with me about your animals and for being an inspiration to keep on going to ensure we continue to do better for you and your animals.

I received funding from the Bob Kerridge Animal Welfare Fellowship Trust towards the wildfire components of this research. I am grateful to have been awarded the funding along with the support and encouragement from the Fellowship trustees.

Professor Frazer Allan was a mentor, manager and leader throughout my PhD journey. He strongly encouraged me to focus on my passion in AWEM and created opportunities to support my passion. Thank you, Frazer, for your encouragement, support and for believing in me when I questioned my ability to go down this pathway. Frazer, you passed away unexpectedly and far too early. I wasn't able to thank you or tell you in person how important your support has been, so I am doing this posthumously. You have inspired many and you leave behind an amazing legacy in all that you have done for veterinary education and the people you led.

Finally, I want to thank my family. My Mum and Dad for your encouragement in your own ways. I hope that Mum is able to remember some of this journey and can see me graduate before her memories are taken away. To my sisters, Hiedi and Dana, thank you for your continuous support and intuitively knowing when I needed a phone call.

My husband, Douglas, has supported me throughout this journey taking on many parenting roles in my absence. To Jack and Amelia, you really haven't known Mum without her doing her PhD. Although it has been hard on you and you've told me how much you dislike Mum doing her PhD, I have loved the cuddles and words of encouragement. I hope my persistence shows you that you can achieve anything you want. I know you are looking forward to, as am I, a mum without the distraction of her PhD.

Dedication

To neurodiverse children who have been told they will never academically achieve.

It may not feel like it right now, but your neurodiversity is your superpower.

Work to your strengths and understand your challenges.

You can change the world.

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Abbreviations

AR	Action Research
AWEM	Animal Welfare Emergency Management
BoP	Bay of Plenty
CAQDAS	Computer-assisted analysis of qualitative data
CDEM	Civil Defence Emergency Management
CIMS	Coordinated Incident Management System
CR	Critical Realism
DDR	Disaster Risk Reduction
DHB	District Health Board
EBoP	Eastern Bay of Plenty
EM	Emergency Management
EOC	Emergency Operations Centre
FENZ	Fire and Emergency New Zealand
GDP	Gross Domestic Product
ICP	Incident Control Point
IMT	Incident Management Team
INTERPOL	The International Criminal Police Organization
MCDEM	Ministry of Civil Defence & Emergency Management (now NEMA)
MPI	Ministry for Primary Industries
NAWEM	National Animal Welfare Emergency Management Group
NEMA	National Emergency Management Agency – Civil Defence
NGO	Non-Governmental Organisation
NWCG	National Welfare Coordination Group
ODSEC	Official's Committee for Domestic and External Coordination
OH	One Health
OIE	World Organisation for Animal Health
OW	One Welfare
PHF	Port Hills fires
PTSD	Post Traumatic Stress Disorder
PRFO	Principle Rural Fire Officer
SPCA	Society for the Prevention of Cruelty to Animals
TA	Thematic Analysis
UNISDR	United Nations International Strategy for Disaster Reduction
USAR	Urban Search and Rescue
VERT	Veterinary Emergency Response Team – Massey University
WCG	Welfare Coordination Group (Group/Regional Level)

1 Introduction

1.1 Background to the research focus

Recent disasters have highlighted how the bonds between people and animals influence decision-making in times of crisis, with many people placing the safety of their animals above their own wellbeing (Heath et al., 2001; Hunt et al., 2012; Irvine, 2009). Increasingly, communities expect animals to be included in emergency management arrangements (Westcott et al., 2017a). This is especially so in countries where agriculture has a significant contribution to Gross Domestic Product (GDP) and where the protection of animals in emergencies is linked to food security and the protection of livelihoods, biodiversity, human wellbeing and communities (Dalla Villa et al., 2020; Filkov et al., 2020; Nasim et al., 2020; Nusbaum et al., 2007; Vroegindewey, 2014).

Growing interest and activity in animal welfare emergency management (AWEM) across a range of organisations suggests that AWEM is increasingly recognised as a vital component of emergency management systems (Taylor et al., 2015a). The New Zealand National Civil Defence Emergency Management Plan (CDEM Plan) published in 2015 sets out key roles and responsibilities relating to eight welfare subfunctions, including animal welfare, across all phases of emergency management (MCDEM, 2015a). The Ministry for Primary Industries (MPI) is designated as the agency responsible for all animals in emergencies, including companion and production animals as well as animals in zoos, circuses, research, testing and teaching facilities, and wildlife. Appointing a lead agency exclusively for animals acknowledges that disasters have an extraordinary impact on animal welfare (Vroegindewey, 2014) and that there is a strong link between animal welfare and human wellbeing (Pinillos et al., 2016).

Despite a plethora of plans, guidelines and legislation for AWEM (Taylor et al., 2015c), there is limited research in AWEM. What has been published has focused on public safety implications, such as risk behaviours of animal owners (Heath & Linnabary, 2015; Onukem, 2016; Thompson et al., 2014; Trigg et al., 2017), animal owner expectations of the inclusion of animals in emergency management arrangements (McCarthy & Taylor, 2018; Onukem, 2016; Taylor et al., 2017), presence of animals as a risk factor for first responders (Travers et al., 2017), interactions between animal owners and first responders (Taylor et al., 2015c; Travers et al., 2021; Westcott et al., 2017b), and roles of veterinary professionals in disasters (Dalla Villa et al., 2019; Garde et al., 2013).

In 2016, the World Organisation for Animal Health (OIE) adopted Guidelines on Disaster Management and Risk Reduction in relation to animal health and welfare and veterinary public health (OIE, 2016). The guidelines aim to strengthen the capacity of veterinary services to protect animal health and welfare, safeguard human and environmental health, and help restore social and economic conditions in the aftermath of a disaster (Dalla Villa et al., 2019; Garde et al., 2013).

The guidelines highlight the importance of intra- and interinstitutional coordination and identify intersectoral and multidisciplinary approaches as essential principles in AWEM (OIE, 2016). However, there is little research that focuses on AWEM frameworks, or the roles and interactions of agencies involved in the human-animal interface in emergency responses. Even less is understood about the factors that impact on collaboration between stakeholders involved in the human-animal interface in emergencies (Ansell & Boin, 2019; Squance et al., 2018; Taylor et al., 2015c). This doctoral research seeks to contribute to the academic discourse by investigating the key issues that impact effective multiagency collaboration in AWEM, including the role of the current AWEM framework in New Zealand.

1.2 Collaboration in Emergency Management

Scholarly literature reflects an increasing understanding that effective emergency management requires policy makers, practitioners, researchers, educators and communities to work more collaboratively (de Sisto & Handmer, 2020; dos S. Ribeiro et al., 2019; Eide & Skjetne, 2014; Ismail-Zadeh et al., 2017; O'Brien et al., 2020). Although emergency management and emergency service organisations have a long tradition of working together, it is clear that effective collaboration is far from easy (Bryson et al., 2006), particularly in time-dependent and high intensity environments such as those in emergency responses (Berlin & Carlström, 2011; Ismail-Zadeh et al., 2017; Kapucu, 2005).

Generally, in emergency management, collaboration is not well understood or theorised (Curnin et al., 2015; Steigenberger, 2016) and its definition is somewhat elusive and inconsistent (Emerson et al., 2012; Menya & K'Akumu, 2016). Collaboration is often used synonymously with cooperation or coordination; however, all three can be considered as falling along a continuum of increased interaction (Menya & K'Akumu, 2016). In disaster science, Ismail-Zadeh and colleagues (2017) describe a similar transitional continuum from a single discipline to a transdisciplinary approach. The transition to transdisciplinarity includes methods that facilitate the ability of diverse stakeholders to provide complementary perspectives and search for solutions that go beyond their own limited vision or resources (Ismail-Zadeh et al., 2017; Nowell, 2009). Menya and K'Akuma (2016) describe collaboration as organisations engaging across their organisational boundaries to collectively address a problem by trying to understand the complexities of the entire problem rather than only its part (Menya & K'Akumu, 2016). A collaborative approach affords a more effective foundation for conceptualising and implementing strategies that require a comprehensive understanding of present and future social, psychological, economic, livelihood, environmental and governance processes (Ismail-Zadeh et al., 2017; Janssen et al., 2010; Taylor et al., 2015c).

Creating collaborative multidisciplinary approaches in emergency management is a guiding principle in various international disaster management frameworks including the United Nations Yokohama Strategy (1994), Hyogo Framework for Action (2005) and the Sendai Framework for Disaster Risk Reduction (2015) (O'Brien et al., 2020; Ray-Bennett et al., 2020). The United Nations International Strategy for Disaster Reduction (UNISDR) emphasises interagency collaboration as an important mechanism to manage and mitigate the impact of natural hazards and disasters locally and globally (UNISDR, 2013). While it has been argued that countries need to embrace partnerships and cooperation based on common interests and shared responsibilities to achieve real progress (Ray-Bennett et al., 2020), this may be a rhetorical ideal and difficult to achieve in practice (Berlin & Carlstrõm, 2011). Furthermore, as noted in a recent Australian study, despite the awareness of the importance of integrating animal considerations into planning processes and arrangements, "there is still a need for animal interest groups and organisations to translate this to practice" (Trigg et al., 2021, p. 55).

1.2.1 Challenges in collaborative emergency management

Collaboration has become a prevalent organisational trend (Berlin & Carlström, 2011) that is assumed to be a necessary and desirable strategy for addressing complex social issues (Bryson et al., 2006). Mutual engagement, joint decision-making and discussion are fundamental to developing successful collaboration (Charman, 2014). In emergency management, the quality of collaboration is often described in terms of the management of limited and/or inaccurate information and the allocation of limited resources (Boin & Bynander, 2015).

In addition to the complexity of emergencies, there are a number of barriers to emergency management agencies implementing a truly collaborative process, including lack of trust, inefficient communication, contrasting jurisdictional interests and responsibilities,

conflicting organisational cultures and different skills, procedures, knowledge and competencies (Boin & Bynander, 2015; Bryson et al., 2006; Kapucu & Garayev, 2013; Taylor et al., 2015c, Trigg et al., 2021; Westcott, 2021). As a result, agencies frequently work in silos concentrating on their core objectives or they collaborate primarily as a means for advocating their own interests rather than authentically contributing to joint problem solving (Bodin, 2017).

Frequently, post-incident reports and reflections on disasters, such as the 2009 Victorian Black Saturday bushfires, 2016 Kaikoura earthquake, 2017 Port Hill fires and the recent 2019-20 NSW bush fire, express concerns over the lack of collaboration between agencies (AFAC, 2017; CCC, 2017; Commonwealth of Australia, 2020; Filkov et al., 2020; Government of South Australia, n.d.).

Integrated response frameworks such as the Incident Command System (USA), Australasian Inter-service Incident Management System (Australia) and Coordinated Incident Management System (New Zealand) have been developed to try to address multiagency coordination during a response. However, it is not clear how effective these frameworks are in promoting collaboration in the short-term during the response, or in the long-term (Kapucu et al., 2010; Kapucu & Garayev, 2016; Lai & Hsu, 2018).

What is clear is that poor collaboration in emergency management has negative consequences, including ad-hoc reactive or paralytic decision-making which weakens strategic planning (Curnin et al., 2015), poorly coordinated and ineffective action on the ground (Steigenberger, 2016), isolation and duplication of efforts, and misplacement of resources leading to fragmentation at functional and organisational levels (dos S. Ribeiro et al., 2019). When emergency service organisations are not aware of the relevant response and recovery arrangements for AWEM, the challenges for multiagency collaboration in

AWEM are exacerbated (Taylor et al., 2015c). To address these challenges it is vital to understand the key issues impacting effective multiagency collaboration in AWEM.

1.3 The context of this research

The opportunity to carry out this research arose because of the inclusion of animals in New Zealand's emergency management framework and my role as a National Animal Welfare Emergency Management Coordinator with the Ministry for Primary Industries (MPI). Responding to emergency events during the early phases of the implementation of a new framework presented a unique opportunity to develop and test ideas and strategies in practice. This responsive and iterative process underscored the utilisation of an action research approach followed throughout this study.

1.4 Aim of the research

The aim of this doctoral research is to examine the effectiveness of multiagency collaboration in AWEM and consider if New Zealand's newly developed AWEM framework is fit-for-purpose.

1.5 Research questions and objectives

This thesis is written under the 'PhD thesis with publications' format under the Massey University Guidelines. Taken as a whole, the doctoral research builds towards an understanding of enhancing multiagency collaboration in animal welfare emergency management. The doctoral research seeks to answer the following research questions:

RQ1 Is the current animal welfare emergency management framework inclusive of all relevant agencies in the public and private sector who can contribute to AWEM?

RQ2 What are the key issues impacting effective multiagency collaboration in AWEM?

RQ3 Is there an existing framework that enhances transdisciplinary collaboration between cross-sector actors involved in the human-animal-environment interface?

The third research question evolved following the case study (Chapter 4) which demonstrated the necessity to address the newly identified theme of connection (human-animal-environment interdependencies, transdisciplinary and networks, relationships and trust) as key to improving collaboration in AWEM.

To answer these questions, the following are the objectives of this research:

RO1 To identify public and private sector organisations who contribute to AWEM.

RO2 To identify the key issues impacting effective multiagency collaboration in AWEM.

RO3 To explore other cross-sector actors involved in the human-animal-environment interface and frameworks used to promote transdisciplinary collaboration.

RO4 To describe how a transdisciplinary framework could be implemented for AWEM.

Reflective of action research, the thesis is recursive, in that the elements of plan, act, observe and reflect are cyclic. Therefore, this thesis does not necessarily align with the traditional thesis format but is demarcated through three manuscripts, one report and a linking chapter. Table 1.1 outlines the alignment of the chapters to the research questions and objectives. Each manuscript and the report can stand alone as independent articles intended for publication. Due to the format of the overall thesis and action research methodology, some repetition is unavoidable, especially in the introduction sections of individual manuscripts.

Table 1.1 Alignment of chapters to the research questions and objectives of the thesis

Research questions	Research objectives	Manuscript and outputs	Chapter
RQ1 Is the current animal welfare emergency management framework inclusive of all relevant agencies in the public and private sector who could contribute to AWEM?	**RO1** To identify public and private sector organisations who contribute to AWEM.	1st Manuscript • A qualitative exploration of: ○ What type of animals and how animals were affected by the wildfire event? ○ How animals, their owners and responders were affected by the human-animal interface? ○ What organisations were involved in the human-animal interface and agency gaps in the AWEM framework?	3
RQ2 What are the key issues impacting effective multiagency collaboration in AWEM?	**RO2** To identify the key issues impacting effective multiagency collaboration in AWEM.	2nd Manuscript & report • A qualitative exploration of key issues experienced by emergency responders who interacted with the human-animal interface in two different events. • To identify similarities/differences key issues in responses with different lead agencies.	4 & 6
RQ3 Is there an existing framework that enhances transdisciplinary collaboration between cross-sector actors involved in the human-animal-environment interface?	**RO3** To explore other cross-sector actors involved in the human-animal-environment interface and frameworks used to promote transdisciplinary collaboration.	Connection, from inclusion to integration • Exploration of other cross-sector actors involved in the human-animal-environment interface and frameworks used to promote transdisciplinary collaboration.	5
	RO4 To describe how a transdisciplinary framework could be implemented for AWEM.	3rd Manuscript • A conceptual framework for implementation strategies for One Welfare in Emergency Management through an AWEM lens.	7

1.6 Scope of the thesis

At the outset, it is important to identify and understand the scope of the thesis. The following explanations lay out the boundaries of the thesis:

- While the findings presented in this thesis may have implications for other jurisdictions, due to practical constraints, the research concentrated on New Zealand's AWEM framework and agencies.
- The focus of this research was first responders, emergency management practitioners and animal support organisations who experience the human-animal interface. Data was collected with respect to their views and experiences of AWEM.
- While the research was not concerned specifically with the impact on animals in emergencies, due to the nature of working within a framework that is about animals, the data and research outputs do relate directly to them.
- The term 'stakeholder' in emergency management can refer to a wide range of individuals and organisations, including the general public. As the purpose of this research is to explore issues impacting effective multiagency collaboration in AWEM, the research focused on stakeholders with functional roles and responsibilities in emergency management. The general public as a stakeholder is out of the scope of this research; however, the views and experiences of animal owners were included indirectly through reported interactions with agencies involved in emergency response.

1.7 Thesis structure

This thesis presents a record of the research process and outputs. It offers implementation strategies for the introduction of One Welfare as a framework to improve multiagency collaboration in emergency management, and ultimately improve AWEM in New Zealand. The thesis comprises eight chapters, including three manuscripts and a report woven together with an introduction and chapters describing the research philosophy and methodology and the core theme of connection, and an overall discussion.

- **Chapter 1** introduces the rationale behind the research. It provides the context of AWEM and collaboration for the study. It also outlines the research aim, questions and objectives.
- **Chapter 2** discusses the research framework adopted in this study. It covers the overarching philosophy, the subsequent methodology and methods used in the entire research process.
- **Chapter 3**, the first manuscript, introduces AWEM including New Zealand's AWEM legislation and reviews documents, including official reports, peer-reviewed journal articles and media reports concerning the impacts of the 2017 Port Hill fires on animals, with the aim of providing background, literature review and direction for the case study.
- **Chapter 4,** the second manuscript, explores the factors which impact on how well AWEM organisations collaborate during emergency events.
- **Chapter 5** discusses the core theme of connection from the previous chapter and explores how other cross-sector h-a-e frameworks support a h-a-e transdisciplinary approach. Aotearoa One Welfare is introduced as a potential framework to better define complex problems by providing additional perspectives through a transdisciplinary approach that draws on a full range of relevant disciplines, knowledge

systems (including indigenous knowledge), professional groups and community networks.

- **Chapter 6** is a report investigating gaps in wildfire AWEM response. Additionally, consistent with action research, h-a-e transdisciplinary approaches were tested and reflected upon and reported.
- **Chapter 7,** the third manuscript, provides implementation strategies for a One Welfare approach in emergency management through an AWEM lens.
- **Chapter 8** provides an overall discussion that integrates the entire thesis. The narrative returns to the questions and objectives of the research. It concludes the thesis by covering the significance, impacts, limitations and areas for future research.

1.8 Conclusion

This chapter provided the context of the doctoral research with a brief overview of AWEM and collaboration in emergency management. The research aim, questions, objectives and scope have been outlined. An alignment of the research questions and objectives with the chapters and manuscripts was also provided.

2 Research philosophy and methodology

> "*No research is ever quite complete. It is the glory of a good bit of work that it opens the way for something still better, and this repeatedly leads to its own eclipse.*"
> Mervin Gordon

This chapter provides the overarching philosophical approach to the study and the methodology adopted for the research process. The first section reviews philosophical viewpoints in the field of emergency management and presents the philosophical approach underpinning this study. The second section summarises the action research methodology, the qualitative approach and the methods adopted for this research. The methodology used in each study is also detailed in the methods section of relevant chapters.

2.1 Research Philosophy in Animal Welfare Emergency Management

This doctoral research sits broadly within the field of emergency management. Research and practice in emergency management has undergone significant change, due in part to the increase in number, intensity and impact of disasters and subsequent escalating costs (Comfort et al., 2012; Ismail-Zadeh et al., 2017; Peek et al., 2020).

Research in emergency management has a history of supporting problem-focused approaches in the "hard sciences" (such as geology and engineering) with a practical approach to inquiry where the focus is on creating an understanding of practice in order to improve it (Ragsdell, 2009). It spans various disciplines such as physical sciences, social science and public administration but remains predominantly discipline-focused (Ismail-Zadeh et al., 2017).

Given the complex and multifaceted nature of emergency management, a holistic, integrated, action-orientated approach is needed for conducting research in this area (Ismail-Zadeh et al., 2017; Peek et al., 2020). Regardless of the approach taken, research is driven by the researcher's philosophical views of the world (ontology), knowledge (epistemology) and the influence of values on knowledge (axiology) as they shape and influence a coherent study design (Grant & Giddings, 2002; Habinka et al., 2020; Haigh et al., 2019; Saunders et al., 2015; Tan, 2020).

Research philosophy is about understanding preconceptions, assumptions and implications (Check & Schutt, 2017; Harrison et al., 2017; Scotland, 2012). Understanding our research philosophy is an exercise in clarification and reflexivity to shed light on biases and prejudices so as to not compromise the integrity and validity of the research design (Gordon, 2020; Reason & Bradbury, 2012; Scotland, 2012; Tashakkori & Teddlie, 2015; Zachariadis et al., 2013). Given that the selection of this particular research was influenced by the researcher's personal and professional interest as a veterinary professional, emergency management practitioner and tertiary educator (Eco & Sebeok, 1988; Westcott et al., 2017), it is of paramount importance to identify a suitable philosophical view as the first step in the research design.

Some authors argue that researchers should maintain consistency between a philosophical starting point and the methods they adopt whilst others suggest adopting a flexible research strategy (Ritchie & Lewis, 2003). In this research project, the intention is to carry out a naturalistic inquiry in the real world rather than experimental or manipulated settings and provide a holistic perspective within the animal welfare emergency management context. In such a context it is important to identify the philosophical paradigm which can support the research within the scope and context described above. The following subsections compare and contrast four key paradigms with the aim of identifying their relevance and

appropriateness for conducting the proposed research. The key attributes of these paradigms, including ontology, epistemology, axiology and aligned methods are summarised in Table 2.1.

Table 2.1 Comparisons of philosophical paradigms

Paradigm	Ontology (nature of reality or being)	Epistemology (what constitutes acceptable knowledge)	Axiology (role of values)	Research method (tools used for data collection and analysis)
Positivism	Real, external, independent. One true reality, objective.	Scientific method, observable, measurable and repeatable.	The researcher is detached, takes an objective, neutral and independent stance.	Deductive, highly structured, large samples, typically quantitative (surveys, experiments).
Interpretivism	Complex, rich and socially constructed through culture and language. Multiple meanings, interpretations.	Knowledge is gained through subjective interpretations of meaning, new understanding and worldviews as contribution.	The researcher takes a subjective stance, is value bound and part of what is researched.	Inductive, small samples, in depth investigations, qualitative methods (case studies, interviews).
Pragmatism	Complex, single and multiple realities. Reality is the practical consequences of ideas.	Practical meaning of knowledge in specific context, based on experience, by what works. True theories and knowledge enable action. Focus on problems and informing future practice.	Values driven research. Researcher takes multiple stances (both biased and unbiased perspectives).	Mixed methods, multiple quantitative and qualitative.
Critical realism	Reality captured by broad critical examination.	Relativism, meaning created from interplay between subject and object, knowledge is shaped by various influences, historically situated and transient. Different viewpoints are valid yet also fallible.	Value-laden, researcher acknowledges bias by worldviews and cultural experience and upbringing.	Range of methods and data types to fit subject matter such as critical discourse analysis, critical ethnography, ideology critique & action research, depth historically situated analysis of pre-existing structures.

Adapted from (Grant & Giddings, 2002; Habinka et al., 2020; Tan, 2020).

2.1.1 Positivism

Positivism, the foundation for the scientific worldview (Christley & Perkins, 2010) emphasises the importance of objective, neutral, systematic and detailed observation, testing hypothesis through experimentation and verification, and reflecting evidence-based practice (Saunders et al., 2015). Science is viewed as the pursuit of general laws through value-free empirical research whether it is in natural science or social science with no ontological distinction between them (Gorski, 2013).

Positivist research seeks to formulate and test hypotheses through the analysis of what can be empirically recorded by an objective observer who is detached from the subject. It has a deterministic approach and reductionist view to explaining phenomena and cannot properly account for the subjective nature of human reasoning and thought, including the interplay of diverse psychological, social, cultural and economic drivers (May, 2018). Traditionally, veterinary research, based on positivist ideas and philosophical assumptions, has taken a quantitative approach (Christley & Perkins, 2010; Gordon, 2020; Mossop, 2012) to guide professional decision-making and practice (Grant & Giddings, 2002) and has not considered the social implications of decision-making.

The social realm has characteristics that ontologically distinguish it from the natural world. The natural world is composed of things and forces that can often be mathematically represented (Moon & Blackman, 2014; Scotland, 2012). In contrast, the social world is a mix of different human reasoning and choices, all of which make it more heterogenous, contingent and complex than anything in the natural world (Moon & Blackman, 2014). Therefore, it can be argued that methodologies driven by positivism are less appropriate when addressing research questions in AWEM that explore social interactions which could be influenced by the interplay of diverse drivers, such as in this research.

2.1.2 Interpretivism

Interpretivism, on the other hand, states there are other ways of knowing about the world than direct observation and assumes that the reality we perceive is constructed by each individual's social, cultural and historical contexts (Grant & Giddings, 2002; Ragsdell, 2009).

Research driven by an interpretivist paradigm tends to be conducted in a more subjective manner analogous to the way in which social scientists operate, in that, the causal relationships are phenomenological rather than theoretical (Habinka et al., 2020). There is an emphasis on qualitative methods and researchers attempt to take account of the unpredictable nature of human beings while employing relevant methods for the unique scenarios in which they find themselves and are part of what is researched (Grant & Giddings, 2002).

Some researchers define interpretivism as "soft" and "unscientific" (Grant & Giddings, 2002; Ritchie & Lewis, 2003) with a common criticism being that it lacks the scientific rigour, reproducibility and generalisability that positivist research delivers (Christley & Perkins, 2010). However, as Gordon (2020) noted, "as long as interpretivist research is approached with the same rigour as a positivist, there is no evidence that such a criticism is justified" (p. 51). Interpretivism has also been criticised for its extreme subjectivism which denies the concept of generalisations and restricts knowledge beyond the subject being examined (Mingers, 2004; Smith, 2006). Such limitations may impede the aims and objectives of this study, especially when discussing policy change and framework development as proposed in this research.

The opposing value systems of knowledge and what serves as evidence, of positivism and interpretivism, have contributed to long-standing theory-practice inconsistencies (Tan, 2020). Both are criticised for utilising limited methodologies with a singular focus of knowledge, for purporting one methodology as right and the other as wrong, and for arguing

that the concepts of meaning and reality are problematic (Ritchie & Lewis, 2003). In an effort to meet the middle ground researchers have sought to adapt and develop alternative paradigms, such as pragmatism and critical realism (Tan, 2020).

2.1.3 Pragmatism

Pragmatic research is a naturalistic interpretative approach, characterised by flexibility, compromise, interdependencies and creative resolution (Ansell & Boin, 2019). It accepts that there can be single or multiple realities (Creswell & Clark, 2017) and claims to bridge the gap between the scientific method and naturalistic methods (Kaushik & Walsh, 2019). Pragmatism is contextualised with an understanding that action and interaction create meaning and require constant adaptation (Ansell et al., 2015; 't Hart, 1993) and that knowledge is judged according to its consequences in action (Cornish & Gillespie, 2009). For a pragmatist, research starts with a problem and the aim is to contribute practical solutions that inform future practice (Habinka et al., 2020). The most important determinant for the research design and strategy is the research problem being addressed. The research question, in turn, incorporates the pragmatist emphasis of practical outcomes and effective solutions (Cornish & Gillespie, 2009) and is often associated with multiple methods (Kaushik & Walsh, 2019).

Seale (1999) suggests that the pragmatic approach is about choosing the most appropriate method for addressing the specific research questions, rather than focusing overly on the underlying philosophical debates, in that the philosophy states that what's true is what works (Ritchie & Lewis, 2003). It requires detection of a socially situated problem and adequate action to address the problem (Kaushik & Walsh, 2019) and is seen as offering a productive approach providing for critical analysis for positive social action (Cornish & Gillespie, 2009).

Tan (2020) reports "Many scholars are cautious about pragmatism because of methodological eclecticism, … as it requires little theoretical commitment and may be used

by researchers to mix different methods without consideration of theoretical contradictions, incompatibility, or implications" (p. 11). Therefore, having a weak, non-reflective, shallow or ambiguous ontology makes arguing theory much harder and many fail to convincingly implement the philosophy (Fleetwood, 2005; Hall, 2013; Holland, 2013). Although a pragmatic perspective would be consistent with the position of this research to develop practical solutions to complex problems, the unreflective "what works" approach threatens the validity of findings, is non-definitive and lacks the credibility desired for this qualitative research.

2.1.4 Critical realism

Critical realism (CR) is a relatively new paradigm position and an alternative philosophical perspective citing different viewpoints and knowledge that are valid yet also fallible, mistaken, partial and changeable over time (Albert et al., 2020; Haigh et al., 2019; Zachariadis et al., 2013). It can be argued that CR is the most appropriate philosophical paradigm to conduct this research project which is retrospectively critically examining emergency events through the experiences of various emergency responders from multiple disciplines. The researcher being an emergency management practitioner and educator who experienced the events also aligns with CR philosophy (Zachariadis et al., 2013).

Critical research is designed not just to explain or understand reality but to change it (Grant & Giddings, 2002). CR is often seen as combination of views that contrast with positivist and interpretivist paradigms as it takes a realist stance and a critical outlook (Archer et al., 2013; Fleetwood, 2005; Haigh et al., 2019; Tan, 2020). Zachariadis et al (2013) notes: "It supports the idea of a reality which exists independently of our knowledge or perception of it and is socially produced knowledge of a natural (human-independent) thing" (p. 856). CR is said to critique an existing situation and use the findings to mobilise and inform change and have practical applications (Patton, 2015).

Critical realists advocate for a renewed strong focus on ontology alongside critical accounts of epistemological conditions (Holland, 2013). CR is a move from experiment to experience (Albert et al., 2020), accepts that social, cultural and political influences shape knowledge and allows for generalisability (Tan, 2020).

Bhaskar (1975), an original theorist for CR, suggested that reality is stratified into three domains: empirical, actual and real, and that it is important to have differentiated ontology. Rather than being concerned with regularities and laws, he argued we should operate with a tacit stratified distinction between the empirical (experiences, observations and data), the actual (the totality of the event even if they haven't been observed) and the real (causal mechanisms and structures that generate events) (Archer et al., 2013; Bhaskar, 1975; Haigh et al., 2019). For example, disaster events can be unique but reoccurring in type (i.e. earthquake) and context-dependent leading to the real, actual and empirical often being out of phase, in that, there is no one to one correspondence between experiences, events and mechanisms. For example, offshore earthquakes might only be known for their effects (offshore tsunami) and may not be directly experienced (doesn't make landfall). It also means that peoples' experience of those events can be significantly different due to the context in which they experience them (Holland, 2013). By ontologically separating out the empirical, actual and the real and shifting between them in our research as separate but related levels of reality, we are able to develop richer and more complex ontologically informed theories (Leca & Naccache, 2006).

CR argues that by attending to the philosophy we are able to come to a better understanding of what is presupposed by our research and the background assumptions in our methods, epistemologies and our explanations (Holland, 2013). Researchers in this ontology can be involved as participants and include critical methodologies, such as action research (Zachariadis et al., 2013).

As for any researcher, I will have a bias. However, supported by the CR paradigm, the choice of action research as a methodology is seen as a means of mitigating such bias by the co-creation of knowledge and solutions with research participants.

2.2 Methodology

While there are other methodologies such as critical discourse analysis, critical ethnography and ideology critique supported by CR (Scotland, 2012), Action Research (AR) is identified as the most appropriate methodological approach to conduct this research. AR is intended for practitioners to work on a problem that they can investigate and do something about as part of the social system. It includes integrated forms of enquiry, such as the scholarship of discovery, to advance propositional knowledge (justified true belief) and the scholarship of integration to bring together knowledge from across disciplines, usually in collaboration with research participants (Kemmis et al., 2014; Tashakkori & Teddlie, 2015).

Health and education researchers have adopted and successfully argued the usefulness of AR methodology. In education, the interpretations of the teachers themselves have become of critical importance, not dissimilar to emergency management AR whereby practitioners become critically important (Kemmis et al., 2014; McNiff, 2013). AR is a key means of contributing to holistic and relational forms of cultural, social and intellectual progress (McNiff, 2013).

The aim of this doctoral research is to investigate the key issues that impact effective multiagency collaboration in AWEM and consider if New Zealand's newly developed AWEM framework is fit-for-purpose by exploring the practical concerns of people, with the research goals of responsiveness and continuous improvement. AR allows the researcher, as a practitioner, to test ideas and concepts through cycles of continuous improvement and a recursive relationship between theory, data, research questions and interpretation (Scotland, 2012). For the proposed research, both the researcher and participants can be

considered as active participants in the task of unveiling reality, critically analysing it and recreating knowledge. Therefore, AR is reasoned to be the most appropriate methodology to conduct the proposed research. The following section further elaborates on the key components of the AR methodology and its application.

2.2.1. Action research methodology

AR is applied qualitative research described as a continuum of philosophical assumptions and methodologies. However, CR has been the preferred theoretical lens of action researchers (pracademics) due to the multiple forms of data necessary to refine practice over iterative cycles (Tashakkori & Teddlie, 2015).

Also known as practice-based research, AR links theory and practice by combining the practical concerns of people in problem situations with the goal of continuous improvement for social benefit (McNiff, 2013). Reason and Bradbury's definition in the Sage Handbook of Action Research (2008) clarifies this connection:

> *"Action Research is a participatory process concerned with developing practical knowing in the pursuit of worthwhile human purposes. It seeks to bring together action and reflection, theory and practice, in participation with others, in pursuit of practical solutions to issues of pressing concern to people, and more generally the flourishing of individual persons and their communities."* (p. 4)

The AR process is responsive, involving non-linear steps of planning, action, development and reflection (Check & Schutt, 2017; Ragsdell, 2009). McNiff (2013) describes these cyclical steps as a generative transformational evolutionary process (Figure 2.1):

Figure 2-1 Step-by-step Process of Action Research adapted from McNiff 2013

Planning (Reconnaissance) – Identifying the issue and fact-finding. AR begins with a question, problem or idea relating to a group of practitioners. *What is happening now*? *Why*? *What changes are we attempting to negotiate? With whom?* This process assesses the present activities and practices, including understanding the social relationships, structures and organisations of the particular context. The aim is to understand the why and how of causality.

For this research project, the reconnaissance stage involved studying existing academic and grey literature to explore what organisations experience the human-animal-environment interface in emergencies. Reflections of my practical experience in emergency responses also contributed to this planning process and informed the research plan.

Acting – Asking the questions – *What is happening? Why is happening in specific events? Who else will benefit from the change?* This is achieved through the collection and analysis of data.

This research project took a case study approach. Qualitative data was collected via document review, focus groups and semi-structured interviews. Analysis of the data examined the what and the why, identified gaps and explored where we want to be. Once the present situation was analysed, the problem identified and the future direction established, the development stage could begin.

Developing – Asking the questions – *How are you going to successfully solve the problem? How can you implement these solutions?* This step entailed exploring and offering and testing tangible solutions as a means to solve the original problem. It is essentially a proposed strategy for implementing the results of the research project. As the action plan is implemented, its effectiveness is continuously monitored, evaluated and revised.

For this research project, the developing stage involved the exploration of existing cross-sector ideas and strategies to create innovative solutions to the identified problem and testing the ideas through practice.

Reflecting – Fact finding about the result of action and asking *So what*? It forms conclusions that require iterative reflection and the sharing of results with the sector. Reflection is a critical aspect of the AR approach and stimulates further change in action and practice. This is not a single stage at the end of the action but an almost continuous process throughout the acting and developing phases.

For this research project, reflection occurred at each subsequent event when ideas were tested. Additionally, it involved presenting a model on how to operationalise the new paradigm and sharing personal reflections on how ideas were tested and the outcomes.

This research project is practice-led, therefore the general first step of other methodologies of understanding the context of the research domain is accepted as part of the daily context of the researcher. Therefore, the research project starts with identifying a research issue impacting effective multiagency collaboration in AWEM. It proceeds to explain why the issue is important and gathers data to show what the situation is like. The next step is to take action by offering a solution and finally, further data gathering after the action has been instituted and generation of evidence occurs. By following the above process driven by AR methodology, this research project explored three events as interrelated case studies.

2.2.2 Case study

Supported by the AR methodology, this research used the case study approach to generate an in-depth, multifaceted understanding of complex issues in their real-life context (Crowe et al., 2011). Case study is one of the principal means by which inquiry is conducted in social sciences, education, business, law and health to address a wide range of research questions and provide a unique platform for credible research endeavours (Harrison et al., 2017; Thomas, 2011).

Due to the complexity of collaboration in emergencies and disasters, many emergency management research contributions take the form of in-depth case studies (Steigenberger, 2016). For example a case study approach was used in a recent Australian study investigating the uptake and application of the National Planning Principles for Animals in Disasters (Trigg et al., 2021). Such studies are often descriptive and focused on observable phenomena. They demonstrate the utility of case study for researching complex issues and testing causal mechanisms resulting from a new policy initiative (Harrison et al., 2017; Yin, 2009). Primarily exploratory and explanatory in nature, the case study lends itself well to capturing information on “how”, “what” and “why” questions (Crowe et al., 2011; Harrison et al., 2017). They offer additional insights into what gaps exist, placing emphasis on holistic

analysis, resulting in the development or refinement of theory and practice (Crowe et al., 2011).

The case study approach is, as with all research, not without its limitations. Case studies can generate a lot of data, have been criticised for lacking scientific rigour and are said to provide little basis for generalisation (Crowe et al., 2011). There are several ways to address these concerns, including respondent validation and transparency through the research process.

In this research project, respondent validation and transparency were achieved through a review of the focus group report and transcripts of semi-structured interviews by respondents before data analysis occurred. Additionally, the choice of AR methodology and focus-group data collection with the interaction of participants and colleagues to develop reactive and innovative ideas, solutions and strategies strengthen the validity and generalisability of the research.

This research project uses collective case studies which is the study of multiple cases simultaneously or sequentially in an attempt to generate a broader appreciation of a particular issue (Crowe et al., 2011; Harrison et al., 2017). Cross-case learning has the potential to consolidate a coherent picture, to allow for generalisability and link the arguments in the philosophy of science (Anthony & Jack, 2009; Harrison et al., 2017). In order to develop a thorough understanding of the case studies, the collection of multiple sources of evidence, using a range of qualitative techniques, was employed.

2.2.3 Data collection: document analysis, focus groups and semi-structured interviews

The research project used qualitative methods including document analysis, focus groups and semi-structured interviews for data collection. The use of multiple sources of data (data triangulation) has been advocated as a way of increasing the integrity and validity of case studies (Crowe et al., 2011; Ritchie & Lewis, 2003). An underlying assumption is that data

collected in different ways should lead to a more synergistic and comprehensive view. Approaching the same issue from different angles can help develop a holistic picture of the phenomenon (Crowe et al., 2011; Harrison et al., 2017).

Situation reports, debrief documents and media reports from events were reviewed and analysed. This type of document analysis has been used in previous studies to contextualise the effectiveness of existing policymaking and implementation processes to inform recommendations (Howes et al., 2015; Termeer et al., 2011).

The key types of generated data in qualitative research are in-depth interviews and focus groups, both serving different roles (Harrison et al., 2017). Focus groups are group discussions organised to explore a specific set of issues where a group process will illuminate the research issue (Ritchie & Lewis, 2003). While they offer less opportunity for a detailed generation of individual accounts, they give participants more opportunity to refine what they have to say and offers opportunities to reflect on differing perspectives. The main strength of interviews is their ability to yield unanticipated findings and an in-depth understanding of the personal context within which the research phenomenon is located (Ritchie & Lewis, 2003). Consistent with qualitative techniques, the aim is not to interview a minimum number of interviewees, rather, it is to reach a level of saturation of themes (Guest et al., 2006).

In this research, the focus group and semi-structured interviews were conducted using a standard debrief format incorporating discussion and analysis of the experience, and evaluation of lessons learned. The focus group explores lessons learned through a consensus-based synthesis in a group environment (Gardner, 2013; Raemer et al., 2011). Typically used after an emergency, the debrief process asks participants to explore what worked well, what could be improved and to identify gaps (Kitzinger, 1994; MacKinnon & Gough, 2014). The debrief format was considered the most appropriate method for data collection because of

the participants' familiarity with the process in their professional roles. The outline for the focus group discussions and interview questions are included in Appendix 1.

The combination and cyclic staging of in-depth interviews and focus groups is useful and strengthens the generalisability and validity of the research (Guest et al., 2006; Harrison et al., 2017; Ritchie & Lewis, 2003). Focus groups can be used initially to raise and begin to explore relevant issues which are then taken forward through in-depth interviews.

In this research, the collective case study approach and cyclic nature of AR allowed for the iterative process of building on ideas for each successive event to allow for reflection, discuss issues at a strategic level and develop co-created policy solutions that could be implemented at strategic, tactical and operational levels.

Good research relationships are required for negotiating access to organisations and individuals: creating rapport and building trust requires patience and sensitivity (Ritchie & Lewis, 2003). Participant trust in the researcher and the intent of the research is critical to the success of a study. In this research project, relationship building was initially hampered by previous negative experiences with another researcher in this field. Despite this, effective engagement was achieved by utilising my professional relationships and rapport with colleagues from different organisations who championed the project and garnered support from senior people within organisations. This led to organisations offering to host focus groups and invite participants to contribute to the project on my behalf. This gave the project credibility, but a high level of trust from participants was still required.

I sought to build trust by providing clarity around how the findings would be used and reported, including conditions for anonymity and confidentiality. All participates received a research project information sheet (Appendix 2) outlining confidentially, employers were supplied with permission for employees to participate in the project (Appendix 3) and all participants signed a consent form (Appendix 4) before participating in the research.

The location of focus groups and presence of the lead agencies may have inhibited the response from some prospective participants. To address this potential barrier, prospective participants were offered the opportunity to take part in an individual in-depth interview in addition to, or in lieu of, focus group participation.

Determining the appropriate timing of research in relation to disaster events is a critical variable and requires careful consideration due to the impact of the event on participants and recall of information (Norris, 2006; Ritchie & Lewis, 2003). In this research project, data collection occurred eight months to two years after significant events. Additionally, participants were able to withdraw at any time through the research process if they were not comfortable proceeding and offered access to mental health support.

2.2.4 Data handling and analysis

Interviews and the discussion component of the focus groups were recorded using a digital voice recorder. Recordings were downloaded as individual files. The focus group recording was transcribed into a focus group report and then shared with participants to ensure the core concepts were accurately represented. The interview recordings were transcribed by a professional transcription service who had signed a confidentiality agreement (Appendix 5). Once the transcripts were received, they were checked for accuracy by listening to the recording and reading the transcription simultaneously. The transcriptions were sent to the participant for review and any changes were made before the analysis commenced.

It is important that the researcher remains “close” to the data during the data handling and analysis processes. In this research, although a transcription service was utilised, the review of the recording and transcription and amendments after the participant had reviewed the transcription allowed for familiarisation. Additionally, throughout the coding process, the recordings were reviewed to discern the context not captured by the transcripts.

Transcript analysis was managed using Dedoose, a web-based data management application (https://www.dedoose.com) that enables computer-assisted analysis of qualitative data (CAQDAS). This expedites the management of large amounts of qualitative data. It is important to recognise that CAQDAS cannot perform analysis – it merely organises the analytic process and ensures an accurate paper trail of the process, improving speed, rigour and consistency of approach (Ritchie & Lewis, 2003). Within existing qualitative research literature CAQDAS is not without its detractors, who consider that the ease and speed of CAQDAS has the potential to encourage researchers to take shortcuts (Weitzman, 2000). However, as the use of CAQDAS is becoming commonplace, a realisation that this tool does not obviate the crucial role of the researcher within the analytical process has emerged (Ritchie & Lewis, 2003).

Supported by Dedoose, Thematic Analysis (TA) was selected to analyse the data. TA offers an accessible and theoretically flexible approach to analysing qualitative data that generates themes (Braun & Clarke, 2019; Castleberry & Nolen, 2018; Terry et al., 2017; Vaismoradi & Snelgrove, 2019). Similar to other qualitative approaches, such as discourse analysis, grounded theory and narrative analysis, the researcher plays an active role in identifying themes as patterns of shared meaning that are important in relation to the particular topic and research question being explored (Braun & Clarke, 2014). Although TA is widely used in social science, health research and psychology, it is generally a poorly defined and demarcated method of qualitative analysis (Braun & Clarke, 2012; Mossop, 2012) with the main criticisms being the mixing of different TA approaches and lack of transparency and understanding of underlying research values and assumptions (Braun & Clarke, 2019).

Braun & Clarke, who first published a TA approach in 2006, have recognised their failure to articulate the assumptions made about their audience of readers and a lack of transparency of their underpinning philosophical assumptions has contributed to confusion about TA

(Braun & Clarke, 2019). To address these issues Braun & Clarke (2019) refined their TA approach, describing reflexive TA as a defined approach and highlighting that reflexive TA is "central to the researcher's subjectivity and reflexivity and is not static, as qualitative researchers are always thinking, reflecting, learning and evolving" (p 592).

Although TA is acknowledged as a theoretically flexible approach, the researcher must be aware of the philosophical sensibility and theoretical assumptions informing the use of the TA. Therefore, researchers must be transparent about their philosophical and theoretical assumptions and why it is being used in the particular research (Braun & Clarke, 2019).

The final analysis and resultant themes in reflective TA are the product of deep and prolonged data immersion, thoughtfulness and reflection which is active and generative (Braun & Clarke, 2019; Vaismoradi & Snelgrove, 2019). This reflexive process is aligned and suited to AR methodology, thus well suited for this research.

Reflexive TA was chosen as the most appropriate method of data analysis for this research because of its flexibility, reflexivity, creativity, subjective nature and potential to provide a rich, detailed and complex account of the data. TA can be conducted in a number of different ways, for example, inductive versus deductive or theory-driven data coding and analysis, an experiential versus critical orientation to data and an essentialist versus constructionist theoretical perspective (Braun & Clarke, 2006, 2014). Furthermore, it provides a rigorous and systematic approach for coding and theme development across the data set in relation to the research question, and it is fluid and recursive rather than linear (Braun & Clarke, 2006, 2014; Braun & Clarke, 2019).

Braun and Clarke (2006) describe the six phases of TA as:

1) Data familiarisation: involves immersing yourself in the data by reading and rereading textual data for examples from transcripts and listening to audio recordings or watching video data, whilst taking notes to highlight items that may be of interest.

2) Generating initial codes: codes are the initial building blocks and are developed from the participant data. The preliminary coding begins with an open, line-by-line coding process in which data is labelled with codes according to their meaning (Gill et al., 2008; Ritchie & Lewis, 2003; Vaismoradi & Snelgrove, 2019). This preliminary stage of coding must be carried out in detail initially so that meaning is not lost from the information provided and the researcher remains open to ideas.
3) Searching for themes: review of coded data to identify areas of similarity and overlap between codes. Searching for themes is an active process meaning themes and subthemes are generated that describe coherent and meaningful patterns in the data which are related to the research question (Braun & Clarke, 2006).
4) Reviewing potential themes: a recursive process where the themes are reviewed in relation to the coded data and entire data set. This is a quality checking process, particularly for large data sets (Braun & Clarke, 2012).
5) Defining and naming themes: themes need to be defined and named to ensure they are not trying to do too much, are easy to understand, are not repetitive and address the research question (Braun & Clarke, 2012). This phase involves deep analytic work and is driven by the question "so what" in terms of relevance or usefulness in answering the research question.
6) Producing the report: qualitative analysis requires the researcher to continually write informally, unlike quantitative analysis where you complete the data analysis then write up the report at the end. TA analysis has an interwoven process of informal writing to a more formal process of analysis and report writing (Terry et al., 2017). This is usually in the form of a report or journal article.

For this doctoral research, the data gathered is experiential and exploratory as responders were asked about their human-animal interface experience. This fits with TA with a CR underpinning philosophy which assumes truth can be accessed through language but that

accounts and experiences are socially mediated (Braun & Clarke, 2012). Data analysis was a journey which started with interpretive components through the data familiarisation process when revising transcripts and again when reading the full data set before beginning coding which then shifted to a more descriptive process. The process was a combination of inductive and deductive TA; inductive as it was mainly coded from the data, on the basis of participant's experiences (meaning the analytic lens does not completely override their stories); deductive as theoretical constructs from EM and AWEM scholarship were drawn on to render visible issues that the participants did not explicitly articulate.

2.3 Conclusion

It was evident when commencing this research that an action research qualitative approach was necessary in order to provide the depth of information required to address the research questions. It could be argued this approach may impact generalisability; however, the collective case study approach with data triangulation ensures validity and addresses any concerns about generalisability. Reflexivity of the researcher and the critical analysis of the research approach will be the cornerstone of the study.

A CR approach allows this research to critique an existing situation, use the findings to mobilise and inform change, have practical applications, accepts that social, cultural and political influences shape knowledge and allows for generalisability.

As the results are presented, strengths and limitations will be clearly described in order to give the reader confidence in the process undertaken.

2.4 Ethics

This doctoral research project involves different data sets and uses various methods with parts of it requiring participation from stakeholders. Where necessary, peer-reviewed ethical approval was sought under the Massey University code of ethical conduct for research, teaching and evaluations involving human participants (Massey University, 2017). The first and third manuscripts did not undergo the ethical approval process for human participation as the studies only used secondary data through the literature. The method for the second manuscript (Chapter 4) and the report (Chapter 6) utilised focus group and semi-structured interview approaches. All of these involved human participation and, due to the nature of the impact on participants in disaster research and the requirement for participants to recall experience due to events, a full human ethics approval was granted by the Massey University Human Ethics Committee: Southern A, Application 17/54. The ethics notifications on the peer-reviewed approvals can be found in Appendix 6.

3 An integrative review of the 2017 Port Hill fires' impact on animals, their owners and first responders' encounters with the human-animal interface [1st Manuscript]

Chapter narrative

The purpose of this manuscript was to offer a background and literature review of AWEM and the AWEM framework in New Zealand. Additionally, the manuscript offered a baseline of AWEM in New Zealand through a wildfire event and explored the first research question – *Is the current AWEM framework inclusive of all the relevant agencies in the public and private sector who contribute to AWEM?*

The manuscript provided a direction for the case study (Chapter 4) into the wildfire event and assisted with preparing the questions for the focus groups and semi-structured interviews.

Manuscript preparation and publication

I prepared the manuscript as the primary author with my supervisors, Professor Johnston and Dr Stewart and colleague Professor Riley, as co-authors. I conducted the data collection and analysis and drafted the initial manuscript. The co-authors provided guidance on the systematic review analysis and offered feedback on the content and structure of the manuscript. I prepared the final manuscript for submission to the journal. The manuscript, published in 2018 by the Australasian Journal of Disaster and Trauma Studies, was accepted with minor revisions by the journal (Squance et al., 2018). Statement of Contribution Appendix 7.

Abstract

Animal welfare emergency management is a critical component of modern emergency management because the powerful bond between people and animals influences decisions and actions taken during emergency events. High risk behaviour and poor decision-making can negatively affect evacuation compliance, observance of cordons, the safety of frontline responders, and the psychosocial recovery of responders and animal owners. This paper reviews documents, including official reports, peer-reviewed journal articles and media reports, concerning the impacts of the 2017 Port Hill fires on animals and identifying what agencies were involved in the animal response with the aim of providing direction for future research and identifying other information needs. Key themes were identified, including evacuation, cordons, animal rescue, communication and co-ordination. The implications of these for emergency management practice are discussed, including recommendations to consider animals across all phases of wildfire management; enhance emergency responders' understandings of animal owners' emotional drivers; develop a national animal loss database; include animal ownership in relevant public education; leverage the human-animal bond as a motivator for mitigation and emergency preparedness; more carefully consider animal evacuation logistics; and develop relevant wildfire response strategy.

Keywords: animal welfare, emergency management, wildfire, 2017 Port Hills fires

3.1 Introduction

In February 2017 a devastating fire burned over 1,600 hectares of land on the Port Hills of Christchurch, New Zealand (Langer, McLennan & Johnston, 2018). In the two weeks it took to bring the blaze under control, a firefighter died, nine homes were destroyed and 450 households were evacuated (Australasian Fire and Emergency Service Authorities Council Limited, 2017). The fire affected rural-urban interface communities (Langer & Wegner, 2018)

where households were likely to have a high number of pets and animals, such as horses, goats, pigs, cattle, deer, alpacas and poultry (NZCAC, 2016).

Past wildfires in New Zealand, such as the 2000 Wither Hills fire, West Melton fire in 2003 and Mount Somers fire in 2004, are known to have affected animals. They have also resulted in significant financial implications for farmers and impacted the psychosocial wellbeing of affected communities (Graham & Langer, 2009; Jakes & Langer, 2012; Kelly, Jakes & Langer, 2008). Unfortunately, there are known issues with the quality and availability of long-term wildfire records in New Zealand (Doherty, Anderson & Pearce, 2008), and the lack of an official database documenting the impact of wildfires on animals, stock losses and other animal death (Coll, 2013a) makes it difficult to fully appreciate the impact on animals. The 2017 Port Hills wildfires provide a context for considering factors of importance in disaster responses that involve animals, their owners, emergency responders and other agencies impacted by the human-animal interface.

Animals play an important role in the lives of many people (Darroch & Adamson, 2017). They provide companionship, protection, production-based and other livelihoods (Taylor et al., 2015b; Trigg et al., 2015b; Westcott, 2015). They are regarded as symbols of identity, (Hamilton & Taylor, 2013) and positively impact on mental and physical health (Hunt et al., 2012; Nusbaum et al., 2007; Travers et al., 2017). Pet ownership rates in New Zealand are among the highest in the world, with 64 per cent of households owning a pet – a rate nearing the proportion of households with children (Evans & Perez-y-Perez, 2016; NZCAC, 2016).

Animal ownership rates are even higher in rural communities, including farms and lifestyle, or hobby farm, properties (Westcott et al., 2017a), and especially true for large animal species, such as cattle and horses. Generally, multiple animals are kept on rural properties (Pawsey, 2015). New Zealand has an increasing trend of farm land conversion to smaller rural properties (Nicholas & Hepi, 2017), with a high migration rate of urban populations to rural

land in some areas (Langer & McGee, 2017). A clear majority of rural properties use their land for grazing stock (Nicholas & Hepi, 2017). Additionally, New Zealand is heavily reliant upon primary industries economically, with over 70 per cent of export earnings derived from agriculture and 12 per cent of the national workforce employed in the sector (MPI, 2018). Livestock and production losses due to disasters have serious, long-term implications for the New Zealand economy that cannot be immediately remedied from elsewhere within the economy (Coll, 2013a). Therefore, it is paramount that New Zealand protects the economic assets and viability of the rural community connected to production animals.

The strong ties between people and both production and companion animals and the legal, moral and ethical aspects need to be considered during uncontrolled wildfires and other hazard events (Bernard & Pascoe, 2010; Pawsey, 2015; Rogers et al., 2015; Smith et al., 2015; Squance, 2011; Taylor et al., 2015b; Thompson, 2015; Travers et al., 2017; Trigg et al., 2016a; Westcott et al., 2017a). Many people indicate that they would risk their lives to save their own pets (White, 2012) and other animals (Booth & Curtis, 2014). Poor decision-making by animal owners, the public and emergency responders can lead to confusion and inappropriate actions by well-meaning but untrained, inappropriately trained or inexperienced people (Bernard et al., 2010; Pawsey, 2015; Rogers et al., 2015; Taylor et al., 2015a).

In this paper, we introduce key concepts in animal welfare emergency management (AWEM) in New Zealand, discuss the legislative context, and analyse and discuss documents concerning the 2017 Port Hills fires. As part of an ongoing discussion, the authors will frame the current paper in terms of the role of AWEM and current New Zealand legislation concerning animals and wildfires.

3.1.1 Animal welfare emergency management

AWEM describes the management of animal welfare needs through all phases of emergency management: reduction or mitigation, readiness or planning, response and recovery (Squance, 2011; Travers et al., 2017). It is a critical component of modern emergency management because the powerful bond between people and animals may influence decisions and actions taken during emergency events (Brackenridge et al., 2012). The strong ties people have with their animals can have a significant effect on their decision-making during emergencies, often putting their own lives at risk as well as that of responders (Bernard et al., 2010; Rogers et al., 2015; Smith et al., 2015; Trigg et al., 2016b; Westcott et al., 2017a). This has been blamed for evacuation non-compliance of pet owners and their return to cordoned areas to rescue or tend to their animals in recent disasters (Heath & Linnabary, 2015; Squance, 2011; Taylor et al., 2015a; Trigg et al., 2015a; Yamazaki, 2015). Heath & Linnabary (2015) explain that inclusion of animals in emergency evacuation plans is one of the single most effective steps emergency managers can institute to reduce evacuation non-compliance.

The experience of Hurricane Katrina was one of the first disasters to be internationally recognised for highlighting the need to include considerations for animals in disaster planning, to avoid compounding the emotional and economic toll on individuals and communities impacted by devastating loss or injury (Heath et al., 2001; Taylor et al., 2015b; Thompson, 2015; Travers et al., 2017). Forcing owners to leave their animals behind can lead to reactive decision-making, putting lives at risk, creating tension with emergency responders and decision makers, and significantly increasing the resources required to rescue animals in disaster zones (Evans & Perez-y-Perez, 2016; Heath et al., 2001; Nusbaum et al., 2007; Yamazaki, 2015).

> *The lack of adequate planning for the management of animals and their welfare in emergencies often result in poor, last minute decisions with dangerous or fatal*

> *consequences for animals and their owners or carers.* (Victorian Emergency Animal Welfare Plan, 2016, p. 10)

Animals have always been affected by disasters. Pressure to do something about it is often placed on government agricultural agencies and farming organisations for production animals; animal welfare organisations and the veterinary profession to respond to companion animals; and conservation agencies to address affected wildlife (Pawsey, 2015). However, this often occurs within silos with no co-ordination or collaboration across agencies, leading to duplication of effort (Pawsey, 2015), inaccurate information and a lack of intelligence sharing, and organisations and individuals working outside of the official response (Heath & Linnabary, 2015). Therefore, an integrated, multiagency, multidisciplinary, systematic approach is required (Taylor, et al., 2015c) to mitigate tension during response and recovery, that can be addressed through planning and preparation (FAWC, 2012; Heath & Linnabary, 2015; Pawsey, 2015; Taylor et al., 2015c; Westcott et al., 2017a).

In 2016, the World Organisation for Animal Health (known as OIE under their historical acronym) adopted the Sendai Framework for Disaster Risk Reduction 2015 – 2030 and issued guidelines on disaster management and risk reduction in relation to animal health, animal welfare and veterinary public health. The OIE noted that:

> *recent disaster events highlight the need to bring all components of disaster management together in cohesive response plans at both national and international levels using a multidisciplinary (thus multiagency) approach to achieve optimal efficiency and effectiveness.* (OIE, 2016, p. 2)

Until recently, only production animals were considered in emergency management, and then only in the recovery phase, where provision was made for attending to injured animals and rebuilding farming infrastructure (Pawsey, 2015; Rogers et al., 2015). However, if we assume that all animals are affected similarly, they should all be included in an AWEM

framework to ensure that animal welfare is considered more broadly and in compliance with legislation, such as New Zealand's Animal Welfare Act 1999. To achieve this, an all-species approach should be instituted in a national AWEM framework, as has occurred in New Zealand (MCDEM, 2015a). Animals may be considered property. However, the attachment people have for their animals impacts on emergency services. This means that agencies cannot exclude animals from their charter, because excluding animals will put lives at risk as the owners try to save their animals (Taylor et al., 2015a).

3.1.2 Animals in emergency management legislation

The public outcry over the impact on animals during Hurricane Katrina resulted in the enactment of the Pet Evacuation and Transportation Standards (PETS) Act 2006 in the USA (Heath & Linnabary, 2015). This act requires a city or state to include households with pets or service animals in the disaster preparedness plans. While only companion animals and service animals are included in the USA legislation, New Zealand has an all-species national AWEM framework (MCDEM, 2015b) ensuring that companion (including service animals), production, zoo and research animals, as well as wildlife, are considered in all phases of emergency management.

Under the Animal Welfare Act 1999 (NZ), the primary responsibility for the physical, health, and behavioural needs of an animal rest with the owner or person in charge. However, there are circumstances, such as separation and incapacitation in emergencies, which may result in owners being unable to adequately care for their animals (Heath & Linnabary, 2015). The inclusion of animal welfare as a sub-function of welfare in the 2015 National Civil Defence and Emergency Management (CDEM) Plan serves to address this, as shown in the overview of New Zealand's Co-ordinated Incident Management System, published by the Officials' Committee for Domestic and External Security Coordination (ODSEC) (2014).

The New Zealand Ministry for Primary Industries (MPI), as responsible agency for animal welfare, and other support agencies have designated roles and responsibilities under the National CDEM Plan 2015 and accompanying guide (MCDEM 2015a, 2015b; Ricketts, 2017). The animal welfare sub-function includes but is not limited to the provision of animal rescue, animal shelter, food, water, husbandry, veterinary care and other essentials for all animals (MCDEM, 2015c). However, this requires that the main lead agency activates welfare functions. In some emergencies, including wildfire, these functions will need to be activated by fire, rather than civil defence, agencies. Additionally, some components of an animal response do not fit well within the welfare function, such as rescue and evacuation, which are time-critical, particularly for wildfires. These components may be better aligned within the operational function of a response.

3.1.3 Animals and wildfires

The 2009 Black Saturday fire provides a vivid example of relevant animal welfare issues. Following this fire, it was estimated that over one million animals died (Bernard et al., 2010), including over 11,000 farm animals (Pawsey, 2015) with a direct cost of livestock losses of more than AUD 18 million (Coll, 2013b). These conservative estimates do not account for the loss of animal genetic gains or traits which may have taken generations to achieve (Pawsey, 2015) or the flow-on effects of lost production (Coll, 2013a). Additionally, the Australian Veterinary Association noted that the high numbers of animals burnt and otherwise injured exceeded the capacity of the local veterinarians (White, 2012).

International research indicates that animal owners are often more concerned about the safety of their animals than their property (Trigg et al., 2015c) or their own wellbeing (White, 2012; Potts & Gadenne, 2014), with 90 per cent indicating that they expect to take their animals with them if they evacuate (Taylor et al., 2015a). Fire response plans need to be based on the potentially problematic human behaviours outlined earlier. Processes are

needed that mitigate the risks created by such behaviours and the subsequent impact on human and animal welfare (Westcott et al., 2017).

While wildfire events that impact communities and their animals are infrequent in New Zealand, the risk is increasing due to the combined effects of changes in climatic conditions, demographics, and the expansion of urban and rural communities into previously undeveloped areas (Jakes, et al., 2010; Langer & McGee, 2017; Nicholas & Hepi, 2017). Interestingly, a recent report on engaging owners of lifestyle blocks in understanding and mitigating wildfire risk in New Zealand, noted that 83 per cent of lifestyle block owners use their land for grazing (Nicholas & Hepi, 2017). This implies there are a large number of animals at the wildland-urban interface. However, the recommendations in the report did not include utilising the human-animal bond as a motivator to influence lifestyle block owner attitudes and practice in relation to wildlife risk (Thompson, 2013; Trigg et al., 2016a). This highlights the need for a culture of wildfire preparedness and innovative public policy to enhance collaboration amongst agencies that experience the human-animal interface in wildfires and communities (Taylor et al., 2015a; Westcott, 2015).

While the morbidity and mortality of animals in wildfires is thought to be significant, this is based on estimates and anecdotal reports, and exact numbers remain undocumented (Pawsey, 2015; Coll, 2013a). In Australia, this is due to the lack of reporting requirements for animal deaths in disaster events (Pawsey, 2015). New Zealand is not dissimilar, with no national database for recording animal mortality in disasters (Coll, 2013a), as well as the lack of a national requirement for animal identification. Numbers are based on anecdotal evidence; therefore, the full economic and psychosocial impact cannot be accurately addressed. However, if countries want to achieve the goals set out by the Sendai Framework for Disaster Risk Reduction 2015 – 2030, a national loss database, which includes animal mortality, should be instituted (UNISDR, 2015).

3.2 Methods

For this study we undertook a wide-ranging and inclusive review of peer-reviewed journal articles, media reports, official documents, expert opinions and observations relevant to the 2017 Port Hills fires. We initially searched Massey University's electronic library resources including the NZ Science, Google Scholar, Web of Science and Scopus databases using the key phrase "Port Hills fires". However, this strategy only yielded two published journal articles which were duplicates. Therefore, to broaden the scope of information considered, an extended search strategy was adopted, using more general searchable resources such as Newztext, Discover, Google and YouTube that cover printed media, television and radio interviews. The time period searched was mid-February 2017 to March 2018. Official documents such as the review of the event by the Australasian Fire and Emergency Service Authorities Council Limited, alongside official Fire and Emergency New Zealand (FENZ) and Christchurch City Council response documents, were also included. Criteria for inclusion were that items were about the 2017 Port Hills fires and referred to animals or provided details about a situation involving animals. The overall search strategy is depicted in Figure 3.1.

Initially, the literature search only revealed one academic article which was duplicated (one in the Web of Science and one in Google Scholar). The search was extended to other search engines which revealed 896 items in total (Discover 65, Google 66, Newztext 690 and Youtube 83).

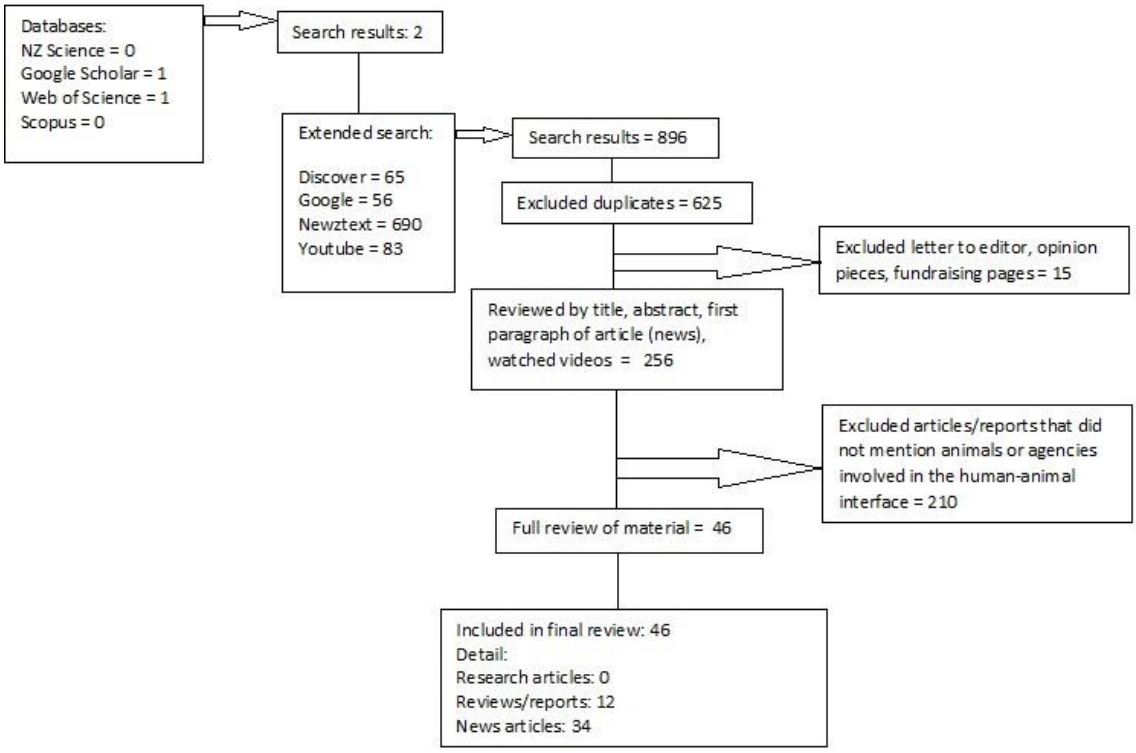

Figure 3.3-1 Flowchart of research strategy

All item titles were reviewed, and duplications were removed. This excluded 625 duplicates, mainly from Newztext news articles; however, it also excluded letters to the editor, fundraising pages and opinion pieces. The articles were further reviewed for the title, abstract or the first paragraph of the news article and all videos were watched through their entirety. A further criterion was instituted to exclude articles that did not mention animals or agencies involved in the human-animal interface. This excluded a further 210 articles. All remaining written articles were fully reviewed. This included 12 reports and 34 news articles.

Based on preliminary results, the research questions were refined to: 1. What type of animals were affected by the event? 2. How were animals, their owners and responders affected by the human-animal interface during the Port Hill fires? and 3. What agencies were involved? A simple coding process was utilised when a recurrence of themes was apparent, as part of a thematic analysis of the animal-related content of all retrieved documents.

3.3 Results and Discussion

The 12 reports and reviews of the event, summarised in Figure 3.1, discussed the management of the response. They also outlined the agencies involved (Table 3.1) and provided recommendations and lessons learned. Recommendations in the reports did not include a reference to animals or animal ownership.

The 34 relevant news articles generally focused on event status updates and individual stories of responders and home owners. These articles described a range of property and animal types impacted by the fire (Table 3.2), including a range of species such as cattle, sheep, horses, dogs, cats and chickens.

Table 3.1 Agencies and organisations involved in the Port Hills response

Agency involved in the response	**Areas of responsibility**
Christchurch City Council	Rural fire animal control civil defence and emergency management
Sewlyn District Council	Rural fire animal control civil defence and emergency management
Department of Conservation New Zealand Fire Service National Rural Fire Authority New Zealand Police New Zealand Defence Force	Rural fire
Society for the Prevention of Cruelty to Animals	Christchurch City Centre
Veterinary profession	South Island Wildlife Hospital
Ministry for Primary Industries	Animal welfare

Thematic analysis was used to identify themes across the retrieved documents to identify repeated patterns of meaning (Braun & Clarke, 2006). The identified themes reflect the issues associated with animals in wildfire events noted earlier in this paper. The key themes, of evacuation, cordons, animal rescue, communication and co-ordination are discussed below.

The Port Hill fires were unique to New Zealand, due to impacting so many communities including the rural-urban interface (McNamara, 2017). This meant that a mixture of farm, lifestyle and urban properties were impacted. These properties contained a variety of animals such as pets and livestock. Wildfires, such as the Port Hill fires, are a complex social problem as they significantly impact livelihoods and are non-routine in nature (Westcott et al., 2017a). Therefore, communities are required to make decisions based on limited experience. Issues relating to international fire response, such as evacuation, cordons, animal rescue, communication and co-ordination, were nonetheless highlighted in the literature and are discussed below.

Table 3.2 Types of properties and animals mentioned

Article type	Property type	Animals mentioned
Response reports	Urban residential lifestyle properties	Pets and livestock in general
News articles	Urban residential lifestyle/ farming properties	Dogs, cats, fish, guinea pigs, birds, livestock (sheep, cattle), horses, alpacas, llamas, donkeys, pigs, chickens
Videos	Urban residential lifestyle properties	Dogs, cats, fish, guinea pigs, birds, livestock (sheep, cattle), horses, alpacas, llamas, donkeys, pigs

3.3.1 Evacuation

Evacuation is noted as being one of the most socially disruptive and stressful impacts of a wildfire (Jakes et al., 2010). This is further compounded by the emotional impact wildfires have on animal owners and first responders when animals are involved. Over 90 percent of owners expect to evacuate with their animals (Taylor et al. 2015a); however, the lack of consideration of animal ownership during an evacuation can lead to public health consequences (Chadwin, 2017; Travers et al., 2017). Additionally, owners may not have access to the resources required, such as appropriate transportation or enough warning to evacuate all their animals. Adequate information to support decision-making for early or pre-

emptive evacuation by animal owners would be beneficial, and was identified as lacking by some stakeholders affected by the Port Hills fire for example:

> *If ... the risk of evacuations had been considered and communicated to the Christchurch Emergency Operation Centre earlier, it would have enabled the centre to inform residents that evacuations may be required. This would have allowed residents to prepare for evacuations, including making arrangements for pets and removing important possessions.* (Christchurch City Council, 2018, p. 10)

Past experience of wildfires can influence perceptions and actions during an event (Trigg et al., 2015a). It follows that the lack of personal experience of wildfires can affect decision-making as reporter John Campbell from Radio New Zealand Checkpoint explained while talking to a resident who was describing their experience of evacuating the family which included an elderly dog with flames lapping at their heels:

> *If you were in Australia, in Victoria, you would understand how fast flames move but I don't think we really comprehend that in New Zealand. That they can move like that, especially with that Nor'wester in Christchurch.* (Campbell, 2017, 3.25 minutes)

Animal owners can be more concerned about the animals in their care than they are about themselves. Often animals are their priority when preparing to evacuate and this fire was no exception. There were countless examples of this occurring as explained by a local farmer:

> *We were more worried about our stock. We moved 800 breeding ewes and 200 lambs to a lower paddock on the farm away from the fire front ... then all we could do was sit in the paddock and watch. By morning 150 ha of prime late summer grazing was gone. We lost over 6km of fence-line, our late summer grazing and shearing and winter shelter are gone.* (Deavoll, 2017, 8.11 minutes)

Due to fire conditions, such as the smell of smoke, sounds of sirens and flashing lights from emergency vehicles, a normally well-behaved animal can become difficult to handle. This can increase the logistical difficulty and time needed to evacuate. This issue was highlighted in a recorded call to ConCam (Fire and Emergency New Zealand's communication centre) during the Port Hill fire, when a 111-caller who explained that they had 20 horses and were

concerned the fire front was getting close. They were looking for guidance on whether they should evacuate their 20 horses. The caller was told that if they felt unsafe, they should evacuate, and was then told that the fire front was not that close, and they would be fine (FENZ, 2017a).

This report not only highlights a conflict about the information communicated to those affected by the wildfire. It also highlights a lack of awareness among responders that the logistics to evacuate 20 horses in a high-stress environment would take more than several hours. Less than 3-hours' notice would not be adequate to facilitate the evacuation of such a high number of horses. The Australasian Fire and Emergency Service Authorities Council (AFAC) (2017) fire review further highlighted inconsistencies with respect to the assistance of members of the public seeking to plan or execute an evacuation:

> *Residents were reliant on face-to-face contact with emergency services for information to make decisions. Some residents who felt threatened by the fire on the first night (Monday) began preparations for evacuation including their animals in case an evacuation was ordered. But the first morning after the fire commenced public communication indicated the fire was contained. The visible threat appeared to be less, so many residents unpacked their vehicles thinking the worst was over and carried on with their normal daily activities such going to work and leaving their animals at home. Many of the residents who were displaced feel they were given little notice to evacuate.* (AFAC, 2017, p.8).

Therefore, the reports collected for the current study provide evidence that relying on the community who have little to no experience of wildfires, little ability to gauge the seriousness of the threat and need to have reasonable trigger points to evacuate may not be adequate.

Fire agencies can promote premature evacuation of large animals on extreme fire risk days (Trigg et al., 2015c; Thompson et al., 2015; Taylor et al., 2015a; Westcott et al., 2015) to reduce the risk of emotion-based decision-making (Westcott et al., 2017a). Likewise, pre-identification of locations for large animal shelters, veterinary triage centres and places for

owners to be reunited with their animals could encourage animal owners to evacuate. When planning staging areas for animal evacuation and rescue, the types and numbers of vehicles required to transport large animals should be considered to ensure continued emergency vehicle access (Pawsey, 2015; Roger et al., 2015; Westcott et al., 2017a).

Emergency management planners need to remember that it is not only owners who encounter animals in wildfires and that front-line responders are significantly impacted by the presence of animals on fire grounds (Chadwin, 2017; Westcott et al., 2017a). Unfolding disasters such as the Port Hills fire mean that responders are operating within a very complex environment where animals are usually highly stressed, causing a public safety issue due to the increased risk of injuries inflicted by animals, as well as the potential of psychological distress during and after the event (Chadwin, 2017). This includes the fire fighters who have encountered animals. A couple of examples of representative reports from responders to the Port Hills fire evidence the challenges encountered:

> *One dog was a little Foxy and the other a brindle or Staffy. We caught the dog, chucked it in the car and one of the crew drove it through the blanket of smoke down to the bottom of the hill. We were worried the dog might have a go at him in the car but it was good, I think the dog knew we were trying to help it.* (Station Officer, cited in Anderson, 2017, para 14)

> *We couldn't get to the house and just had to hope the people had gone. We were opening up gates and trying to get stock (cattle and a group of horses) out of the way of the fire. I don't know how they fared.* (Station Officer, cited in Anderson, 2017, para 16).

Early activation of agencies and teams with requisite skills and experience to handle stressed animals and to capably assist with animal evacuations should be instituted. Large animals such as horses require a specific skill set when in a stressed environment such as a wildfire. Stressed large animals, no matter how well they are handled, have been likened to a grenade with the pin pulled and someone poking at it with a stick (Squance, 2015). They are

unpredictable, very powerful and have the potential to cause fatal injuries to responders, animal owners and the animal itself.

The use of experienced animal rescue teams would reduce the risks of injuries associated with inexperienced people handling stressed and scared animals. In another situation, a firefighter who was also an experienced horse woman was tasked with assisting to rescue eight horses, a dog and sheep trapped behind the cordons. She stated, “Here I was, thinking I could do animal control work, but I ended up having a cry – I just couldn’t believe that the horse had been left behind. It really got to me.” (Thompson, 2017, para 15).

The firefighter had no way of knowing that the owners were away from the property when cordons were put in place and were unable to evacuate the horses. They were distressed because they did not know if their horses were safe and they did not know who to contact to request assistance to rescue the horses. This example highlights the importance of having a registration process that enables animal owners to request assistance for evacuation and reunification with their animals (Pawsey, 2015; Taylor et al., 2015a; Westcott et al., 2017a).

3.3.2 Cordons

Cordons are frequently established as part of the response management process and were employed in this event. However, they presented significant challenges for animal owners. For example, Maja Burry reported that hundreds of people were evacuating their homes, moving livestock and taking pets with them while:

> *Other people standing at the cordons saying they have horses in paddocks nearby that they want to evacuate, but aren’t allowed. But there have been a number of people leading horses out past the cordon to get to safer ground.* (Radio New Zealand, 2017, 29.30 minutes)

In some instances, during the Port Hill fire event, cordons were placed during the day when some householders were away from their properties. In these cases, animals were left behind, posing risks to the safety of the animals, emergency responders and to the

psychological wellbeing of the owners and responders. People's emotions can supersede self-preservation and innate human drivers can cause people to make emotional-based decisions about animals (Westcott et al., 2017a). A resident waiting in her car at the cordon reported that:

> *I am coming home from work and I just can't get home. They are not letting you go up (referring to past the cordons) to get your animals ... I have a cat and dog. I'm really worried.* (Radio New Zealand, 2017, 0.18 minutes)

Additionally, international research and experience describe how people will break cordons to gain access to their animals. An example of this is a farmer who broke through a cordon to check on stock and the property, who stated that, "Although the area was cordoned off, on Friday he and his farm worker went 'up the hill to have a look'. It was devastating." (Deavoll, 2017, 8.11 minutes)

The importance of addressing animal welfare needed to end suffering is a time-critical activity following a wildfire (Pawsey, 2015). Veterinary response teams should be given access through cordons to assess animals who have been injured and require immediate medical attention or euthanasia (Madigan & Dacre, 2009). This can be achieved by directly referencing animals in cordon management protocols as a key consideration when identifying early access needs (Pawsey, 2015; Rogers et al., 2015).

The current overview of reports and literature following the Port Hills fire supports the previous conclusion, that wildfire response structures should include the consideration of animals to improve animal welfare, human safety and resilience outcomes. The same conclusion was arrived to by the State of Victoria (2015). This must be integrated into the structure of the response and requires effective co-ordination, leadership and communication. As identified in reports regarding the fire, if an animal response is not visible, people will risk their lives to save animals and rogue teams unconnected to the overall response may form and break cordons. This behaviour presents several challenges for

firefighting agencies in managing animal owners as well as protecting public safety. Therefore, the following recommendations are offered to start to address human behaviours and reduce psychological impacts both during the event and during psychosocial recovery:

1) Consider animals across all phases of emergency management in relation to wildfires, including the expectations of animal owners and the public health consequences of not including them;
2) Develop a programme which will enhance emergency responders' understanding of the emotional drivers of animal owners during an emergency to better support their planning and preparation to develop a culture of organisational support and capacities to deliver an animal welfare response;
3) Develop a national animal loss database that includes morbidity and mortality of all animals to further demonstrate the operational need to consider animals in decision-making for wildfires involving animals;
4) Include animal ownership in public education campaigns;
5) Utilise the human-animal bond as a motivator for hazard mitigation, emergency preparedness and response in wildfires;
6) Consider the logistics of evacuating animals, including production animals during the decision-making of evacuations;
7) Explore ways to develop an animal inclusive wildfire response strategy.

3.4 Conclusion

The emotional attachment between people and animals is complex and has the potential to significantly impact the outcomes of a wildfire response. In the wake of the Port Hill fire, a number of reports provide evidence supporting the development of operational action plans that focus on the community at the centre and safety as a priority (FENZ, 2018). A better understanding of the potential impact on animals and their owners in wildfire emergencies and improved multiagency collaboration will assist in achieving these objectives. Animals must be included in wildfire awareness and planning, not only to prevent animal suffering but to improve the success of the broader emergency management goals of human and community safety and resilience (Pawsey, 2015). Plans must balance the expectations of communities towards animal welfare and the need to protect human and animal life.

Human and animal welfare are not mutually exclusive and should not be addressed in isolation (White, 2012). Shifting the focus from keeping pets with people to keeping people with their animals acknowledges the importance of the human-animal bond and mitigates the risk behaviour of animal owners. The consequences of inaction outweigh the challenges of integrating human wellbeing and animal welfare in all phases of wildfire response frameworks. This conclusion is core to recommendations made at the end of the current Results and Discussion section, to consider animals across all phases of wildfire management; enhance emergency responders' understandings of animal owners' emotional drivers; develop a national animal loss database; include animal ownership in relevant public education; leverage the human-animal bond as a motivator for mitigation and emergency preparedness; more carefully consider animal evacuation logistics; and develop a relevant wildfire response strategy.

3.5 Research limitations

In order to get a better understanding of the impact of the 2017 Port Hills fires, with respect to animal welfare and response operations, relevant research needs to encompass as many information sources as possible. However, limitations are that these articles in the literature and the media may have a bias on either side of the reporting and do not provide for a more objectively controlled study of the factors involved. The current lack of central reporting within New Zealand also prevents access to another independent source of information. Likewise, a potentially large body of research literature on the Port Hills fires was still in progress at the time of our literature review. Many documents will have been excluded by starting this review within twelve months of the event.

These and other issues mean that the current review does not purport to be an in-depth study of the issues raised. One additional gap in the current research, that was not highlighted in this analysis, is the lack of interagency co-ordination with respect to animal welfare in emergency situations. These issues will be explored in greater detail in forthcoming research such as a survey, focus groups and semi-structured interviews, using both qualitative and quantitative methods. The aim of the survey is to understand Port Hills animal owners' risk perception of wildfires before the event, preparedness measures, what resources they have to evacuate animals, the actions they took during the event, and how they and their animals may have been affected. Semi-structured interviews will be conducted with agencies who were affected by the human-animal interface, to better understand what they believe went well, what could have been done better and to identify gaps.

4 Collaboration in animal welfare emergency management: Case studies of wildfire and flooding events in Aotearoa New Zealand [2nd Manuscript]

Chapter narrative

The purpose of this manuscript was to investigate the second research question – *What are the key issues impacting effective multiagency collaboration in AWEM?* A case study approach of two events, the 2017 Port Hill fires and 2017 Eastern Bay of Plenty floods, was used. Additionally, reflective of AR being applied, responsive and cyclic in nature, the gaps identified during the debriefing process for the Port Hill fire response required solutions to solve the problems. Therefore, as an evidence-based AWEM practitioner and using the developing step of AR, I sought to explore the scholarly literature, cross-sector ideas and strategies to develop tangible solutions to address the problems identified following the Port Hill fire response. These solutions were offered and tested in practice during the Eastern Bay of Plenty flood response. Furthermore, in line with AR continuous monitoring, evaluation and revision, this manuscript sought to iteratively reflect on the solutions offered and share the results with the emergency management sector.

Manuscript preparation and publication

I prepared the manuscript as the primary author with my supervisors, Dr MacDonald, Dr Stewart, Dr Prasanna and Professor Johnston, as co-authors. I conducted the data collection and analysis and drafted the initial manuscript. Dr MacDonald provided guidance on the TA. All co-authors offered feedback on the content and structure of the manuscript. I prepared the final manuscript for submission to the journal. The manuscript was submitted to the International Journal of Disaster Risk Reduction on the 28th of June 2021. The manuscript is under review. Statement of Contribution Appendix 8

Abstract

Animal welfare emergency management (AWEM) is a vital component of emergency management systems and involves a wide range of professionals and other stakeholders. The aim of this study is to explore the factors which impact on how well these agencies collaborate during an emergency event.

Data was collected via analysis of documents, and 47 responders who had been involved in a flood and/or wild fire event involving animal welfare participated in focus groups and/or semi-structured interviews. Focus group discussions were recorded, and summaries were transcribed into a focus group report. Interviews were conducted in person or by telephone or video conferencing and were audio-recorded and transcribed. Data gathered from the documents, focus groups and interviews was analysed using inductive and deductive thematic analysis.

We identify four interrelated themes describing the key factors influencing interagency collaboration during emergency response: 1) emergency management context, 2) behaviour in emergencies, 3) the knowledge base of responders and 4) connection. The findings suggest that connections (including human-animal-environment interdependencies, transdisciplinary approach, and networks, relationships and trust) are key to improving collaboration.

Achieving effective collaboration among the many stakeholders involved in AWEM requires a shift towards a transdisciplinary approach that understands and incorporates the human-animal-environment interface.

Key words: animals; collaboration; wildfire; flood; animal welfare emergency management

4.1 Introduction

Recent disasters have highlighted how the bonds between people and animals influence decision-making in times of crisis, with many placing the safety of their animals above their own wellbeing (Heath et al., 2001; Hunt et al., 2012; Irvine, 2009). Increasingly, communities expect animals to be included in emergency management arrangements (Westcott et al., 2017a). This is especially so in countries with a significant agriculture sector where the protection of animals in disasters is linked to food security and the protection of livelihoods, biodiversity, human wellbeing and communities (Dalla Villa et al., 2020; Filkov et al., 2020; Nusbaum et al., 2007; Vroegindewey, 2014).

In 2016, the World Organisation for Animal Health (OIE) adopted Guidelines on Disaster Management and Risk Reduction in relation to animal health and welfare and veterinary public health (OIE, 2016). The guidelines aim to strengthen the capacity of veterinary services to protect animal health and welfare, safeguard human and environmental health, and help restore social and economic conditions in the aftermath of a disaster (Dalla Villa et al., 2019; Garde et al., 2013).

The guidelines highlight the interdependence of the human, animal and environmental health impacts in emergencies and reflect the diversity of stakeholders concerned with animals in emergencies (Onukem, 2016; Taylor et al., 2015c). Growing interest and activity in AWEM across a range of organisations suggests that it is increasingly recognised as a vital component of emergency management systems (Taylor et al., 2015c).

The New Zealand National Civil Defence Emergency Management Plan (CDEM Plan) published in 2015 sets out key roles and responsibilities relating to eight welfare subfunctions, including animal welfare, across all phases of emergency management (MCDEM, 2015a). The Ministry for Primary Industries (MPI) is designated as the agency responsible for all animals in emergencies, including companion and production animals as

well as animals in zoos, circuses, research, testing and teaching facilities, and wildlife. Appointing a lead agency exclusively for animals acknowledges that disasters have an extraordinary impact on animal welfare (Vroegindewey, 2014) and that there is a strong link between animal welfare and human wellbeing (Pinillos et al., 2016).

Despite a plethora of plans, guidelines and legislation for AWEM (Taylor et al., 2015c), there is limited research in this area. What has been published has focused on public safety implications, such as risk behaviours of animal owners (Heath & Linnabary, 2015; Onukem, 2016; Thompson et al., 2014; Trigg et al., 2017), animal owner expectations of the inclusion of animals in emergency management arrangements (McCarthy & Taylor, 2018; Onukem, 2016; Taylor et al., 2017), presence of animals as a risk factor for first responders (Travers et al., 2017), interactions between animal owners and first responders (Taylor et al., 2015; Travers et al., 2021; Westcott et al., 2017a), the ripple effect of decisions made during responses and recovery on animal welfare (Westcott et al., 2017a) and roles of veterinary professionals in disasters (Dalla Villa et al., 2019; Garde et al., 2013). What is less understood are the factors that impact on collaboration between stakeholders involved in the human-animal interface in emergencies (Ansell & Boin, 2019; Squance et al., 2018; Taylor et al., 2015c). Collaboration and an understanding of roles and responsibilities between agencies is fundamental for managing the integration and coordination of systems during all phases of a disaster (Becker et al., 2018; Curnin et al., 2015a; Howes et al., 2015; Janssen et al., 2010).

This paper addresses this gap by examining key issues and challenges reported by emergency responders from a range of organisations in the context of two separate events (flood and wildfire) that tested the New Zealand AWEM system. The focus is on the factors which impact the collaboration between a wide range of emergency responders and other stakeholders.

4.2 Methods

4.2.1 Case study selection

A wildfire (the 2017 Port Hill fires) and an extensive flood (the 2017 Eastern Bay of Plenty flood) were selected as case studies for this research because: 1) they had similar timing and duration; 2) animal impacts occurred in both; 3) they were a significant geographical distance apart, thus there was a low likelihood of emergency responders deploying to both; 4) the events had different lead agencies and 5) the principal researcher (HS) had first-hand experience in both responses.

4.2.1.1 2017 Port Hill fires – Canterbury

In February 2017 devastating fires burned over 1,600 hectares of land on the Port Hills, adjacent to Christchurch. During the event, a helicopter pilot died, nine homes were destroyed and at least 1,400 residents were evacuated (Langer et al., 2018; Squance et al., 2018). The fires spread through the rural-urban interface with many resident domestic and production animals, including horses, goats, pigs, cattle, deer, alpacas and poultry. While anecdotal evidence suggests that animals died in the fires, the scale of loss is unknown because New Zealand does not have a national database to capture these statistics (Squance et al., 2018).

At the time of the Port Hills fires, the legislative responsibility for the management of fires in rural areas sat with each respective fire authority (AFAC, 2017). The principal agencies involved with the fires were the New Zealand Fire Service, the National Rural Fire Authority, the Selwyn District Council, the Department of Conservation, the Christchurch City Council and the New Zealand Defence Force (AFAC, 2017).

4.2.1.2 2017 Eastern Bay of Plenty flood

In April 2017 heavy rainfall generated by Ex-Tropical Cyclone Debbie resulted in a 1 in 500 year event with extensive flooding throughout the Bay of Plenty region. On the morning of

the 6th April, the stop bank protecting the town of Edgecumbe from the Rangitāiki River breached causing widespread flooding, property damage and threat to life. Residents had minutes to escape from their homes and a state of emergency was declared, allowing for the mandatory evacuation of 1,600 residents from 580 properties.

In the early stages of the response, the Whakatane District Council CDEM team took the lead with the support of the Emergency Management Bay of Plenty Group who became the sole lead once the extent of the damage was realised and a regional response was activated.

4.2.2 Data collection / participant recruitment

The research used qualitative methods including document analysis, focus groups and semi-structured interviews for data collection. Situation reports, debrief documents and media reports from both events were also reviewed and analysed. This type of document analysis has been used in previous studies to contextualise the effectiveness of existing policy-making and implementation of processes to inform recommendations (Howes et al., 2015; Termeer et al., 2011).

Two focus groups and 13 semi-structured interviews were conducted using a standard debrief format incorporating discussion and analysis of the experience, and evaluation of lessons learned through a consensus-based synthesis in a group environment (Gardner, 2013; Raemer et al., 2011) (Appendix 1). Typically used after an emergency, the process asks participants to explore what worked well, what could be improved and to identify gaps (Kitzinger, 1994; MacKinnon & Gough, 2014). This was considered the most appropriate method for data collection because of the participants' familiarity with the process in their professional roles.

Prospective participants were identified through a consultative process with the lead and support agencies for each event (Fire and Emergency New Zealand (FENZ) for the fires and Emergency Management Bay of Plenty (EMBoP) and the Ministry for Primary Industries (MPI)

for the flood). The lead agencies identified animal welfare agencies and primary sector groups who were also involved in animal response during emergencies. Through discussion, this was expanded to include emergency services, human service organisations, health services, government, non-government organisations, public and private sector organisations, and other stakeholders identified as also having encountered the human-animal interface during the wildfire event (Squance et al., 2018).

The lead and support agencies invited prospective participants to the focus groups. The emails included project information, ethics approval, consent forms and contact details of the principal researcher. Reminders were sent two weeks prior to the focus groups. Individual semi-structured interviews were also offered for those who were unable to attend the focus group and/or felt more comfortable with this option.

Focus groups were arranged and hosted in collaboration with the lead agencies from each event (MPI and BoP CDEM for the flood; FENZ for fires). Participants were given an information sheet (Appendix 2) and signed a consent form (Appendix 4), either before the session or at the time of meeting the researcher. The focus groups ran for between 120 and 180 minutes. Discussions were audio-recorded and key themes documented. A report with data collated from the focus group was sent to participants for review to ensure accuracy. Resulting edits were made by HS prior to data analysis.

Participants who agreed to take part in the semi-structured interviews were provided with written information (Appendix 2) and asked to sign a consent form (Appendix 4). The interviews were conducted by HS at a mutually agreed date, time and venue. The interview was undertaken in person or by telephone or video conferencing, as chosen by the participant. An interview schedule was developed (Appendix 1) based on the debrief format from the focus groups with flexibility in the questions to allow for differences in the nature

of the events and for participants to elaborate on or introduce topics or issues not otherwise covered.

All interviews were audio-recorded, transcribed verbatim and checked against the original recordings for accuracy. Interviews lasted between 30 to 45 minutes and generated transcripts of between 3,500 and 11,000 words. Participants were asked to check the transcripts for accuracy with any edits made by HS before data analysis. Participants signed an authority to release transcript form after reviewing the transcripts (Appendix 4).

4.2.3 Data analysis

Transcripts were uploaded into and analysed in Dedoose, a web-based data management application (https://www.dedoose.com) which supports qualitative data analysis.

Data analysis was conducted with the aim of finding answers to the specific research question – *What are the key issues impacting effective multiagency collaboration in animal welfare emergency management?*

Data were analysed using inductive thematic analysis incorporating data familiarisation, data coding, theme development and revision through an iterative coding approach (Braun & Clarke, 2006). This flexible approach can provide a rich and detailed report of the patterns within data (Braun & Clarke, 2014; Braun & Clarke, 2006).

The first round of analysis, conducted by HS, yielded 154 codes. These were refined into 17 codes which through a process of discussion and consensus with CM, and subsequently grouped into four primary themes and 13 subthemes.

4.3 Results

A combined total of 47 individuals participated in semi-structured interviews (n = 13) and focus groups (n = 34). The participants who had responded to the Port Hill fires (PHF) and/or Eastern Bay of Plenty (EBoP) flood represented 19 different national, regional and local

organisations including Civil Defence Emergency Management (CDEM) groups, emergency services, government organisations, animal charities including animal response teams, veterinary professionals, agriculture sector organisations and non-government organisations (NGOs) (Table 4.1). Most participants (96%, n = 45) experienced only one of the events, with two of them (4%) being involved in both.

It is not surprising that almost half of the participants (47%) were from organisations with animals as their primary focus, and therefore likely to share goals and a sense of responsibility for supporting animals in emergencies. However, the substantial number of participants from emergency management and emergency service organisations reflects the significance of animals in emergencies.

Table 4.1 Number of participants by organization type

Organization type	**N**	**%**
Rural sector groups	8	17
Central Government Ministries and Departments	7	15
Animal charities and response teams	7	15
Veterinary professionals	7	15
Fire services and police	6	13
Regional and local CDEM	5	11
Local government	3	6
District Health Boards	2	4
Other NGOs	2	4
Total	47	100

From the interview and focus group data, four interdependent high-level themes were identified that reflected key issues impacting effective multiagency collaboration in AWEM.

The following discussion elaborates on the four themes and their corresponding subthemes (see figure 4.1).

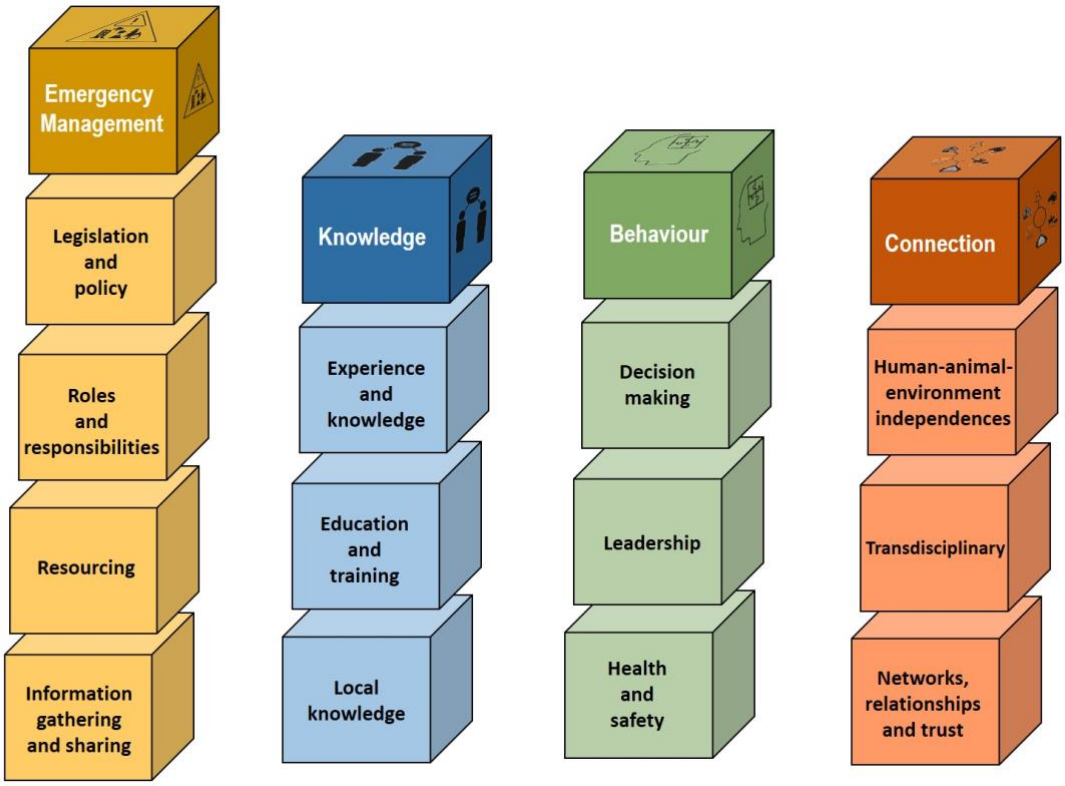

Figure 4-1 Themes and subthemes arising from data analysis

4.3.1 Emergency Management Context

The emergency management context encompasses the overall emergency management structure including emergency management policy, procedures and practice. Related to the higher-level theme – *emergency management context* – several interdependent sub-themes on strategic, tactical and operational issues were identified. These were legislation and policy, roles and responsibilities, resourcing, and information gathering and sharing.

4.3.1.1 Legislation and policy

Legislation and policy issues featured strongly, including the need for statutory plans to reflect new legislation with the inclusion of animals in emergencies, and gaps and weaknesses in the current emergency management legislation were identified. In particular,

there were significant issues relating to the notification, activation and escalation of animal welfare responses by lead agencies.

At the time of the events there were no regional AWEM plans and in the PHF the regional animal welfare emergency management coordinator was not activated. However, the Selwyn District Council had local informal arrangements due to pre-existing relationships amongst CDEM, animal control and the primary rural fire officer (PRFO) as they knew they had to have arrangements in place to address the impact on animals during wildfire events. The local arrangements were based on experience with wildfires in the area and personnel co-located at the council building. Christchurch City Council did not have pre-existing arrangements with CDEM, animal control or the PRFO to address animal welfare needs for wildfire events.

The PHF focus group noted that in the absence of any official animal response activation, an ad-hoc approach emerged with limited co-ordination and collaboration resulting in a disconnect and confusion for animal agencies. This in turn led to communication difficulties and a delay in mobilising essential resources. The group identified small fires as a particular problem for animal welfare because, even though wildfires can escalate quickly and need an immediate animal welfare response, this is unlikely to happen. In New Zealand during a wildfire event the animal welfare function is only officially activated when CDEM is activated and usually this only occurs in moderate to large fires involving the evacuation of many people. It is not based on the number of animals requiring evacuation or the resources needed to assist with animal evacuations. Furthermore, participants noted that there were a lot more animals on rural properties than people; however, the resources required and what is available through animal support agencies is disproportionate to the significant resources available to support people.

> *"The biggest confusion at that time was we didn't know in terms of emergency response who was leading the response". PHF3*

In the EBoP event, animal organisations self-deployed prior to a delayed official coordinated animal welfare response activated by the lead agency. Due to the time critical nature of components of AWEM, such as evacuation and rescue, the time delay caused issues such as lack of coordination and delayed deployment of resources in the early stages of the response.

Due to the rapid nature of the event and time of day (many residents had already left for work before evacuation orders were in place), only a small number of companion animals were evacuated and most evacuees were instructed to leave their animals behind. Following the official animal response activation, a large number of both companion and production animals were rescued and relocated.

> *"The council, the police, no-one was interested at all. I got told that the fire service was dealing with it and nobody else was allowed in there. … They told me to stay out of it. Then I started getting the public coming in crying, saying that they've been put in boats, taken off from their houses, actively told that they were not able to take their pets on those vehicles that were evacuating them and had to leave their animals on their doorstep. The last thing they saw was their cats and dogs floating away." EBoP5*

> *"During the animal rescue operation, there were 250 requests for assistance from animal owners with approximately 1,400 companion animals rescued from 230 properties. More than 1,000 of the animals rescued were aviary birds, with the rest made up of over 100 cats, 50 dogs, rabbits, guinea pigs, fish, turtles, ducks, chickens, cattle, sheep, pigs, goats and an emu." EBoP9*

> *"Approximately 5,500 cattle, mainly dairy cattle, were relocated from farms in the eastern Bay of Plenty, which were inundated by flood waters. Some animals were evacuated more than once due to the delay in flooding further down the water ways and cyclone Cook which caused infrastructure damage a week after ex-cyclone Debbie. Livestock evacuations were coordinated by a group consisting of various primary sector organisations from a local farmer's house." EBoP2*

Legislative and policy gaps such as the lack of animal inclusive response plans and procedures, for example, animals not directly referenced in evacuation and cordon access plans were identified as barriers to the AWEM response. Furthermore, uncertainty about the

legalities of forceful entry of properties to rescue animals was noted as an issue which requires further investigation and clarity.

4.3.1.2 Roles and responsibilities

The interview and focus group data revealed that a lack of clarity about roles and responsibilities, and knowledge about the capacity and capability within agencies for delivering animal welfare services, has created issues with trust and communication between organisations. Such issues impacted negatively on the timeliness and effectiveness of decision-making during the response.

> *"I think agencies need to get together whether they like it or not and know exactly what each other's powers and roles and responsibilities are, have their network sorted and know who to contact. Nobody knew what their powers were or that there were animal welfare roles which created tension with the army, the fire department, the police and what we were doing." EBoP6*

There was a strong belief that it is essential to have the right people in the right roles, especially within the emergency operation centre (EOC). The presence of the regional animal welfare coordinator in the EBoP EOC was believed to have assisted with better connection to the overall response, offered opportunities to advocate for the inclusion of animals in decision-making, articulated the consequences of decision-making on animal welfare and promoted resource sharing.

> *"The problem with EOCs is that often it's not the right people in there, they don't have the specialist knowledge needed for an animal response and I don't think people appreciate how complex it is." PHF3*

4.3.1.3 Resourcing

Successful policy implementation and emergency response is dependent upon the allocation of sufficient and appropriate resources, including financial, human, technological tools, supplies and equipment. Resourcing was identified as a key issue impacting the effectiveness of the animal response and recovery.

The reliance on the goodwill of organisations, including private businesses, to release people to work in the response and have the capacity and capability to do their roles presented significant challenges. It was also noted that the community made a significant contribution to the response efforts through offers of support, such as the use of horse floats (trailer) and other vehicles to assist with evacuations, a place to stay with pets, land made available to contain larger animals and financial donations.

> *"We found that actually separating people and animals isn't productive and it is resource intensive. Looking after them at the pound or SPCA shelter is a short-term solution but then you've got the question around who pays because it isn't included in our business-as-usual operational budget. That's the big worry around animal welfare and emergencies, who's paying." PHF1*

> *"We didn't have the capacity and we were probably stretched a little thin to be honest to be able to be helping with the operations in terms of clearing houses rather than specific rescue requests. I would've liked to have been able to offer more support to the veterinary clinics particularly to those that were flood affected." EBoP9*

> *"In the recovery phase after six months staff and volunteers including our regular animal foster carers got fatigued, angry and didn't want to be involved with it any more. They wanted to get back to business as usual or worse they no longer wanted to be a foster carer." EBoP7*

The EBoP focus group discussed the risks for private businesses offering to assist animal owners being unable to recuperate costs unless they have a direct arrangement with the animal owner. For example, an animal boarding facility that offered free sheltering for displaced pets during the flood event suffered significant financial losses. The facility unintentionally accepted animals contaminated with an infectious disease due to the animals being in flood waters. The disease spread throughout the facility, forcing its closure until the infection was under control. The facility's inability to recover costs or loss of income highlights the risks associated with involvement in emergency response and a gap in funding arrangements as there is no cost recovery for animal sheltering.

The flood event also provided an example of how multiagency collaboration, in the form of sharing technological resources, can enhance the effectiveness of the animal response.

> *"It was probably day five or six when we came across a team who said they saw a cat down [name] road. I could see the flooding looked all very still and the road markers showed that it wasn't too high but I couldn't see around the corner where the cat was located if the water was flowing or got deeper. A fire team nearby offered to put their drone over to assess the road. It showed it wasn't driveable. We don't have this type of equipment so it was fantastic to be able to share resources." EBoP4*

Participants discussed the misalignment of roles and responsibilities of animal support organisations with the available resources to support the animal welfare function and the vulnerabilities these place on their organisations. They felt they were expected to do a lot without additional government support, the likes of which is available to non-animal organisations, such as access to financial, human, technological tools, supplies and equipment resources. Furthermore, they noted that the heavy reliance on volunteers to deliver animal welfare support services creates significant vulnerability in the AWEM response framework.

4.3.1.4 Information gathering and sharing

Information gathering and sharing were identified as key challenges impacting effective collaboration in animal welfare response and recovery. The information flow and lines of communication to and from the "coal face", the EOC, the incident management team and the animal welfare response was noted as being slow, convoluted or non-existent. This created a disconnect between the animal response with the wider response.

> *"We were required but it didn't get through to us. When we did get up there the fire commanders said where have you been, we've been calling you for four days. We never got those calls or messages." PHF1*

> *"Reflecting on some of the animal welfare response there was quite a lot of disconnect. There were lots of people going off doing really cool work but that wasn't being coordinated or communicated properly or coming through to the EOC." EBoP1*

The integration of the Urban Search and Rescue (USAR) liaison from the fire service into the animal rescue team during the EBoP flood was noted as a valuable communication conduit which resulted in animal responders having better access to information and technological resources and improved situational awareness. Conversely, during the PHF, the presence of animal responders improved communication by gathering and sharing valuable information with other agencies.

> *"When we finally got on the non-active fire ground information started flowing both ways. I could talk to fire command about what was actually up there. Rather than the rumour, I could explain to them what was happening in the area as far as hot spots which was valuable to them. For example, we were sent into an area for a couple of cows after the fire front had gone through and fire fighters had moved on to another active fire area. The cows were in an area which had hot spots and trees that were smouldering so I told them about that. Fire command got a better idea of what was going on up on the fire ground after it was out because we were there addressing animal needs and able to collect intel at the same time." PHF1*

> *"Having [name] from fire service embedded in the animal rescue operation was quite integral in terms of the information channels and also in terms of working with the overall incident command point in the flood zone. He was effectively working as a liaison for animal response in terms of the flood operations with fire, police and CDEM. He gave us a lot of time critical information that we were struggling to get on our own." EBoP9*

The lack of effective and timely public communication about the animal response was noted as a significant issue during both events. In the early stages of the responses there was little public communication about animals behind the cordons. As a result, people felt that animals were being ignored and not part of the response. Animal owners were frustrated with the lack of communication from agencies once they had requested assistance to rescue their animals or gain access to their animals left on their property. The belief that agencies were not being transparent and/or that they failed to grasp the full extent of the needs of animal owners, led some people to engage in aggressive or risky behaviours.

Once animal inclusive public communication and engagement was included in the response plans the public felt better informed and the sense of frustration changed to a more positive perspective. One participant reflected on the change in the atmosphere at a community meeting from high tension to a little more relaxed once the animal agencies spoke about the animal rescue operations in progress. Animal responders felt the animal rescue operations was seen as a positive component of the overall response by the community.

> *"Every day I kept giving them [media] a couple of stories … it was a good opportunity to use them in a positive way to actually get out to the community what they needed to hear. We've got sixteen on the ground, we're working 12 hours a day, we're getting to the animals, we're prioritising them. That's what they wanted to hear. A lot of the aggression I felt from the owners was that they didn't know what was going on." EBoP6*

4.3.2 Behaviour in Emergencies

Most participants were more concerned about issues with the behaviours and actions of organisations and individuals than other components of the events. Poor behaviour of individuals and organisations negatively impacted the response, created a risk to both responders and the community, and had implications beyond the event. The issues have been grouped into three sub-themes: decision-making, leadership, and health and safety.

4.3.2.1 Decision-making

There was a strong belief among participants that an uncompromising, rule-driven approach to decision-making within government organisations negatively impacts AWEM. Decision-making around the establishment of roadblocks/cordons was cited as an example where an inflexible single agency does not consider multilateral views.

> *"When these decisions are made about cordons, they need to be more multilateral decisions rather than one organisation making that call. It's too easy to say right we stop in this area here because it is convenient for them. But we are faced with oh hang on a minute now we've got a thousand cows behind a cordon that need milking twice a day, you know it's not easy to move a thousand cows." PHF2*

In contrast, collaborative decision-making which considered the connections between people and animals was seen in the EBoP flood response.

> *"We started thinking about reuniting people with their animals whether they were alive or had died. We wanted to put something in place to make sure that when people were reunited with their pet it wasn't as traumatic as it could be. It was a good exercise because I've never done that before. We talked about it with various agencies, brainstormed and I think we got really good robust planning in place. We organised a walk-in chiller to store the bodies and had teams cleaning the bodies as some were unrecognisable due to being covered in silt." EBoP1*

4.3.2.2 Leadership

Focus group and interview participants cited leadership as an important factor having a major influence on effective multiagency collaboration and the overall animal response. Criticism of 'poor' leadership included a lack of clear direction and visibility from lead agencies and questions about the legality of 'self-appointed' leaders. The absence of effective lead agency direction resulted in a failure to establish an appropriate command structure in a timely manner, a lack of understanding about different agencies' roles and purpose, and a disconnect between the animal and overall response.

Many participants reported how the behaviour of some people in leadership roles caused tension between agencies and negatively impacted the effectiveness of the response.

> *"The chain of command changed after a few days and the rescue operations went much better. The first one made some questionable decisions which were time consuming and caused a lot of tension. The change in leadership style helped with efficiency and collaboration amongst other agencies." EBoP4*

4.3.2.3 Health and safety

Health and safety risks for responders and the community are inherent in emergency response. The primary issues identified by participants include fatigue, risky behaviour of responders and animal owners, and infectious disease. One of the most significant risks identified for responders was fatigue which was related to the duration of the response and

exacerbated by limited resources and poor collaboration. In contrast, participants believed that the inclusion of the fire service liaison and safety officer in the animal rescue team during the flood response improved the safety of animal responders because there was someone whose primary focus was on responder health and safety rather than animal rescue.

> *"We had been on the go for over 20 hours and there were no operational periods set out. I got bitten the first night, my first dog bite ever, for a multitude of reasons but to be honest I was just so tired, my reactions were slow and I just didn't make the right decisions. That was one of those times that was really traumatic for me." EBoP4*

A number of factors associated with animal rescue operations, such as delayed response activation, long rescue duration, limited resources and poor or conflicting public communications resulted in animal owners becoming angry about the time taken to be reunited with their animals. In frustration, many put themselves at significant risk to gain access to their animals.

> *"They [animal owners] were going in under the cover of darkness, going through flood waters to their houses trying to get their pets back." EBoP5*

A notable risk identified by the participants in flooding events is the contamination from waterborne diseases, zoonotic diseases and chemicals. Responders describe the condition of the flood waters they were in as extremely contaminated with petrochemicals, raw sewage and rodents. A protocol for decontaminating animals from flood waters was instituted but it was not fully achieved due to high resource needs. Participants related how animal boarding facilities reported cases of giardia from flood animals and local veterinary clinics reported a significant increase in the number of leptospirosis cases in dogs. Because leptospirosis is not a notifiable disease in animals, public health officials only became aware of this issue months later. It took more than 6 weeks after being notified, and with considerable pressure from animal support organisations, before public health officers communicated to (human) general practitioners to include leptospirosis in their differentials and lower the thresholds for laboratory testing of patients with symptoms or signs that could represent leptospirosis.

The very limited temporary accommodation options allowing people to take their animals created problems as some people chose to return to their damaged and contaminated properties to avoid being separated from their animals. This posed a significant health and welfare risk to the owners and animals.

> *"Some animal owners felt like they were forced to go back to their houses because there was nowhere else to go with their pets. Animals were chained up because the fences had been washed away and were not able to exercise. They were lying in silt and wet ground." EBoP6*

4.3.3 Knowledge Base

Participants raised many issues pertaining to the knowledge base for emergency management including an awareness and understanding of animal welfare emergency management, experience, education and training, and the local lens.

4.3.3.1 Experience and knowledge

Lack of knowledge about animals in emergencies by animal owners, the community and emergency management responders was identified as a key barrier for building a multiagency collaborative environment. Similarly, participants believed that animal responders' lack of knowledge about emergency management or experience of emergency response resulted in a disconnect between the animal response and the overall response.

An incident in the early stages of the flood event was cited as an example of the lack of experience in AWEM across emergency service agencies resulting in significant animal welfare consequences.

> *"I was in the emergency operations centre and [emergency service] came up to me and asked who they could give the animals to that had been pulled out of the flood waters. Animal response is not my role so I tried to find out who to connect with through colleagues. I made a couple of calls, got contact details which took about 15 minutes. I found the [emergency service] but by the time I got back to them, they had released the animals, they let them go because they said they didn't have time to hold on to them." EBoPFG1*

The PHF focus group highlighted how in the initial stages of the response the lead agency did not utilise CDEM knowledge and networks effectively. Some believed that CDEM could have fulfilled a mentoring and support function to enable appropriate connections to be made and to ensure that the right agencies were in the fire incident management team. Experienced emergency responders were, however, able to make genuine connections during animal rescue operations and, drawing on interagency skills, knowledge and resources, to address emerging challenges.

> *"We gathered at our meeting point where multiple other agencies were … I heard those conversations through animal control. People said "oh someone else has got a horse down the road' and I perked up and went "I could possibly help. Which way do I go?" So it was all right place, right time that I heard the conversations and I offered. Basically, he was more than welcoming of my help and assistance." PHF4*

> *"We became a true integrated multiagency response which supported the animal rescue operation. Once we were set up, it allowed the easy flow of information going backwards and forwards because we know how we work." EBoP2*

Participants also mentioned how they valued the skills and experience of their colleagues from the veterinary emergency response team (VERT) and how this was transferred to the veterinary practice during the response.

> *"When the animals arrived, they were all colour coded and had addresses attached if they were known, which helped with keeping family groups together. We were informed of what the different coding was, which was a triage system the VERT used in the field. We wrote the colours up on our boards and everyone knew exactly what the colour codes meant. It made our job a lot easier and made us feel connected to the field response." EBoP7*

4.3.3.2 Education and training

Education and training were highlighted as key challenges and future considerations. Participants noted that animal welfare services with roles and responsibilities need to have buy-in from their organisation's leadership to invest in staff training. There was also discussion on the need to include animals in emergency response team credentialing.

"It's about being educated on who's out there and what they do. Everyone knows what a fireman does, everyone knows who FENZ are. Not everyone knows what we do and what we're capable of doing and what we can help with. We're stock handlers, we're companion animal handlers, we've got equipment, vehicles and expertise. We just need to get that message out there that there's resources here that can help to be a more effective and inclusive response." PHF1

4.3.3.3 Local knowledge

Responders highlighted the importance of utilising local knowledge during emergencies. This included ensuring that in events impacting rural communities, decision-making includes a rural lens and an understanding of the implications of the event on seasonal farming operations. The PHF focus group discussed how, when compared to a large urban council, a smaller rural council evidenced a much better connection to their community and were thus able to utilise the knowledge and resources of local animal agencies.

"Initially we were based out in the rural community coordinating the farm response. That was a learning that we needed to be close to the EOC. This evolved into needing people in the EOC to have the local rural geographical and farming knowledge. There were two semi-retired farmers who had great knowledge of the area so we got them on a roster to be in there just to help out and have a rural lens added to the decision making." EBoP2

"We are an out of region team so we split our team up into the local teams so that they could share their local knowledge. It changed our team cohesion and changed the way we would normally work, but our team members were fantastic, they coped with it. The value of having local knowledge on the team outweigh the changes in cohesion." EBoP9

4.3.4 Connection

Many participants felt strongly that a lack of understanding of the human-animal-environment interrelationship resulted in animal welfare being siloed and disconnected from the overarching emergency management system. Participants' experiences during response and recovery also highlighted the lack of a transdisciplinary approach and associated

network, relationship and trust issues. Taken together these issues form a strong and predominant theme we have termed connection.

4.3.4.1 Human-animal-environment interdependences

The separation of human and animal welfare in the emergency management system was a major concern for many participants who argued that a failure to understand this interdependency creates unintended divisions and results in ineffective emergency responses. They described the need to rethink how animal welfare in emergencies is conceptualised, arguing that rather than focusing on animal welfare, AWEM should be about people with animals that have issues.

There was a strong belief that welfare and operation functions such as temporary accommodation, financial assistance, psychological support, evacuations and cordon management are addressed separately from animal welfare rather than holistically, in that the presence of animals is not considered in their decision-making, and this fails to recognise the intertwining of human and animal welfare. It was noted, for example, that forcing people to be separated from their animals, such as arranging temporary accommodation for farmers some distance away from their farm, created a number of issues and significant stress in the community.

> *"I know human welfare is what you address first, they are the priorities and then animal welfare but for a farmer animal welfare and human welfare are just so interlinked. The farmers welfare depends on their animal's welfare. Farmers put looking after their animals' lives over and above their own. We cannot differentiate between animal welfare and human welfare from a human point of view." EBoP3*

> *"I remember there was an issue with an old man. He had to leave his house because the police were trying to set up the whole area [evacuate the area and place cordons]. He didn't want to leave because he had alpaca with cria and no one knew how to move the animals. The guy was just saying "I'm not going to leave them." PHF3*

> *"We had some elderly people and they had this small dog and where they'd put them up in the accommodation, they couldn't have their dog with them. The extra stress that created on an elderly person who had to move out of their home was significant and unnecessary. We found some of our farmers had holiday homes not far away and they were happy to have them stay with their small dog. So much weight went off their shoulders when they had that. It was such a simple solution to reduce the stress the elderly couple were experiencing". EBoP3*

4.3.4.2 Transdisciplinary

The lack of a transdisciplinary approach was identified by the participants as an issue impacting the effectiveness of the overall response and recovery. For example, because public health professionals do not have an official link in the welfare functions of the Coordinated Incident Management System (CIMS), issues have to be reported through District Health Board (DHB) colleagues and the urgency of issues may be lost in translation. Also, agencies responsible for temporary accommodation do not connect with the AWEM response. The lack of connection created silos and isolated animal responders from the overall response. Additionally, when non-animal agencies focus on their roles without considering the consequences of their decisions on the community, including animals, effective response can be hampered or delayed. On the other hand, when a transdisciplinary approach was followed (through the sharing of resources, knowledge or information), even if in an ad hoc way, this was seen as integral to the success of the response.

> *"Urban search and rescue had four-wheel drive vehicles and our rural support trust people and the red cross worked together going around rural properties and visiting people to make sure they're all right." EBoP3*

Participants also elaborated how a transdisciplinary approach would help address capacity and capability issues. Because there were no experienced local animal response teams, individuals such as veterinary professionals, animal welfare inspectors and animal control officers responded to address immediate animal needs with little or no training or experience in emergency response and limited access to resources. Bringing human and animal

responders into a unified team from the start of a response would facilitate the sharing of skills, experience, knowledge, and resources and enhance outcomes for all. It was recognised that some form of "just-in-time" upskilling and the implementation of appropriate safety measures would be needed to support the inclusion of inexperienced responders in teams.

> *"How to bring the teams together as a one unit is the big thing. The human rescue teams were important. They were skilled in CDEM response, flood rescue, had equipment we didn't have and they kept us safe. So having skill sets from human rescue teams, animal rescue teams and veterinary professionals who are skilled in understanding animal behaviour and handling animals under stress is needed." EBoP6*

4.3.4.3 Networks, relationships and trust

A clash of cultures was evident between different organisations in the focus groups and illustrated further in the interviews. Interprofessional challenges impacting on how well people worked together included pre-existing tensions, 'patch protection' and failing to involve others, elitism of 'professionals' versus volunteer/NGO agencies, and not seeking or listening to advice from others. A common issue for animal responders was the range of assumptions or beliefs about their roles and responsibilities and a general lack of understanding within other agencies about the role AWEM has in a response.

> *"Not everybody likes animals. Not everybody has that compassion so it's about educating the responders as well. We had an AWEM expert came and talk to our emergency management team about when you make decisions, animal welfare has to be considered. There were a few lightbulb moments there. They had never considered the consequence of their decisions on animal owner behaviour let alone animal welfare." EBoP1*

> *"We had a mixture of responses from emergency services and one in particular was not a friendly or cooperative response. I got the feeling that they didn't think we would be serving a useful purpose. Their actions were counterproductive to what we were trying to achieve." EBoP9*

> *"What I found in the ten years that I have been with the [animal welfare organisation] in New Zealand is that a lot of things were expected from the [animal welfare*

> *organization], but nothing was really defined. Not only from members of the public were there different expectations, but also from other agencies as well as from the [animal welfare organization] staff themselves." PHF3*

Participants believed that many of the tensions, trust issues, conflicting views and delays in response could have been reduced had networks and relationships existed between individuals and/organisations prior to the emergencies. They believed that where positive pre-existing interagency relationships and networks did exist, such as teams having worked and trained together, animal welfare needs were addressed more effectively.

> *"The [human rescue team] was incredibly helpful. They provided their ICP [incident control point] trailer to have on site as well as some team members to operate the comms system, who knew it well. Which was just a life saver." EBoP4*

> *"The only reason we were so successful is because of our networking. We could pull in whoever we needed to. We already had those networks there and people trusted us." EBoP6*

Participants discussed the need for people working in emergency response to be culturally competent. This includes understanding the customs of indigenous people, knowing who the appropriate people are to reach out to, as well as knowledge of the history of some communities including why there is mistrust in government agencies. It was acknowledged that if the complexities of communities are not acknowledged and communities are not engaged with in appropriate ways, this could also impact on the effectiveness of an animal response in emergencies.

4.4 Discussion

This study explored the experiences of 47 emergency responders who had been involved in a flood and/or wildfire event involving animal welfare. Our findings are consistent with previous research that has highlighted the difficulties of achieving integrated and

coordinated disaster response generally (Becker et al., 2018; Curnin et al., 2015a; Howes et al., 2015; Janssen et al., 2010).

Findings from the documents, focus groups and interviews have clearly shown how factors associated with the emergency management context, behaviour in emergencies, and the knowledge base of responders have a significant impact on how well individuals and organisations work together during an emergency response. We identified connection as a new, predominant theme. While all four themes are interrelated, we argue that understanding connections, including the human-animal-environment interdependencies, transdisciplinary approach, and networks, relationships and trust, is vital to improving multiagency collaboration in AWEM (Figure 4.2).

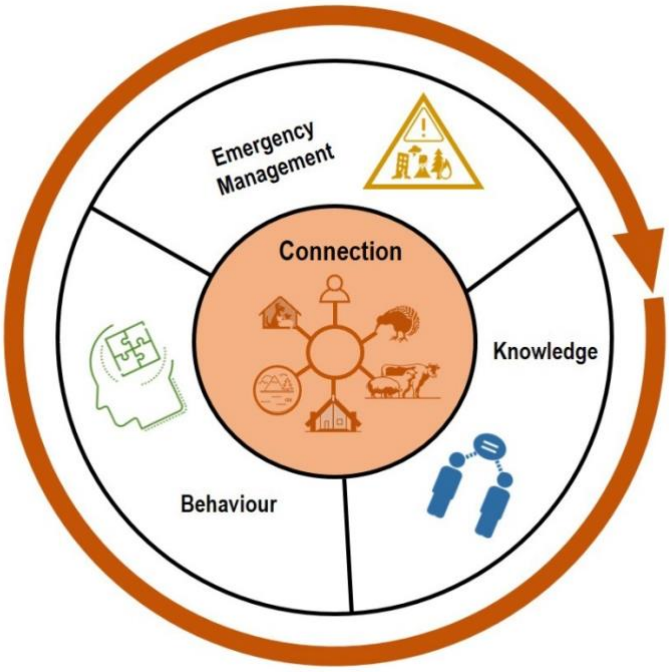

Figure 4-2 Interrelated themes: Emergency Management, Behaviour, Knowledge & Connection highlighting key issues impacting effective multiagency collaboration in AWEM

The current AWEM framework can be conceptualized as a number of 'pillars' that must be coordinated in a response: rescue, temporary shelter, food and water, animal husbandry and veterinary care. Although MPI is responsible for the overall coordination of animal welfare

services, there are no designated responsibilities for specific services, such as animal rescue. Furthermore, this study highlights the need for animal evacuation to be included as a specific animal welfare service in the framework, along with a delegated agency to ensure that this time critical action is effectively managed.

When an integrated approach is taken to evacuating people and animals, animal owners are more likely to comply with orders to evacuate and are less likely to engage in risky behaviours to gain access to their animals, human and animal mortality and morbidity is reduced, public health issues resulting from the presence of animals in impact zones are decreased, and less resources are required to return to rescue animals (Farmer et al., 2016; Heath et al., 2001; Trigg et al., 2015a). A failure to fully understand the interdependence between humans, animals and the environment has serious consequences. For example, measures put in place to protect human life and wellbeing may in fact be counter-productive.

Role clarity is noted as an important mechanism in facilitating multiagency collaboration and the formation of temporary supa-organisations during response to and recovery from emergencies (Curnin et al., 2015b; Steigenberger, 2016). The results of this study have highlighted how the lack of clarity about roles and responsibilities, both within and between agencies, impacts negatively on AWEM. Furthermore, role confusion can be exacerbated by a lack of knowledge about the relative capabilities and capacities of agencies. For example, emergency responders often assume emergency management is taught in veterinary curriculums, therefore assume veterinary professionals can step into a response role and understand the response structure, language and protocols (Squance, 2011). However, this is not the case, and this limits the capacity for locally skilled animal responders who can deploy to impact zones in an emergency event.

Those encountering the human-animal interface during emergencies often meet for the first time during a response. Without existing networks and relationships, they are unfamiliar with

the roles and responsibilities of other agencies and may not be aware of how their decisions can impact the overall response. This occurs in a context of high risk and high stress environment which is not conducive to effective AWEM (Curnin et al., 2015a), including improving public safety outcomes for communities and emergency responders (Squance et al., 2018; Taylor et al., 2015c; Westcott et al., 2017b). Currently, the AWEM framework does not reflect the full range of stakeholders involved in emergency responses involving animals.

The New Zealand CDEM funding framework does not include costs associated with AWEM response and recovery and organisations who have appointed AWEM roles and responsibilities are required to retain funding and resources to maintain their capacity and capability outlined in the legislation. Human welfare arrangements are delivered by central and local government agencies in a business-as-usual capacity. However, organisations delivering animal welfare services in an emergency are generally working in non-routine operating parameters and relationships and reliant mainly on volunteer, private business and non-government organisations, with the exception of local authorities. These arrangements, based on good-will, constrain the availability of resources (financial, human, equipment) and create a significant risk to the organisations' ability to continue to operate after the event. The increased frequency and severity of events has the potential to cause burn out in responders and communities further depleting limited resources. Furthermore, emergency management legislation and policy must have multilateral coherence with other relevant legislation to ensure AWEM is adequately supported (Lakhina et al., 2021; Lee & Brumme, 2013; Olson et al., 2020).

Mutual engagement, joint decision-making and discussion are fundamental to developing successful collaboration (Charman, 2014). The strict adherence to a command and control system is a significant barrier to achieving this. In the context of a lack of shared understanding of the emergency management system, the infancy of the AWEM framework,

inexperience of responders, limited education and training opportunities for AWEM, and individuals' behaviours and interprofessional culture clashes, this may be slow to change (Lee et al., 2012; Waugh & Streib, 2006).

The results of this study have illustrated how the separation of animal emergency response from the human response poses challenges with cross-sector collaboration in environments demanding the swift acquisition of trust, creates unintentional silos, results in ad-hoc decision-making and duplication of effort, and intensifies demands on limited funding and resources (Curnin et al., 2015b; Squance et al., 2018; Taylor et al., 2015c; Westcott et al., 2017a).

However, this study has also shown that collaborative effort can achieve a more integrated approach with improved communication and a shared holistic goal. It highlights that animals need to be integrated across all components of emergency management rather than simply appointing a lead agency to be responsible for animal emergency management. This will require a shift from a centralised, hierarchy-based and compliance-driven approach in emergency decision-making to a more agile approach that reflects the dynamic environment in which collaborative decisions must be made (Kapucu & Garayev, 2011). It will also require leadership at all levels within and across organisations to set direction, lead people, manage relationships and deliver results that take into consideration people, animals and the environment (Squance et al., 2018).

4.5 Strengths and limitations

The location and presence of the lead agencies may have inhibited the response from some participants. However, these organisations' presence provided a high degree of support for the project and highlighted the high value placed on the research outcomes.

The length of time from the inclusion of animals in New Zealand's emergency management framework and the timing of the two events in the case studies (13 and 15 months respectively) may be deemed too short to implement a new framework before exploring the key issues. However, as emergency management includes a process of continuous reflexivity the length of time is deemed appropriate.

The participants in this study reflect a diverse range of emergency response organisations and stakeholders who experience the human-animal interface during emergency events. This sample goes beyond traditional animal welfare agencies and organisations and highlights that the presence of animals in emergencies transcends the expertise of many organisations (Squance et al., 2018).

4.6 Conclusion

This study produced a valuable evidence-based narrative from the first-hand experiences of emergency responders involved in flood and/or wildfire events involving animals. AWEM relies heavily on official organisations working with non-government agencies within extraordinary operating parameters. It is clear that achieving effective collaboration among a wide range of stakeholders is challenging and there remains much to be done. Not least, this will require a shift from a traditional focus on individual emergency management domains towards a transdisciplinary approach that acknowledges the interdependencies of the human-animal-environment interface. This will require inclusion, innovation, connection, support and agility.

Ethical approval

Ethics clearance was obtained from the Human Research Ethics Committee of Massey University Southern A, Application 17/54.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. HS was actively involved in both events discussed in this study.

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5 Connection – the missing link to collaboration in AWEM

Image 5.1 AWEM workshop participants take home message: Animals and missing links in collaboration (photo credit: Dana Weeks Photography)

5.1 Introduction

The previous chapter identified four interrelated themes described as key factors impacting multiagency collaboration during animal emergency responses:

1. Emergency management context
2. Behaviour in emergencies
3. The knowledge base of responders; and
4. Connection.

The findings are consistent with previous research highlighting challenges and barriers to achieving integrated and coordinated disaster response generally (Becker et al., 2018; Curnin et al., 2015; Howes et al., 2015; Janssen et al., 2010). In this thesis, connection has been identified as a new, predominant theme. While all four themes are interrelated, understanding connections, including the human-animal-environment interdependencies, transdisciplinary approach, and networks, relationships and trust, is the pivotal link to improving multiagency collaboration in animal welfare emergency management (AWEM).

The purpose of this chapter is to describe human-animal-environment (h-a-e) interdependencies, discuss the lack of transdisciplinary approach in emergency management, and consider other cross-sector actors involved in h-a-e interfaces and the frameworks that have been developed to support a h-a-e transdisciplinary approach. It is proposed that improved relationships, increased trust and effective networks will result from an integrated h-a-e transdisciplinary approach.

5.2 Human-animal-environment interdependencies

People, animals and the physical and social environment are interconnected and interdependent, as illustrated in figure 5.1. Figure 5.1 illustrates the complex interdependencies between humans, all animals (companion, production and wildlife), and the social[1] and physical environments. The h-a-e philosophy has only recently appeared in academic literature as a "whole-of-person" and "whole-of-society" approach to complex and challenging problems (Destoumieux-Garzón et al., 2018; Harrison et al., 2020; Pinillos, 2018a). However, the h-a-e philosophical underpinnings are not new as they are reflective of the existing indigenous worldview that emphasises holism, transdisciplinarity and

[1] The social environment is depicted as a marae, the social and spiritual hub of a Māori community, a place where people gather for meetings, celebrations, funerals, and other important events.

interconnectivity between humans, animals and environment *pou* (meaning pillars in the Māori language) (Durie, 2001; Harrison et al., 2020; Rochford, 2004; Walker et al., 2019). A western discourse has seen the separation of the h-a-e philosophy into individual *pou*; however, as evidenced by the previous chapter this is no longer tenable when addressing complex and challenging problems in emergency management (Litfin, 1999; Walker et al., 2019).

H-a-e interdependencies exist in emergencies and in some cases are heightened due to the external stressors and widespread impacts that emergencies cause (Douglas et al., 2019; Evans & Perez-y-Perez, 2016; Hall et al., 2004; Irvine, 2009). Although the complexity of emergencies is increasing due to multiple anthropogenic pressures, these h-a-e interdependencies are not recognised and each *pou* is addressed independently in disciplinary silos. For example, where one agency is responsible for temporary accommodation for people and a separate agency is responsible for sheltering their animals, a "whole-of-person" approach is not implemented. In some cases, this separation has resulted in devastating consequences which I have observed throughout this PhD journey.

Figure 5-1 H-A-E interdependencies

In March 2018, I was deployed to a localised flooding event in the Hawke's Bay, New Zealand, as the animal welfare coordinator. Residents living in a holiday park located close to a river were given little time to evacuate when the stop-bank was breached, and their housing was flooded. Over 50 residents were displaced with their pets and required emergency accommodation, clothing and food. I was asked by CDEM to attend a community meeting with other agencies to assist the holiday park community. The main issues I was presented with as the animal welfare coordinator were due to h-a-e interdependencies not being considered by various agencies.

I met Jan (name changed), a resident of the holiday park, who was a single mother and survivor of domestic violence. She had a large (approximately 60 kg) male dog, who she said was her protector and made her feel safe to live on her own with her son in the holiday park. Jan requested assistance with procuring dog food; however, it was evident she was not

coping with the overall situation. After talking to her, I was made aware that emergency accommodation was arranged away from the holiday park for Jan and her dog; however, they were accommodated in separate places as accommodation services did not cater for pets. On the surface, all welfare needs were met because Jan had emergency accommodation, clothing and food as did her dog. However, not taking a "whole-of-person" approach and separating Jan from her dog, her protector, had devastating wellbeing consequences which meant she required significant mental health support. If she was able to be accommodated together with her dog (support system), the mental health impacts and subsequent demands on resources and recovery time would likely have been reduced.

As evidenced by this experience and those discussed in the previous chapter, emergency management requires a paradigm shift from focusing on single disciplines and *pou* to an approach that recognises and addresses h-a-e interdependencies collaboratively. The emergency management sector requires a transdisciplinary approach that draws on a full range of relevant disciplines, knowledge systems (including indigenous knowledge), professional groups and community networks (Harrison et al., 2020) to understand increasingly complex systems and challenges that affect emergency management (Ismail-Zadeh et al., 2017; Peek et al., 2020).

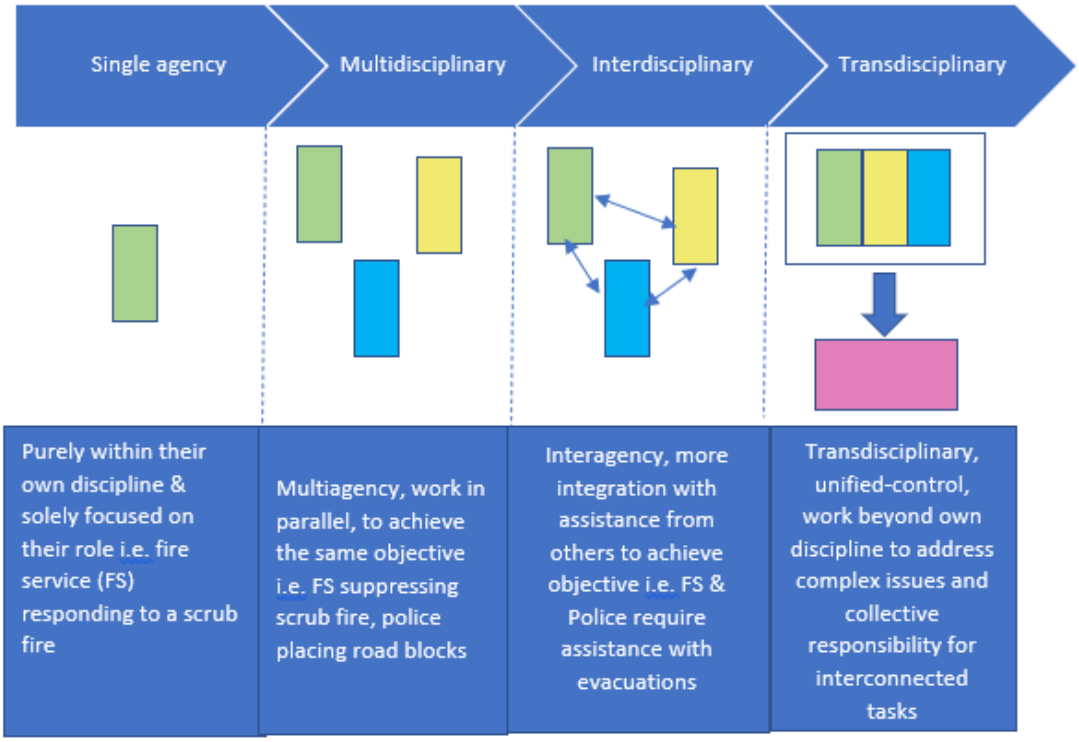
5.3 Transdisciplinary approach in EM

One of the key issues impacting multiagency collaboration in AWEM is the lack of a transdisciplinary approach across all phases of emergency management (Squance et al., (2021) in review). A transdisciplinary approach is defined as a continuum of multi- and interdisciplinary approaches, whereby different disciplines work together to contribute their expertise in a transcending way to form a new holistic approach (Figure 5.2) (Choi & Pak, 2006; Ismail-Zadeh et al., 2017; Peek et al., 2020). A multidisciplinary approach draws on the knowledge of different disciplines but they work independently considering the specific issue

and the disciplinary perspectives are not changed, only contrasted. An interdisciplinary approach allows for knowledge transfer between disciplines, in that they share information informing each other of their work yet they still work independently (Choi & Pak, 2006; Ismail-Zadeh et al., 2017; Matsuura & Razak, 2019).

In the context of AWEM, an example of a multidisciplinary approach is when animal response teams and human response teams in an impact zone work separately and independently using only their own intelligence sources to rescue their target groups (i.e. the animal response teams only rescue animals and the human response teams only rescue people). Another example would involve different organisations working independently to address the welfare needs of different types of animals, such as companion animals and production animals.

In contrast, with an interdisciplinary approach, different animal organisations with a common goal would work together to share intelligence and resources. Similarly, an animal response EOC would share intelligence with the lead agency EOC to assist with the animal response. As argued in the previous chapter, AWEM must shift from the inclusion of animals to the full integration of animals across all phases of emergency management, and this requires a h-a-e transdisciplinary approach.



Source: Adapted from Matsuura and Razak (2019)

Figure 5-2 Disciplinarity continuum

Much of the literature referring to a transdisciplinary approach in emergency management relates to disaster science (Ismail-Zadeh et al., 2017; Matsuura & Razak, 2019; Peek et al., 2020; Sherman-Morris et al., 2018), is conceptual and theoretical in nature and has had limited transfer of knowledge to practitioners and other end users (Aguirre & El-Tawil, 2020). However, due to the increasing complexity, intensity and frequency of emergency and disaster events it is critically important for emergency management practitioners and front-line teams to work together in novel ways which transcend their disciplines and organisational boundaries (Ismail-Zadeh et al., 2017; Peek et al., 2020). Furthermore, in order to reduce event-related losses and promote collective wellbeing and recovery, practitioners and teams need to be able to address social, cultural, economic, environmental, organisational and technical challenges and barriers (Janssen et al., 2010; Peek et al., 2020; Taylor et al., 2015c).

International disaster risk reduction (DRR) frameworks have evolved from saving lives, protecting infrastructure, and focusing on mitigation strategies to include innovations that promote a holistic "whole-of-person" and "whole-of-society" approach (O'Brien et al., 2020; Ray-Bennett et al., 2020). For example, while the Hyogo Framework for Action (2005) focused on reducing physical and economic losses (UNISDR, 2013), the Sendai Framework for Disaster Risk Reduction (2015) recognised that effective disaster risk reduction requires a holistic focus including animals and advocates for "the substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries" (UNISDR, 2015, p. 12). Although, the Sendai Framework identifies a 'whole-of-person' approach it does not explicitly address the h-a-e interdependencies. This has resulted in h-a-e being addressed independently by different organisations within disciplinary silos.

In 2016, due partly in response to the Sendai Framework for Disaster Risk Reduction, the World Organisation for Animal Health (OIE) adopted guidelines on disaster management and risk reduction in relation to animal health and welfare and veterinary public health (OIE, 2016). The guidelines highlight h-a-e *pou* insofar as they advocate for the integration of emergency management measures which promote the health and welfare of animals, safeguard human and environmental health, and help to restore social and economic conditions in the aftermath of a disaster (Dalla Villa et al., 2017; OIE, 2016). However, the guidelines fail to highlight h-a-e interdependencies and the transdisciplinary approach required to successfully deliver on safeguarding animal, human and environmental health and restoring social and economic conditions. It is clear that due to h-a-e interdependencies, there are many stakeholders who should have an interest in managing animals in emergencies, including emergency, health and human services and animal welfare, agricultural, government and non-government organisations (Squance et al., 2018; Taylor et al., 2015c). Therefore, to strengthen interagency collaboration and thereby improve animal

welfare, human wellbeing and ecosystems, the current focus in AWEM on agencies and organisations which represent animal welfare needs to expand (Squance et al., (2021) in review).

Response frameworks such as the CIMS 3rd edition in New Zealand are evolving and recognising the importance of the h-a-e *pou* by including them in their core principles:

> *"Any response should mitigate and manage the consequences of an incident on the affected individuals, families/whānau and communities, including animals. Response personnel must recognise an individual's rights, treat individuals with fairness and dignity and ensure the needs of affected people and animals are identified and met throughout the response and into recovery."* (CIMS 3rd Edition, 2019, p. 8)

Although a positive step, such principles do not resolve the current disconnection experienced by AWEM practitioners. Humans, animals and the environment are intricately linked; however, the ways in which we respond to impacts on them are mostly independent and many non-animal agencies fail to recognise their role in the h-a-e interface. To address these failures, emergency management response frameworks need to shift from the current emphasis on individual sectors to a transdisciplinary framework which acknowledges h-a-e interdependencies and adopts a holistic view which is integrative, problem-focused and solutions based (Ismail-Zadeh et al., 2017; Peek et al., 2020).

Historically, other cross-sectoral actors involved in the h-a-e interface, such as public health, have experienced similar individual sector *pou* and disciplinary silo challenges (Gibbs, 2014; Johnson et al., 2018; Woods & Bresalier, 2014; Zinsstag et al., 2011). In response to these challenges, the cross-sector actors have developed conceptual frameworks that seek to transition from the traditional management of individual sectors and, being siloed in their activities, towards a sustained transdisciplinary approach with the explicit intention of breaking down the disciplinary silos (Destoumieux-Garzón et al., 2018; dos S. Ribeiro et al.,

2019; Harrison et al., 2020; Lee & Brumme, 2013; Mackenzie et al., 2013; Queenan et al., 2017).

5.4 Human-Animal-Environment transdisciplinary frameworks

This section explores two h-a-e transdisciplinary frameworks/concepts, One Health and One Welfare, developed by cross-sector actors who experience the h-a-e interface including implementation challenges. Furthermore, this section discusses the potential for One Welfare to promote interdisciplinary collaboration through a h-a-e transdisciplinary emergency management framework, what this would look like in emergency management and makes suggestions for the development of Aotearoa One Welfare for emergency management.

5.4.1 One Health

One Health (OH) represents an approach for addressing complex global health problems related to climate change, environmental sustainability, and zoonotic and infectious diseases based on the engagement of professionals from many disciplines to develop and sustain broad transdisciplinary collaboration (dos S. Ribeiro et al., 2019; Woods & Bresalier, 2014). OH emphasises a holistic understanding of health beyond the purely biomedical and recognises the interdependencies of human, animal and environmental health (el Zowalaty & Järhult, 2020; Woods & Bresalier, 2014; Zinsstag et al., 2011). The COVID-19 pandemic is a global example of h-a-e interdependencies, as the virus is known to have animal reservoirs that can transfer the virus to humans through the environment (el Zowalaty & Järhult, 2020; Ghai et al., 2021; Mahdy et al., 2020). Therefore, many disciplines are required to work together to investigate hosts, transmission and treatment (K.C. et al., 2020).

Recognising that the interrelationship between animals, humans and the environment necessitates an integrated perspective, OH encourages collaborative, rather than individual effort by professional disciplines, such as human, veterinary and environmental health, when

dealing with complex health problems (el Zowalaty & Järhult, 2020; Ruscio et al., 2015; Xie et al., 2017). In addition, international policy stresses the critical need for intersectoral and multidisciplinary measures to address complex health care to achieve global health goals, such as those in the 2030 Agenda for Sustainable Development (de Macedo Couto & Brandespim, 2020), supporting a OH approach.

While OH is not a new concept (Woods & Bresalier, 2014; Xie et al., 2017), it is still evolving conceptually under the influence of health challenges, scientific advances, and political, economic, environmental and professional priorities (de Macedo Couto & Brandespim, 2020; el Zowalaty & Järhult, 2020; Lee, 2019). The implementation of OH has so far proven a challenge due to the desire for a global rather than a local approach (Johnson et al., 2018; Lee & Brumme, 2013) and inconsistencies in a generally accepted definition for the OH concept (dos S. Ribeiro et al., 2019). Additionally, the scope and breadth of its practice are mainly constrained to zoonosis (Xie et al., 2017), and there is a lack of "whole-of-government" mechanisms to ensure policy coherence and an integrated holistic approach to health (de Macedo Couto & Brandespim, 2020; Lee & Brumme, 2013). Furthermore, much of the impetus has come from the animal health side and has lacked environmental science contributions (Johnson et al., 2018; Lee & Brumme, 2013; Woods & Bresalier, 2014).

Although the modern OH concept was first published in the literature in 2004 and a previous version in the early nineteenth century (Mackenzie et al., 2013), it is noted that similar approaches pre-date this. Exploring the traditional knowledge, practice and values of indigenous peoples highlights how the OH approach is infused in their genealogy and has been practised for centuries (Walker et al., 2019). In New Zealand in the late 1960s, Sir Mason Durie developed a culturally specific framework to respond to the health needs of Māori (indigenous people of New Zealand) known as Te Whare Tapa Whā (Durie, 2001; Rochford, 2004). The framework acknowledges the interconnections of h-a-e as critical social and

biophysical determinants of health and wellbeing of Māori people and Māori communities (Rochford, 2004). The indigenous approach focuses on a "whole-of-person and whole-of-system" context, requiring a unified, intersectoral collaborative approach to health services and extends beyond OH in current literature (Rochford, 2004; Smith, 2007). However, the similarities of a OH approach and indigenous worldview have not been acknowledged in the OH literature until recently (Harrison et al., 2020).

It is argued that although OH has sparked an evidence-based body of knowledge that goes beyond individual disciplines, the strong health focus lacks a vision of a set of health, social, economic and environmental outcomes – whose interdependence is similarly acknowledged, creating a significant gap in welfare-focused approaches (dos S. Ribeiro et al., 2019; Pinillos, 2018a). This led to the development of a broader concept, One Welfare (OW), which embraces an interdisciplinary approach by acknowledging animals' contribution to well-functioning societies in different settings globally (Mills & Hall, 2014; Pinillos, 2018b) whilst including social science research and practice (Lerner & Berg, 2017). As OW is focused on social, economic, environmental and cultural interdependencies, it is better suited than OH to the emergency management context.

5.4.2 One Welfare

One Welfare (OW) is a concept that describes the interrelationships between animal welfare, human wellbeing, and the physical and social environment (Pinillos et al 2016). It is a nascent concept which offers a platform for professions and disciplines to work together to achieve common goals to improve human and animal wellbeing while taking into consideration social, cultural, economic and political connections (Colonius & Earley, 2013; Frisk et al., 2018; Pinillos et al., 2016). OW promotes holistic collaborative approaches to respond to rapidly changing environments, such as in disasters, to

address complex issues impacting human and animal communities and the environment, rather than in disciplinary silos (Alshawawreh, 2018; Ruscio et al., 2015).

While OW is conceptual and theoretical in nature, literature describes h-a-e welfare interdependencies as a strong case for a OW approach to address complex welfare issues. There are demonstrable links between poor animal and human welfare (Boat & Knight, 2001; Hawes et al., 2019). Human and animal welfare are impacted by disasters and the previous chapter is an exemplar of how human wellbeing is compromised if animal welfare is not concurrently addressed. Furthermore, the very nature of a disaster creates complex social, economic, environmental and technical challenges that transcend the expertise and boundaries of any one organisation. A OW approach has the potential to address these challenges and promote collective wellbeing.

5.5 One Welfare in emergency management

While OW is mentioned in emergency management literature, this has largely been limited to comments about needing to include animals by considering them alongside people (Dalla Villa et al., 2020; Gongal & Ofrin, 2020; Pinillos, 2021; Pinillos, 2018a), but little attention has been given to how this could be achieved in practice. Furthermore, due to the novelty of OW there has been no detailed discussion in the emergency management literature about the potential for OW to promote collaboration through a h-a-e transdisciplinary approach.

The previous chapter highlighted that simply including animals in emergency management is not enough. Simply adding AWEM onto overall emergency management has created unintentional silos and poses challenges with cross-sector collaboration. This research highlights that animals need to be integrated across all components of emergency management and how this can be achieved by a h-a-e transdisciplinary approach such as OW.

A comparison between the challenges in the current emergency management framework, identified in the previous chapter, and a OW emergency management framework (Table 5.1) shows that the OW framework has the potential to address such challenges in several ways.

First, it offers a platform for different disciplines to work together in complex environments to achieve common goals of increasing community resilience and reducing the impacts of events on communities, addressing disciplinary silos and developing community-centric solutions. Additionally, the transdisciplinary approach promotes sharing of resources, including intelligence which contributes to better situational awareness and cross-sector communication.

Second, OW promotes a whole-of-person and whole-of-society approach by considering h-a-e interdependencies. For example, rather than organisations referring all responsibility of a *pou*, such as animals to an animal organisation, all organisations will be required to integrate and consider all *pou* in their roles and responsibilities, encouraging a transdisciplinary approach. This will support holistic decision-making including holistic consequence management in response and recovery.

Finally, OW enables more opportunities to build relationships, networks and trust that are required in emergency management. Together, these attributes can allow for the broad application of the OW framework across legislation, sectors, settings, processes, issues and time.

Table 5.1 Comparison of current EM framework and OW EM framework

Current EM framework challenges	**One Welfare EM framework**
Disciplinary silos	Transdisciplinary
Agencies work within the boundaries of their roles and responsibilities	Agencies boundaries are blurred to be agile to respond to nuances of community, event and individuals circumstances, creating community-centric solutions
Limited resources	Sharing of resources across *pou*
Common operating picture – agencies are responsible for collecting their intelligence to contribute to situational awareness	Collaborative intelligence – intelligence collected and shared with agencies on behalf of others
Human life centric	Holistic, "whole-of-person", h-a-e interdependencies
Animals included	Animals integrated
Constrained thinking and decision-making	Collective holistic thinking
Unilateral decisions without taking into consideration the consequences to other *pou*	Considers other *pou* consequences and works collaboratively to mitigate them
Lack of networks, relationships and trust	Creates opportunities and supports the development of networks, relationships and trust
Legislation and policy constrain collaboration and h-a-e approach	Legislation and policy support collaboration and h-a-e approach

To further illustrate a OW approach in emergency management, we will return to the experience of Jan and Max first mentioned at the start of this chapter. Following disasters, animal owners are often forced to be separated or relinquish their companion animals to obtain temporary housing or live in unsafe housing to keep their pets due to policy constraints (Graham et al., 2018), purported public health risks (Chadwin, 2017) and lack of acknowledgement of h-a-e interdependencies (Douglas et al., 2019; Graham & Rock, 2019), as experienced by Jan. Given that pet loss has been found to give rise to Post Traumatic Stress Disorder (PTSD), acute stress and peri-traumatic dissociation (Hall et al., 2004), and some pet owners report the presence of pets during times of stress as being more beneficial than the

presence of humans (Barker & Wolen, 2008; Brackenridge et al., 2012; Chadwin, 2017; Lowe et al., 2009), there is real value in keeping owners with their animals (Evans & Perez-y-Perez, 2014; Douglas et al., 2019).

A OW approach would involve the development of cross-sector solutions to interdependent issues, such as emergency and temporary housing by organisations working beyond their boundaries. Rather than Jan and Max being separated, they would be accommodated together and their needs met collectively rather than separately. Additionally, various organisations would work together with Jan to develop long-term solutions which acknowledge the h-a-e interdependencies.

A OW approach must be underpinned by the policy that supports cross-sector collaboration and keeping people with their animals rather than addressing *pou* separately (Coombs et al., 2015; Darroch & Adamson, 2017; Evans & Perez-y-Perez, 2016; Graham & Rock, 2019). For example, public health legislation is cited as a reason why animals cannot be housed together with their owners due to the risk of zoonotic disease outbreak and allergies to animals (Chadwin, 2017). However, there is little evidence that owned animals pose such a zoonotic disease risk other than an increase in animal bites experienced by responders rescuing abandoned animals (Chadwin, 2017; Garde et al., 2013). Public health risk is not a valid argument to continue to separate people and animals, particularly in emergency shelters. The value of housing animals and owners together far outweighs the risks. Evacuating and sheltering owners and animals together can protect public health because people will not be putting their life at risk to rescue animals left behind, fewer animals will be roaming and, in Jan's case, the mental health sequelae would have been mitigated.

The interaction between more frequent and intense events means that the cost of reacting to disasters will become progressively untenable and a threat to national security (Ismail-Zadeh et al., 2017). Mills and Hall (2014) eloquently argue that in the current economic

climate of limited resources, there is a need to consider novel approaches such as valuing the interconnections of humans and animals as a potentially more cost-effective and socially acceptable way of addressing issues. Similarly, the previous chapter highlights the cost benefits of keeping animals and owners together during evacuations rather than separating them (Squance et al., (2021) in review). The OW approach acknowledges the interdependencies of human wellbeing, animal welfare and the environment and the transdisciplinary collaboration needed to address the issues effectively and efficiently to achieve the best outcomes for each individual, agency and community.

5.6 Aotearoa One Welfare in emergency management

A OW approach is an obvious fit within the New Zealand emergency management context, and several characteristics suit a h-a-e transdisciplinary, whole-of-person and whole-of-society approach. These features include New Zealand's strong economic dependency on agriculture and the physical environment, high pet ownership and an existing indigenous Māori worldview that emphasises holism and interconnectivity (Harrison et al., 2020).

New Zealand is heavily reliant upon primary industries economically, with over 70 per cent of export earnings derived from agriculture and 12 per cent of the national workforce employed in the sector (Dalla Villa et al., 2020; Harrison et al., 2020; MPI, 2018). Furthermore, New Zealand's biomass ratio of livestock to humans is approximately 25:1 (Hillerton et al., 2017), compared to the global biomass ratio of approximately 2:1 (Bar-On et al., 2018). With the prediction of further intensification of agriculture, New Zealand's biomass ratio will continue to increase (Harrison et al., 2020). Livestock and production losses due to disasters have serious long-term implications for the economy that cannot be immediately remedied from elsewhere within the New Zealand economy (Coll, 2013). Therefore, it is paramount that New Zealand protects the economic assets and viability of the rural community connected to production animals.

Pet ownership rates in New Zealand are among the highest in the world, with 64 per cent of households owning a pet, a rate nearing the proportion of households with children (Evans & Perez-y-Perez, 2016; NZCAC, 2016). Animal ownership rates are even higher in rural communities, including farms and lifestyle, or hobby farm, properties (Westcott et al., 2017a), and especially true for large animal species such as cattle and horses. New Zealand has an increasing trend of farm land conversion to smaller rural properties (Nicholas & Hepi, 2017), with a high migration rate of urban populations to rural land in some areas (Langer & McGee, 2017). A clear majority of rural property owners use their land for grazing stock (Nicholas & Hepi, 2017) and generally multiple animals are kept on rural properties (Pawsey, 2015). Furthermore, with a significant increase in pet ownership and households migrating to rural areas during the COVID-19 pandemic (Applebaum et al., 2020; Hawkins & Brodie, 2020; Peer et al., 2021), the rate of households owning pets and other animals will have increased.

The philosophical underpinnings of OW are reflective of the existing Māori indigenous worldview that emphasises holism, transdisciplinarity and interconnectivity between humans, animals and environment *pou* (Durie, 2001; Harrison et al., 2020; Rochford, 2004; Walker et al., 2019). For Māori, all parts of the environment are infused with mauri (life force) and are connected by whakapapa (genealogy). People, plants and animals are all descendants of Ranginui (sky father), Papatuanuku (earth mother) and their children, which means humans are intrinsically linked and inseparable from animals, plants and the environment (Barnes et al., 2021; Cheung, 2008).

Kaitiakitanga (guardianship) is the responsibility to live respectfully with the environment to maintain the delicate balance between Tangata Whenua (people of the land) and the natural environment (Barnes et al., 2021). Kaitiakitanga seeks balance in sustaining natural resources as the basis for wellbeing. In a similar way, OW is an interdisciplinary approach that

recognises the interrelationships between human wellbeing, animal welfare, and the physical and social environment. Therefore, OW is not necessarily a new concept in New Zealand; however, emergency management has an established reductionist, discipline-orientated system that counters integrative approaches (Harrison et al., 2020; Barnes et al., 2021).

Aotearoa OW in emergency management has the potential to better define complex problems by providing additional perspectives through a transdisciplinary approach that draws on a full range of relevant disciplines, knowledge systems (including indigenous knowledge), professional groups and community networks (Harrison et al., 2020).

5.7 Conclusion

OW could provide the theoretical underpinning for enhancing interdisciplinary collaboration for emergency management to improve human, animal and environmental outcomes. OW entails a reframing process to shift the focus from the current human-centric siloed view in emergency management towards a holistic perspective that values the three human-animal-environment *pou* equally.

Aotearoa OW in emergency management has the potential to offer an approach for the emergency management sector to play an important role as guardians or kaitiaki of our shared welfare by addressing the interconnections between animals, the environment and humans. Aotearoa OW offers the opportunity to embrace societal “whole-of-person” and “whole-of-society” expectations and innovation stemming from indigenous Māori perspectives and values. Aotearoa OW offers an opportunity where Māori and non-Māori can come together for emergency management transdisciplinary approaches and work closely to form a mutually beneficial partnership. Acknowledging that such a transformational change will not be easy, Chapter 7 proposes a number of strategies to overcome the challenges and optimise the outcomes for animal welfare emergency management (AWEM).

6 Enhancing multiagency collaboration for humane animal welfare outcomes – wildfire responses [Research report]

Chapter narrative

The purpose of this research report was to investigate the second research question, *What are the key issues impacting effective multiagency collaboration in AWEM?*, utilising a case study approach of two wildfire events (2017 Port Hills fire and 2019 Pigeon Valley fire). Additionally, reflective of AR being applied, responsive and cyclic in nature, the gaps identified from previous responses and research, the inclusion of a h-a-e transdisciplinary approach required tangible solutions. Therefore, as an evidence-based AWEM practitioner and the developing step of AR, I sought to explore scholarly literature, cross-sector ideas and strategies to develop tangible solutions. These solutions were offered and tested in practice during the Pigeon Valley fire response. Furthermore, in line with AR continuous monitoring, evaluation and revision, this research report sought to iteratively reflect on the solutions offered and share the results with the emergency management sector.

Manuscript preparation and publication

I prepared the report as the sole author. I conducted the data collection and analysis and drafted the initial report. Dr MacDonald provided guidance on the TA and structure of the report. All the supervisors, Dr MacDonald, Dr Stewart, Dr Prasanna and Professor Johnston, offered feedback on the content of the report. I prepared the final report which was submitted to the Bob Kerridge Animal Welfare Fellowship Board of Trustees on the 28th February 2021. The research report was well received (Appendix 9) and disseminated to CDEM groups and FENZ. Statement of Contribution Appendix 10.

Enhancing multiagency collaboration for humane animal welfare emergency outcomes – wildfire responses

Cover image credit *"Dog in wildfire" Saint John SPCA Animal Rescue*

The Bob Kerridge
ANIMAL WELFARE FELLOWSHIP

Research Report

Summary

This study investigated gaps in the wildfire animal welfare emergency management (AWEM) arrangements through semi-structured interviews and focus groups with individuals and agencies involved in the 2017 Port Hill fires and the 2019 Pigeon Valley fires.

Four themes were identified reflecting the key improvements needed for animal welfare response in wildfires: 1) Wildfire response structure, 2) Evacuation and sheltering, 3) Cordon management, and 4) Communication.

Results from this study have highlighted areas for further work and the need to do an in-depth analysis of AWEM in wildfires across all phases (reduction, readiness, response and recovery) of emergency management. This improved understanding will highlight knowledge gaps and enhance multiagency collaboration in AWEM frameworks that integrate human, animal and environment interdependencies.

Image 6.1 People, animals & the environment (image credit: New York State College of Veterinary Medicine)

Recommendations are offered to strengthen and build on the current wildfire response framework:

- ✓ Improve awareness and training of AWEM in wildfires with emergency services organisations who experience the human-animal interface.
- ✓ Develop a scalable animal-inclusive wildfire response framework (include an AWEM technical expert in the wildfire incident management team and at the incident command point).
- ✓ Ensure animal welfare response is coordinated from the multiagency emergency operations centre.
- ✓ Develop triggers for evacuations that take into consideration the time required to evacuate pets and livestock.
- ✓ Pre-identify intensive animal housing facilities that can't be evacuated due to animal welfare and biosecurity reasons as "assets to protect".
- ✓ Design an evidence-based decision matrix to evaluate the animal welfare impacts of evacuating animals compared to managing them on owners' properties (rather than a blanket expectation of no animals left behind).
- ✓ Ensure animals are directly referenced in cordon management protocols.
- ✓ Ensure animal welfare representatives are present at cordons to assist animal owners during restricted access to properties.
- ✓ Proactively engage animal support agencies in information technology strategies that address gaps in intelligence sharing across organisations and sectors.
- ✓ Strengthen community evacuation compliance by ensuring the crisis communication strategy includes information on animals.
- ✓ Ensure wildfire public education includes plans for animals.

6.1 Introduction

Wildfires can be a natural phenomenon in many types of vegetation cover and forest ecosystems, yet humans are becoming the predominant cause of wildfires (Tedim et al., 2020). The past several years have produced an unprecedented series of devastating wildfire events resulting in substantial social, economic and environmental impacts (Filkov et al., 2020). Many events have resulted in mass evacuation, fatalities, injuries and a high damage toll, in part due to the proximity to more densely populated areas at the rural-urban interface (Langer & Wegner, 2018; Radeloff et al., 2018).

Wildfires significantly impact people, animals and the environment, including agriculture, food security, biodiversity, public health, animal welfare and social structures. Worryingly, the consequences of climate change, including rising temperatures and less rainfall, could increase wildfire frequency and severity (Filkov et al., 2020; Huggins et al., 2020).

In Australia's 2019/20 wildfire season, known as Black Summer, more than 15,000 fires occurred across all states, destroying over 3,000 homes and killing 33 people (Filkov et al., 2020). Environmental and animal impacts were devastating. The fire resulted in a combined impact area of around 19 million hectares. An estimated 3 billion native animals were impacted, killing more than 1.25 billion, and hundreds of millions more were injured or had their habitat destroyed (Filkov et al., 2020).

This figure does not include pets or livestock. Nine per cent (2.3 million) of the national cattle herd and 12 per cent (8.6 million) of the national sheep flock lived in the area of the fires (Gillies 2020). Because there is no national database for Australia that captures animal losses in wildfires, an accurate number of total losses will not be known (Coll 2013a). The Black Summer fires are among the worst animal and biodiversity disasters in modern history (WWF, 2020).

New Zealand is not immune to wildfire events. Historically they have been small, occurred in rural areas, and with limited risk to life and property (Langer & Wegner 2018). However, there is a trend of increasing population growth near the rural-urban fringe, attributed to land conversion from farming to lifestyle properties and urban sprawl (Huggins et al., 2020), leading to increased wildfire risk to people, animals and the environment in these areas. The Port Hill fires in 2017 and Pigeon Valley fire in 2019 are perfect examples of the impacts of wildfires on the rural-urban fringe and highlight the need for research to understand these impacts better.

6.1.1 2017 Port Hill Fires – Christchurch

On February 13, 2017 devastating fires burned over 1,600 hectares of land on the Port Hills of Christchurch, and it met the conditions of an extreme fire event (had significant ecological and socio-economic impacts) (AFAC, 2017; Tedim et al., 2018)

To that date, it was the largest vegetation and property fire in recent history due to the merging of two fires into a single fire (Montgomery 2018; AFAC 2017). In the two weeks, it took to bring the blaze under control, a helicopter pilot died, nine homes were destroyed, and at least 1,400 residents evacuated (Langer & Wegner 2018; Squance et al., 2018).

The fire affected the rural-urban interface communities, where families were likely to have many pets and other animals, such as horses, goats, pigs, cattle, deer, alpacas and poultry. Anecdotal evidence suggests animal lives were lost. However, because there is no national database for New Zealand that captures animal losses in wildfires, an accurate number of total losses will not be known (Squance et al., 2018).

6.1.2 2019 Pigeon Valley Fire – Tasman District

The Pigeon Valley fire started on February 5, 2019 and burned for three weeks. The fire ripped through thousands of hectares of land in Pigeon Valley, Tasman District. It forced thousands of residents to evacuate from Pigeon, Eves, Teapot and Redwood Valleys, Golden

Hills Road and Wakefield in the Tasman Region. It eventually burned around 2,300 ha of commercial plantation forest, property and pastures and had a final perimeter of 35km. A home and a shed were the only property lost in the fire, and no human lives were lost; however, there were animal losses (Gooch, 2019).

Approximately 200 lifestyle properties, 120 urban properties and 15 farms were evacuated. During the response, 900 animals were sheltered at the A&P showgrounds. Many others were cared for at local veterinary clinics, the SPCA and fostered by the community. It is estimated 16,000 animals were still on properties behind cordons which were in place in some areas for up to three weeks.

6.1.3 New Zealand Emergency Management Framework

In December 2015, the New Zealand National Civil Defence Emergency Management Plan included animal welfare for the first time (MCDEM 2015a). The Ministry for Primary Industries (MPI) was appointed as the responsible agency. The inclusion of animal welfare emergency management (AWEM) acknowledges that disasters have an extraordinary impact on animal welfare (Vroegindewey, 2014) and that there is a strong link between animal welfare and human wellbeing (Pinillos et al., 2016).

AWEM is continuing to gain international attention. In 2016, the World Organisation for Animal Health (OIE) adopted the Sendai Declaration. It issued guidelines on disaster management and risk reduction for animal health, animal welfare and veterinary public health. The OIE noted:

> *"recent disaster events highlight the need to bring all components of disaster management together in cohesive response plans at both national and international levels using a multidisciplinary approach to achieve optimal efficiency and effectiveness." (OIE 2016)*

Much of the international research has focused on animal owners and their failure to evacuate (Heath et al., 2001), their risk-taking to save animals (Trigg et al., 2015a; Thompson,

2015), the emotional impacts of animal loss (Hall et al., 2004; Appleby & Stokes, 2008; Hunt et al., 2012; Evans & Perz-y-Perez, 2013; Yamazaki, 2015; Travers et al., 2016; Ounkem, 2016; Darroch & Adamson, 2016) rather than on the importance of AWEM multiagency collaboration.

We know from broad emergency management research that collaboration between agencies is fundamental for managing the integration and coordination of systems during all phases of a disaster (Janssen et al., 2010; Curnin et al., 2015a; Howes et al., 2015; Becker et al., 2018). Therefore, there is a need for research to explore factors influencing the range of stakeholders who encounter the human-animal interface in emergencies in New Zealand (Taylor et al., 2015c; Squance et al., 2018) and to identify gaps in current wildfire emergency management arrangements.

6.2 Study Objectives

This study aimed to investigate gaps within the current AWEM arrangements and develop recommendations for wildfire response to enhance multiagency collaboration for humane animal welfare emergency outcomes. Responses to two recent wildfire events, the 2017 Port Hill fires and the 2019 Pigeon Valley fires, were critically evaluated with this objective in mind.

6.3 Study Methods

The research design used a multiple method approach of document analysis, semi-structured interviews and focus groups for collecting qualitative data.

6.3.1 Document Analysis

An analysis of situational reports, debrief documents and media reports of the events was undertaken. This method has been used in previous studies for contextualising the effectiveness of existing policymaking and implementation processes to inform recommendations (Howes et al., 2015; Termeer et al., 2011).

The agency and organisations targeted for the focus groups and semi-structured interviews were informed by previous work of Squance et al., 2018 and a review and analysis of existing reports/debrief and media reports (social, television) was used to identify agencies who experienced the human-animal interface in the two events. The primary investigator was also an emergency management practitioner at the time of the events and was involved in both fires. Therefore, some emergency responder contacts were facilitated by the networks and relationships of the primary investigator.

The semi-structured interviews and focus group structure was the standard debrief format of what worked well, what could be improved and identify gaps (Appendix 1).

6.3.2 Focus Groups

Focus groups are group discussions organised to explore a specific set of issues. This stage involved running separate focus groups for each event with organisations from the public and private sector and volunteer and non-government organisations.

Fire and Emergency New Zealand (FENZ) hosted the Port Hill fire focus group in the Christchurch justice precinct (June 14, 2019). The Nelson-Tasman Civil Defence Emergency Management group hosted the Pigeon Valley fire focus group at the emergency coordination centre (September 9, 2019). The location and presence of wildfire lead agencies may have inhibited the response from some participants. However, these organisations' presence provided a high degree of support for the project and highlighted the high value placed on the research outcomes. Participants were offered the opportunity to participate in an individual semi-structured interview if they felt more comfortable doing so or were unable to attend the focus group.

The length of time between the events and the focus groups could have impacted on the engagement of participants. In the case of the Port Hill fires, the focus group occurred approximately 2½ years after the event; therefore, the length of time elapsed could have

affected the participants' ability to recall full details of the fire response. The Pigeon Valley fire focus group occurred seven months after the event when many organisations had just completed inter- and intra-agency debrief meetings which could cause debrief fatigue. However, the focus group was the only debrief aimed at organisations that interacted at the human-animal interface.

All participants were given an information sheet (Appendix 2) and signed a consent form (Appendix 4), either before or at the time of meeting the researcher for data collection. The focus groups went for between 120 and 180 minutes. Each focus group was split into two smaller working groups to discuss their experience, and then the participants came together as a full group to discuss key themes. The discussions were audio-recorded and lasted between 20 and 30 minutes. The researcher wrote themes on the whiteboard, and photographs were taken before being removed for the next discussion. A focus group report was written based on the data collected and sent to participants for review to ensure accuracy, with any alterations made by the participants before data analysis occurred.

6.3.3 Semi-structured interviews

The main strength of interviews is their ability to yield unanticipated findings. Consistent with qualitative techniques, the aim is not to interview a minimum number of interviewees rather it is to reach a level of 'saturation' of themes.

The interviews were audio-recorded and transcribed verbatim by a professional transcriber before data analysis. The interviews lasted approximately 30–45 minutes, generating transcripts of between 3,500 and 11,000 words. The interview transcripts were returned to the participants to check and ensure accuracy, with any alterations made by the participants changed in the transcript before data analysis (Appendix 4).

6.3.4 Data analysis

Thematic analysis was used for data analysis because of its flexibility and suitability to the project (Clarke & Braun, 2014). Coding was undertaken without the constraints of pre-existing categories. Instead, it allows for the themes to emerge naturally. Underpinning the data analysis was an inductive, reiterative approach (Glaser & Strauss, 1967). This phase was completed with the aid of the data analysis software, Dedoose (https://www.dedoose.com).

This report provides a summary of four themes, chosen to provide an overview of key issues in AWEM wildfire response. Detailed analyses are not provided here but are or will be available in related publications (Squance et al., 2018; Squance et al., (2021) in review). This report provides a "quick view" of valuable information about participants' views of their lived experiences in two wildfire events in New Zealand. The report includes recommendations for enhancing multiagency collaboration for humane animal welfare emergency outcomes in wildfire response.

6.3.5 Ethics

This project is part of a larger PhD project, "Enhancing multiagency collaboration for Animal Welfare Emergency Management", and has been approved by the Massey University Human Ethics Committee: Southern A, Application 17/54 (Appendix 6).

6.4 Results

6.4.1 Participants

A combined total of 38 individuals who responded to the Port Hill fires and Pigeon Valley fire from 19 different national, regional and local organisations participated in semi-structured interviews (n = 12) and focus groups (n = 26).

The organisations represented included 12% (n = 5) from Civil Defence Emergency Management Groups (CDEM), 10% (n = 4) from local government including local government officials, 15% (n = 6) from emergency services (fire, police and defence force), 15% (n = 6) central government organisations (Ministry for Primary Industries and Department of Conservation), 24% (n = 10) from animal charities including animal response teams, 17% (n = 7) veterinary professionals and 7% (n = 3) agriculture organisations (federated farmers, rural support trust etc) (Figure 6.1).

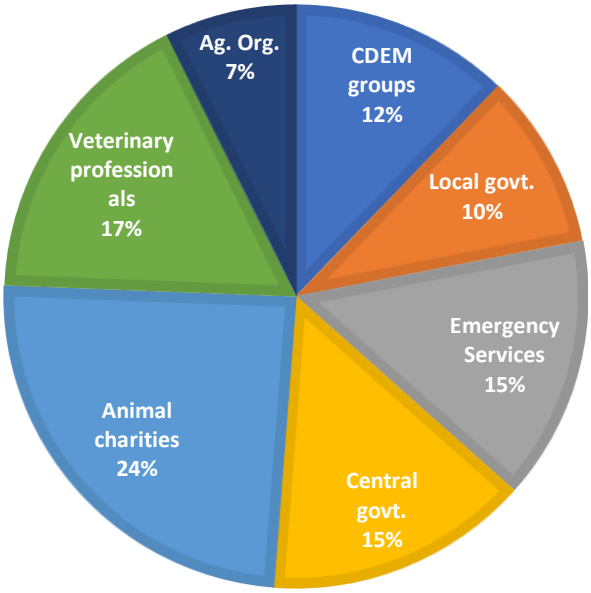


Figure 6-1 Study participants by sector (n = 38)

The total percentage and number of individuals are greater than 100% and 38, respectively, as some individuals represented more than one organisation or category.

The study participants reflect a diverse range of emergency response organisations and stakeholders who experienced the human-animal interface during wildfire events (Taylor et al., 2015c). This expands beyond traditional animal welfare agencies and organisations legislated in New Zealand to address animal welfare needs during disasters (MCDEM 2015b).

Unsurprisingly, the highest number of participants (67%) represented animal welfare charities and other animal-related organisations due to their shared purpose of supporting animals in emergencies. However, the substantial number of participants from emergency management organisations highlights the importance of the presence of animals in wildfire events.

Most participants (95%, n = 36) had only experienced one of the fires, with the other 5% (n = 2) having had experience in both fire events.

6.4.2 Interviews/focus groups key themes

6.4.2.1 Wildfire response structure

Fire agencies are responsible for firefighting to control, contain and extinguish fires (MCDEM 2015b). At the time of the Port Hills fires, the principal fire agencies involved were the New Zealand Fire Service, the National Rural Fire Authority, the Selwyn District Council, the Department of Conservation, the Christchurch City Council and the New Zealand Defence Force. Once a fire event reaches a certain threshold that the fire incident commander determines for each fire event, civil defence is activated in a support role. If a local CDEM declaration of emergency is made, the response structure evolves to unified control, i.e. both fire and CDEM lead (personal comms T Mitchell, FENZ):

> *"My recollection, there's only been three civil defence emergencies declared for rural fires. And so it's not something that we do very often. The majority of fires in rural areas are managed exclusively by fire and emergency."* Emergency services agency

For many, there was a lack of understanding of who was leading the response and what their roles and responsibilities were. A participant from the Port Hill fire response recalled:

> *"The biggest confusion at that time was we didn't know in terms of emergency response who was basically leading the response."* Primary sector agency

A firefighter explained:

> *"We didn't know who to contact to assist with the large animals on properties, especially those that needed to be put down, but after some time, we connected with the right organisations and was able to delegate animals to these organisations."* Emergency service agency

In the Port Hill fire focus group, the lack of animal welfare representation in the emergency operations centre (EOC) and the incident management team (IMT) was discussed. The consensus was that this created a disconnect for animal agencies from the response which caused confusion, led to difficulties with communication and delay in mobilising the required resources. Also, there was a lack of understanding that the region had established animal support agency relationships and networks after the Christchurch earthquakes.

> *"We didn't have any formal arrangements between fire and animal control, but we had relationships with animal support agencies where we have a team called AWERT (Animal Welfare Emergency Response Team), which is an emergency task force for civil defence emergencies. I think the only reason we got involved in the end was because civil defence did get involved because of the evacuations that needed to be done. And again, that was through our own initiative really rather than the formal communication from civil defence in the beginning."* Animal support agency

The focus group identified animal welfare as a big problem in small fires due to how quickly they move and the immediacy of the response needed. However, the animal welfare subfunction is only officially activated when civil defence and emergency management is activated. Generally, this only occurs when it is a large fire and many people are required to evacuate and is not based on the number of animals requiring evacuation or the resources needed to assist with animal evacuations.

In July 2017, fire agencies amalgamated into Fire and Emergency New Zealand (FENZ). With lessons identified from the Port Hill fires, local notification and activation arrangements in Selwyn between FENZ and animal management teams were rolled out in the Canterbury region.

> "*We've fixed that now so there's a better line of communication and people know who to ring. And I guess with FENZ, we probably need to work on that. We have worked on it locally and we've got that fire ground training coming up through our organisation*." Animal support organisation

When the Pigeon Valley fires occurred two years later, these arrangements had not been replicated in other regions, nor were there relationships between animal management and FENZ. However, work had occurred in the region to develop an animal welfare emergency management plan which was in draft form at the time of the incident. The process of developing the plan had created opportunities for the creation of networks and relationships between CDEM, MPI and local animal service organisations and the development of a rural advisory group. It was through these networks the animal welfare coordinator was informally notified of the potential scale of the event and activated relatively early.

> *"….and later in the day getting a phone call from a member of our rural advisory group, who's also involved in the rural fire service. He rang me up early afternoon and said what he'd been looking at from the fire perspective. He thought this was going to be quite a dramatic event. And MPI needed to get the wheels turning very quickly to be able to participate in this situation."* Primary sector agency

The Pigeon Valley fire focus group discussion identified aspects that went well: the early activation of an animal welfare response, the presence of the regional animal welfare coordinator in the EOC and the inclusion in the IMT meetings when it was realised how much the lack of access to animals was impacting the community. Additionally, the recognition of the presence and importance of animal welfare for FENZ and the Police was a new

consideration. This sentiment was echoed during the semi-structured interviews and explained the evolution.

> *"We are now operating under new legislation which clearly gives us a responsibility to assist with recovery so that changes the way we've traditionally done business." FENZ*

> *"But the very clear trend, and the opinion of the CDEM group, is that animal welfare is an extremely important priority and we can see it coming up the rankings of the things we need to work on."* CDEM controller

As animal welfare is a big problem in all (small, medium, and large) wildfires, there is a need to develop an animal integrated wildfire response structure that is at a local level yet scalable.

Image 6.2 Pigeon Valley fire emergency operations centre (image credit: Nelson City Council)

6.4.2.2 Evacuation & Sheltering

Evacuations are known to be among the most socially disruptive and stressful impacts during wildfires and other hazard events (Squance et al., 2018; Jakes et al., 2010). Evacuation is a process designed to reduce risk, keep people safe and control an area. However, the presence of animals creates additional complexities, particularly at the rural-urban interface, where lifestyle properties are involved.

> *"During the initial fire fighting phase we've always got a very close relationship with the landowners. Most of our volunteers are farmers on the rural side so they understand stock, they know the area, they know their farmers and they know their*

farms. So my experience is that the farmers will be talking to us and saying you know I've got stock here, I've got stock here, and in most cases they'll go and cut their fences … but the lifestylers are a totally different beast." Emergency services agency

The decision to evacuate properties is generally based on experience. Fire behaviour modelling is utilised in larger fires by using landmarks as triggers to evacuate (Kuligowski, 2021). However, the chosen triggers do not take into consideration human behaviour, the logistics of evacuating animals, the time it takes to transport animals (Squance et al., 2018), and that animal evacuation is often a highly improvised activity for owners and responders (Wijnker et al., 2018). Furthermore, intensive animal housing facilities such as pork and poultry are unable to evacuate due to animal welfare and biosecurity reasons.

"I remember there was an issue with a man, an old man, and he had to leave his house because the police were trying to set up the whole area (evacuate the area and place cordons). *And he didn't want to leave because he had alpaca with cria and no one knew how to move the animals. The guy was just saying "I'm not going to leave them*." First Responder

Image 6.3 Firefighter assisting with horse evacuations during the Port Hills fires (image credit: N. Powell).

During the Port Hill fires, the disconnect between animal agencies and the response was also highlighted when the public started to reach out asking for assistance with evacuating their animals, initially not knowing who to contact or where they could take their larger animals, such as horses and other livestock. Additionally, emergency services agencies were not aware of who could assist animal owners during evacuations or assist emergency services beyond cordons when animals left on the property were at significant risk and requiring immediate evacuation.

> *"People were definitely ringing up and saying I can't get to my property, and I need someone to go and help. A lot of people, I guess the public, didn't think to ring animal control."* Emergency services agency

The focus group discussed the lack of an animal emergency shelter, with a further issue being that there was no single point of contact for animal owners. In the early stages, people did not know who to contact to request assistance with their animals. However, it was noted that offers of support from the community were tremendous. The offers included the use of floats and vehicles to assist with evacuations, a place to stay with pets, and land made available to contain larger animals.

In contrast, the Pigeon Valley fire focus group discussed the importance of pre-identifying the A&P show grounds as a potential site for a temporary animal shelter before the event occurred.

> "*One thing I will say that I thought was the masterstroke for the Nelson [Tasman District] fires compared to the Port Hill fires, was when they set up that area down at the temporary animal shelter, that was awesome."* Primary sector agency

The temporary animal shelter catered for a large range of animals.

> "*What we found was there was a great need for us to provide a service for cats and dogs, but there was also a huge need to move livestock animals from lifestyle blocks. In the end we looked after over 900 animals.*" Animal support agency

This, among several different components, seemingly led to a better-integrated animal response.

> *"Nelson went a lot better on the animal side of things than the previous responses. It was clear that animals were at the forefront. You knew when people were being evacuated, they were being encouraged to take their animals and given assistance to do so."* Animal support agency

However, approximately 16,000 animals were still present on lifestyle properties and farms after the mandatory evacuation came into force and cordons were put in place. The decision to evacuate or not to evacuate animals is complex, particularly in a rural setting. It can depend on the fire's speed, availability of resources, biosecurity considerations and the stress of transporting animals. If animals are left on properties, they still require basic needs such as food, water, shelter and access to veterinary care.

6.4.2.3 Cordon Management

A cordon is a physical barrier used to restrict access to active fire grounds. Cordons vary in size and duration. They inherently create tensions that are exacerbated when animal owners are separated from their animals (Squance et al., 2018; Underwood et al., 2020).

During the Port Hill fire event, cordons were placed during the day when householders were away from their properties (Squance et al., 2018). Those at home were given very little time to leave.

> "*They've been told to leave them (animals). Especially the ones that were roaming and were outside. That they had to leave straight away and just leave them*." Animal support agency

Various animal agencies reported the community contacting them to ask for assistance.

> "*People were saying "we can't get to our animals, we are cordoned off*." Animal support agency

"Public weren't in that area but there were communications that people had properties where they weren't able to get to and they knew that their dog was still locked inside or chained up." Emergency services agency

However, there was a stark contrast between councils with respect to the ease of access through cordons for animal support agencies. On the Christchurch side of the fire, where pre-existing relationships with fire and animal agencies were not evident, reported access through cordons was extremely difficult.

"*We received a phone call from officials, saying that there were horses and they couldn't get them, they were stuck around a fiery area and they needed to be removed. One party, which I don't know which one was which, but they told us to go in there and get those horses out. The fire was getting to them and they needed to get the horses out. So we were setting up everything, having the trailer ready etcetera. I was preparing my staff getting everything ready to go there and get those horses out. Then we got phone calls saying 'you can't go and you have to stay here' and then I got phone calls with 'no you need to go because the horses are here and we can't get them out'. Then they went there and they were sent back by other people saying 'you can't get in here'* at the cordon." Animal support services

Image 6.4 Cordons in place during the Port Hills fires (Image credit: John Kirk-Anderson/Fairfax NZ).

On the Selwyn side, fire agencies and animal control had pre-existing relationships as they knew they had to have plans in place to address animals during wildfire events. The local arrangements were based on experience with fires in the area and personnel co-located at the council building. Therefore, access through cordons wasn't as problematic as Christchurch, but resourcing was limited due to the animal control team's small size. Firefighters evacuated animals when they came across them on unattended properties (Squance et al., 2018) and assisted animal control when the opportunities arose, as explained by a firefighter who is an experienced horse handler:

> "*We gathered at our meeting point where multiple other agencies were and we were basically waiting to be reassigned to see where else we could be needed because by that stage there were fires on the other side. I heard those conversations through animal control. People said "oh someone else has got a horse down the road' and I perked up and went "I could possibly help. Which way do I go?" So it was all right place, right time that I heard the conversations and I offered. Basically, he was more than welcoming of my help and assistance*." Firefighter

In the Pigeon Valley fire event, through previous experience, the cordon management process evolved as explained by a participant who experienced both the Port Hill fire and the Pigeon Valley fire:

> "*Previous experience that I and others have had where it hasn't gone so well is from an animal welfare perspective, and that actually put animal welfare sort of front and centre.*" Emergency services responder

The Pigeon Valley focus group identified the shift from the initial hard cordons, which people were breaking through to get to their animals, to a permeable cordon system (which included emergency access for animal response teams and later restricted resident access) that really helped with human safety and animal welfare. This was explained further:

> *"[During the] Port Hills fires, people were going back into their houses but a lot of that actually was about animals at the end of the day. It tended to be more about domestic ones. I think this one* [Pigeon Valley fire] *was more livestock. It was the end of summer,*

> *in drought conditions, and it was a rural community, so I think animal welfare was one of the key drivers of the resident access. A priority by everybody involved in that response."* Emergency services

To ensure animal welfare was at the forefront in the cordon management function, an animal welfare coordinator became part of the cordon management team in the EOC. This created opportunities for amalgamated animal response teams to be granted emergency access to cordoned areas to assess animals and address any immediate needs.

> "*We were wanting restricted residential access up there, we just couldn't do it because of the fire break out at the cordon, the resources required to come off the fire ground to protect people and yeah genuine safety concerns for larger numbers of people back up into xxx Valley. To have the support and the resources to actually be able to do it (get animal response teams through the cordons) within a very short period of time was professionally probably one of the more rewarding things."* Emergency services

Image 6.5 Assisting with animal evacuations during the Pigeon Valley fire (image credit: Newshub/Ed O'Driscoll).

In addition to animal representatives on the cordon management team, animal welfare inspectors became part of the physical cordons' multiagency team during the restricted residential access times. They were available to assist animal owners in addressing their animals' needs, such as accessing supplementary feed and stock water source and reporting issues with stock containment. They were also able to gather valuable data on the

number and types of animals still on properties and damage to properties, such as melted water pipes, burnt fencing or damaged fencing due to fire breaks, which could assist with forward planning.

> *"We could say "hey you know what you need, let's get it done", so we were able to focus on those individual people's needs. We knew where people could go to get what they needed or we could arrange it for them. For example a chappy up xxx Valley that had sheep on his front lawn and they'd died. That's not a nice experience for them to go home to so if we can whip up here and clear those sheep out and then they go back and they see they're gone, then it gives them an impression that they're valued. I think that that was really successful how that happened."* Animal welfare inspector

6.4.2.4 Communication

Communication is the process of creating a shared meaning among all involved (Fischer et al., 2016). Crisis communication is usually distinguished into two groups – responders and the public. It takes place within and between response organisations as well as among the public. During emergency events, crisis communication is featured as an area that requires improvement and, on the flip side, good communication assisted in positive outcomes. Participants from the Port Hill fires and Pigeon Valley fire noted positives and improvements about both groups in crisis communication.

An animal support organisation described their experience during the initial stages of the Port Hill fires:

> *"We didn't really know how big the issue was and how big the fire was until it was covering quite a bit of area already. It was quite quiet, so we offered our help, but nothing really came. Then we started hearing phone calls from members of the public coming to our reception area. People that were saying "we can't get to our animals, we are cordoned off."* Animal support agency

This highlights a disconnect between animal support agencies and the fire ground crew through lack of intelligence sharing to understand the event's size and scale. It also explores the gap the public filled by informally creating situational awareness for animal support

agencies. However, once in the cordon areas and working directly at the Incident Control Point (ICP), communication flowed between animal responders and emergency services.

> *"So working with them was really good, they communicated well with me, I communicated how I was going to do certain stuff. And it went seamlessly thankfully… we work with a lot of different agencies, machinery operators, the helicopters, other teams from different areas and you know everyone works differently. But we were all there for a common purpose. And it was to help and even the police working alongside with the animal control. You know animal control said we need someone up at this property. The police were there, they escorted me to the property where the horses were."* Emergency services

In the Pigeon Valley fire, the animal welfare support agencies reported they were better informed:

> *"I compare having dealt with the Nelson fire and what happened in the Port Hills. And the Nelson fires I felt that was way better right from the bat because we turned up, the briefings were ready to be given to us straight away so we knew as soon as we started what, where we were going, what we were doing. And that's the biggest difference between the two of them that we were able to do a lot more work right from the word go."* Primary sector agency

However, there are still gaps that need addressing. The Pigeon Valley fire focus group discussed how the issues which were recorded at the cordons were not getting back to the EOC in a timely manner. Therefore, it was not necessarily captured as part of the intelligence flow, created a gap in situational awareness, and the community's needs were not necessarily being addressed.

Public information is a critical component of effective emergency management. If the community are kept well informed of the developing situation, given time to make their own decisions and plans for evacuation particularly in relation to their animals and execute those plans, this will reduce the resources required to respond to the event. A first responder explains this concept:

> *"It appears that on that night they were very focussed on the fire fighting and perhaps not so much of forward thinking of the community that needed to be given the heads up which meant some of them were really fast evacuations. Perhaps if they had been given a bit more of a heads up, they would've been able to fill their water troughs, proactively feed out and do all of that stuff. Which would've taken some of that initial pressure off. Absolutely it was a fast-moving event but I think potentially some of that big picture planning of this event prediction may have actually helped getting those messages out to people ahead of that rather than giving the word you know five minutes before they had to go."* First Responder

Communication is key to quick and efficient coordination in the response phase. Previous research provides evidence suggesting that poor communication during crisis response negatively affects collective decision-making, collaboration and coordination (Fischer et al., 2016).

Image 6.6 Pet evacuation kit (image credit: Hayley Squance)

6.5 Recommendations

Animal welfare emergency management in wildfires is still novel, yet over the two wildfire events, progress has been made with integrating animal welfare into the wildfire response at a local level. However, much of the improvements were based on networks and relationships rather than formal arrangements. This study highlighted four themes: wildfire response structure, evacuation and sheltering, cordon management and communication which are identified aspects of animal welfare in wildfires that need improving.

The following recommendations are informed by analysis completed to date as well as evidence from relevant literature. They are offered with a view to strengthening and building on the current wildfire response framework.

6.5.1 Wildfire response framework

This theme highlighted the need for agencies and organisations that experience the human-animal interface to understand the importance of the presence of animals, roles and responsibilities of the wildfire response framework in small, medium and large scale events, and the inclusion of animal welfare technical advisors in the incident management team and emergency operations centre. The following recommendations will help to achieve this:

- ✓ Improve awareness and training of animal welfare emergency management in wildfires with emergency services organisations
- ✓ Develop a scalable animal-inclusive wildfire response framework:
  - Fire and Emergency New Zealand should develop doctrine to formally integrate animals into local and national incident management teams and at incident command points.
- ✓ Ensure animal welfare response is coordinated from the multiagency emergency operations centre.

6.5.2 Evacuation and sheltering

Managing evacuations with the presence of animals and the subsequent need to contain animals outside of a cordoned area is complex and resource-intensive. This project has highlighted the need to consider the presence of animals before, during and after evacuations for wildfire events. Additionally, the complexities of decisions that need to be made about evacuating animals to alternate places compared to managing animals on the property. The following recommendations will help to address this:

- ✓ Develop triggers for evacuations that take into consideration the time required to

evacuate pets and livestock.

- ✓ Pre-identify intensive animal housing facilities that can't be evacuated due to animal welfare and biosecurity reasons as "assets to protect".
- ✓ Design an evidence-based decision matrix to evaluate the animal welfare impacts of evacuating animals compared to managing them on owners' properties (rather than a blanket expectation of no animals left behind).

6.5.3 Cordon Management

The separation of animals and their owners due to the placement of cordons is known to create tension within the community. This project continues to highlight the issues experienced due to the placement of cordons and their subsequent management when animals are still on people's property. The evolution of cordon management from the Port Hill fires to the Pigeon Valley fires with the inclusion of animal welfare members on the cordon management team is a positive step forward. However, to ensure animals are integrated into cordon management protocols in the future, the following recommendations are offered:

- ✓ Ensure animals are directly referenced in cordon management protocols.
- ✓ Inclusion of animal emergency management coordinators in transdisciplinary cordon management teams.
- ✓ Ensure animal welfare representatives are present at cordons to assist animal owners during restricted access to properties.

6.5.4 Communication

Communication always features as a component of emergency response which requires improvement, and this is reflected in the findings of this project. Communication within agencies and across agencies requires development to address the shortcomings. Additionally, communicating to the public is also essential to ensure the community is well

informed and can make adequate decisions that will reduce the impact on them, their animals and the environment:

- ✓ Proactively engage animal support agencies in information technology strategies that address gaps in intelligence sharing across organisations and sectors.
- ✓ Strengthen community evacuation compliance by ensuring the crisis communication strategy includes information on animals.
- ✓ Ensure wildfire public education includes plans for animals.

Although this project focused on wildfire response, many recommendations should be addressed during other stages of the emergency management cycle. Further work is required to develop strategies to reduce wildfires' impact on people, animals and the environment.

6.6 Acknowledgements

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The research team is grateful to all of the agencies, organisations and individuals for giving their time and sharing their experiences of the two fire events and thoughts on improvements towards enhancing multiagency collaboration for humane animal welfare emergency outcomes – wildfire responses.

Finally, I greatly appreciate the valuable input of peer reviewers from the Joint Centre for Disaster Research, Massey University.

7 Strategies for implementing a One Welfare framework into emergency management: an animal lens [3rd Manuscript]

Chapter narrative

The purpose of this manuscript was to address the fourth research objective – *To describe how a transdisciplinary framework could be implemented in emergency management.* Additionally, the manuscript introduces the emergency management sector to a h-a-e transdisciplinary framework. The strategies proposed in the manuscript were developed from scholarly literature and tested and refined in the New Zealand emergency management sector.

Manuscript preparation and publication

I prepared the manuscript as the primary author with my supervisors, Dr MacDonald, Dr Stewart, Dr Prasanna and Professor Johnston, as co-authors. I conducted a scholarly research and tested the ideas in practice. All co-authors offered feedback on the content and structure of the manuscript. I prepared the final manuscript for submission to the journal. The manuscript was published by the Animals Journal on the 3rd of November 2021. Statement of Contribution Appendix 11.

Abstract

Responding to emergencies requires many different individuals and organisations to work well together under extraordinary circumstances. Unfortunately, the management of animal welfare in emergencies remains largely disconnected from emergency management overall. This is due predominately to professional silos and a failure to understand the importance of human-animal-environment (h-a-e) interdependencies. One Welfare (OW) is a concept with these interrelationships at its core. This paper argues that by adopting a OW framework it will be possible to achieve a transdisciplinary approach to emergency management in which all stakeholders acknowledge the importance of the h-a-e interdependencies and work to implement a framework to support this. Acknowledging that such a transformational change will not be easy, the paper proposes a number of strategies to overcome the challenges and optimise the outcomes for animal welfare emergency management (AWEM). These include legislation and policy changes including h-a-e interface interactions as business as usual, improving knowledge through interprofessional education and training, incorporating One Welfare champions, and recognising the role of animals as vital conduits into communities.

Keywords: One Welfare, animals in disasters, implementation, emergency management, animal welfare

7.1 Introduction

In many countries animals are increasingly included in emergency management legislation and policy with specific organisations delegated responsibility for animal welfare in emergencies, including the development of animal inclusive emergency management plans (Dalla Villa et al., 2019; Heath & Linnabary, 2015; Possenti et al., 2020; Squance et al., 2018; Taylor et al., 2017c; Westcott et al., 2017a). Despite this progress, issues persist, such as animal welfare response being disconnected from the official overall emergency response.

Inadequate AWEM responses often result in increased risk behaviours of animal owners (Squance et al., (2021) in review). This can then result in failure to meet the intended outcomes of protecting public safety and wellbeing, animal welfare, food security and biosecurity (Dalla Villa et al., 2019, 2020; Migliaccio et al., 2018; Squance, (2021) in review); Squance et al., 2018). Improving AWEM requires a shift from an inclusive approach to one in which animals are fully integrated into emergency management generally (Squance et al., (2021) in review). This demands a transdisciplinary approach to emergency management in which all stakeholders acknowledge the importance of the h-a-e interdependencies and implement a framework to support this (Peek et al., 2020).

OW is a concept that describes the interrelationships between animal welfare, human wellbeing, and the physical and social environment with the aim of creating a platform to enhance the understanding of, and response to, the complexities of the h-a-e interrelationships (Colonius & Earley, 2013; Pinillos, 2018a). OW acknowledges that h-a-e interrelationships transcend the expertise and boundaries of any one organisation and seeks to transition from traditional management by individual sectors towards an interdisciplinary approach (Darroch & Adamson, 2017; Johnson et al., 2018; Patronek et al., 2006). It is a way of breaking down barriers between agencies, individuals, sectors and the community (Lee & Brumme, 2013).

OW evolved from the One Health (OH) concept of structured collaboration and coordination between multiple health science professions to attain optimal human, animal and environment health systems (Gibbs, 2014; Harrison et al., 2019; Lerner & Berg, 2017; Mackenzie et al., 2013; Manlove et al., 2016). OH has been cited as an efficient and sustainable governance approach to address complex health issues (Johnson et al., 2018). It is argued that although OH has sparked an evidence-based body that goes beyond individual disciplines, the strong health focus lacks a vision of a set of social, cultural, economic and

environmental outcomes whose interdependence is similarly acknowledged, thus creating a significant gap in welfare-focused approaches (dos S. Ribeiro et al., 2019; Pinillos, 2018a). To address this gap, OW was developed as a broader concept to embrace an interdisciplinary approach (Lerner & Berg, 2017; Mills & Hall, 2014; Pinillos, 2018b). OW is better suited to the emergency management context as it is not solely focused on health and, by encompassing social, economic, environmental and cultural interdependencies, is more holistic.

While little is known about how the new concept might be applied in practice, the experience from OH implementation provides valuable insights to inform the implementation of a OW framework in emergency management. Although positive steps towards achieving an integrated OH approach have occurred over several decades, there continue to be challenges in its implementation (de Macedo Couto & Brandespim, 2020; Destoumieux-Garzón et al., 2018; dos S. Ribeiro et al., 2019; Gibbs, 2014; Johnson et al., 2018). These include lack of awareness and understanding of OH across sectors required to implement the approach, insufficient "whole-of-government" policy prioritisation and funding to support OH, lack of integrated education and training programmes, reliance on the leadership of a few individuals and institutions, and the translation of global OH to local-level efforts and outcomes (de Macedo Couto & Brandespim, 2020; dos S. Ribeiro et al., 2019; Gibbs, 2014; Johnson et al., 2018; Lee & Brumme, 2013). Dos S Riberiro et al (2019) explain: "the challenges in stakeholder collaboration relate to the fact that a multidisciplinary team of scientists [and practitioners] working together but within their own silo is not enough for the knowledge co-creation proposed in OH innovations" (p. 3).

OW provides a framework to address emergency management silos that negatively impact on AWEM, but challenges, similar to those faced with OH, are likely. Strategies will be needed to address these and to provide practical examples and evidence of the value of OW. While OW has been mentioned in AWEM literature, this has largely been limited to comments

about needing to include animals by considering them alongside people (Dalla Villa et al., 2020; Gongal & Ofrin, 2020; Nasim et al., 2020; Pinillos, 2018a). There has been no detailed consideration of the potential for OW to promote interdisciplinary collaboration through a transdisciplinary approach. This paper addresses that gap by arguing for the full integration of animals in emergency management and discusses how that could be implemented.

Additionally, this paper synthesises and extends a suite of conceptual frameworks, scholarly work around implementation, research findings and practice-based knowledge into an integrative framework with a number of core strategies (Figure 7.1). The strategies that have been tested and refined within the New Zealand emergency management system include legislation and policy changes including h-a-e interface interactions as business as usual, improving knowledge through interprofessional education and training, incorporating OW champions, and recognising the role of animals as vital conduits into communities.

Figure 7-1 Implementation strategies for OW in EM through an animal lens

7.2 Legislation and policy: from animal-inclusive to integrated

In New Zealand and elsewhere, the failure of emergency management legislation and policy to reflect the h-a-e interdependency has artificially compartmentalised human, social and animal welfare and created barriers to collaborative practice (Austin, 2013; Colonius & Earley, 2013; Farmer et al., 2016; Squance et al., (2021) in review). However, given that community wellbeing and safety is at the heart of emergency management, it is vital to break down the sectoral partitioning that exists between emergency management agencies, emergency service organisations, AWEM support agencies and other sectors of activity.

Animal welfare legislation, separate from emergency management and emergency service legislation, has limited application when it comes to collective planning for and management of animal welfare in disaster situations (White, 2012). As a result, fragmented policies and plans set different goals and standards for various agencies, sometimes in direct conflict.

For example, law enforcement agencies have the power to temporarily close a road, by placing cordons, if they believe that there is a danger to the public. However, cordons may be counterproductive if animal owners engage in risky behaviours, such as breaking cordons to gain access to their animals (Squance et al., 2018). Separating owners from their animals also means that they are unable to fulfil their duty of care (providing food, water and shelter) as required under animal welfare legislation (Dalla Villa et al., 2020; White, 2012). Without consultation, the wider consequences of measures, such as the placement of cordons, are not generally factored into the decision-making.

If emergency management legislation and policy is to be fit-for-purpose, it must have multilateral coherence with other relevant legislation, be consistent across Acts and policy and reflect h-a-e interdependencies to enhance social protection (Lakhina et al., 2021; Lee & Brumme, 2013; Olson et al., 2020). Generally, however, legislation and policy are not agile enough to reflect the complex needs of communities with changes being made in a reactive

rather than a proactive manner which only serves to increase sector fragmentation (de Macedo Couto & Brandespim, 2020; Evans & Perez-y-Perez, 2016; Lakhina et al., 2021; Olson et al., 2020).

Legislation and policy must respond to evolving societal needs and foster a holistic approach to emergency management that acknowledges h-a-e interdependency. This can only be achieved when animals are not simply 'included' in emergency management legislation and policy but fully integrated and in a manner that reflects a "whole-of-person" and "whole-of-society" approach (de Macedo Couto & Brandespim, 2020; Ismail-Zadeh et al., 2017; Lakhina et al., 2021; Mackenzie et al., n.d.; Peek et al., 2020; Williams & Sullivan, 2009; Squance et al (2021), in review). For example, the insistent call for animal welfare plans to be in place as a mechanism to protect animals in emergencies is problematic. Plans are only of value if they are co-created with stakeholders who experience the h-a-e interface, build capacity and capability, and integrate h-a-e across all pillars of emergency response and recovery. For example, an animal plan that includes animal evacuation considerations will be constrained and ineffective if the overall evacuation plan does not directly reference animals or is not aligned with the animal plan. By focusing solely on animals, silos are created and the intended outcome of protecting public safety, animal welfare, the economy and biodiversity is not achieved.

Legislation and policy must reflect a holistic, transdisciplinary view of emergency management in which h-a-e interdependencies are an integral component. This is a critical step in addressing interagency fragmentation, competition and breaking down barriers created by the bureaucratic division of responsibility which is counter-productive to the desired goals of emergency management.

As seen during the Eastern Bay of Plenty flood (Squance et al., (2021) in review) and the 2019 Pigeon Valley wildfire responses (Squance, 2021) in New Zealand, innovative, flexible

practices implemented during emergencies illustrate the positive potential of an OW approach to emergency management. Examples include the inclusion of an animal welfare coordinator in the emergency operations centre, animal welfare represented on the cordon management team and incident management team. Illustrating the OW approach as a catalyst to holistic consequence management by including multiple perspectives (Owen et al., 2018). In this way, response and recovery environments provide a unique opportunity to test, refine and develop ideas and provide practice-led evidence in support of legislative and policy changes.

7.3 Normalising the presence of h-a-e interface networks and relationships

Emergencies are complex and fluid. They require a diversity of people, disciplines and organisations to share expertise, perspectives and resources, and to collaborate and form a common goal of addressing acute challenges facing communities (Bridges et al., 2011). Strong collaborative networks based on existing, trusted relationships support better decision-making processes and actions during an emergency (MacDonald et al., 2015). Yet many of those encountering the human-animal interface during an emergency meet for the first time in a highly stressful environment which is not conducive to developing interprofessional trust and understanding necessary for positive transdisciplinary relationships (Curnin et al., 2015; Heath & Linnabary, 2015; Squance et al., (2021) in review; Westcott, 2021).

In the absence of pre-existing relationships, emergency management organisations are frequently required to act as brokers between agencies during a response (Jung et al., 2019). However, networks created under such conditions are rarely long-lasting, resilient or cost-effective with previous siloed ways of working coming to the fore (Andrew & Carr, 2013). Ideally, organisations need to forge direct links with one another so that their interactions

are normalised into business-as-usual activities, rather than relying on emergency management organisations to broker collaborative networks during emergencies. In this way, business-as-usual interactions can lead to more positive and trusting relationships and networks to underpin meaningful collaboration during times of crisis.

Disasters, while affecting whole communities, share some impact characteristics with other crises and extreme stressors experienced at the h-a-e interface, such as domestic violence, animal hoarding, structural fires and animals requiring technical rescue (Darroch & Adamson, 2017; DeGue, 2011; Pinillos, 2018b; Smith et al., 2015; Strong et al., 2019). These incidences often transcend the expertise and/or jurisdiction of any one organisation and should involve agencies such as emergency services, law enforcement, human services, animal control, environmental health, animal charities and veterinary professionals (Curnin et al., 2015; Paton et al., 1998; Strong et al., 2019). In practice, however, agencies generally work in silos, do not deploy simultaneously and if they do it is usually ad hoc due to informal individual relationships (Becker et al., 2018; Squance et al., (2012) in review). This siloed approach leads to unsafe practices (Green, 2014; Spain et al., 2017; Squance et al., (2021) in review), inadequate resourcing and capability and, in the case of animal hoarding, a high recidivism rate (Nathanson, 2009; Patronek et al., 2006; Strong et al., 2019).

For example, while fire services frequently experience h-a-e interactions with the presence of animals in structural fires, motor vehicle accidents and with entrapped animals requiring rescue, they do not routinely work with animal organisations. Such incidences occur more frequently than floods, fires and earthquakes, yet the presence of animals creates the same complexities (Green, 2014; Smith et al., 2015; Thompson et al., 2015; Trigg et al., 2017).

Safe and successful resolution of emergency situations involving animals requires emergency services personnel to have specialist training, skills and equipment, and a collaborative multidisciplinary team (Miranda-de la Lama et al., 2011; Smith et al., 2015; Squance et al.,

2018). However, emergency services did not traditionally have the skills or experience to respond to the presence of animals in such incidences, have lacked relationships with animal organisations and relied on an element of luck which resulted in a high risk of serious harm to the animal, owner and responders and significant reputational risk (Green, 2014; Westcott, 2021). It is equally important that supporting animal agencies have an understanding of, and alignment with emergency management systems and practices (Westcott, 2021).

Internationally the approach to entrapped animal rescue has been increasingly transdisciplinary and collaborative with the inclusion of interprofessional education and training, simultaneous deployment of animal expert resources by emergency services, utilisation of complementary skills and resources, and inclusion of the presence of animals as part of the incident risk assessment (Green, 2014; Smith et al., 2015). This has resulted in better response outcomes with a decreased risk to responders and animal owners, reduced mortality of animals, created a better understanding of individual disciplinary skill sets and roles and responsibilities, and more efficient and effective responses and opportunities for transdisciplinary teams (Thompson et al., 2014; Smith et al., 2015; Thompson, 2015).

Regular interactions between fire services and animal organisations over ‘routine' incidences would cement the relationships needed during an emergency such as a wildfire, earthquake, or flood event. This would enable them to move from novel relationships being brokered by emergency management organisations to normalising the relationships needed for AWEM. The transition to collaborative transdisciplinary teams requires a novel approach to identifying and aligning the synergies between organisations’ core business and h-a-e interdependencies. Focusing on the synergies between diverse positions can improve access to high-quality information and incentives within the network, increase confidence, reliability

and integrity, and develop a sense of trust and reciprocity between partners (Howes et al., 2015).

7.4 Interprofessional education and training

A key step in moving emergency management systems from fragmentation to a position of strength and unity is to become a collaborative practice-ready emergency management workforce (Bridges et al., 2011; WHO, 2010). There is clear evidence that interprofessional education enables effective collaborative practice through attitude change, greater understanding of the roles and responsibilities of others, increased awareness of barriers across professions, and increased awareness of the importance of professional collaboration (Courtenay et al., 2014; Kinnison et al., 2016; WHO, 2010).

Interprofessional education and training is delivered in health and aviation sectors and is recognised as an essential element of successful transdisciplinary collaborative practice, noting that just working with others in scenarios or temporary teams is not enough to build an effective collaborative practice-ready workforce (Courtenay et al., 2014; Destoumieux-Garzón et al., 2018; Gibbs, 2014; Johnson et al., 2018; Lee & Brumme, 2013; Mackenzie et al., 2013; Queenan et al., 2017; Roopnarine, 2019; Sargeant et al., 2008; WHO, 2010).

Despite individuals being expected to possess the skills, knowledge and attitudes necessary to work together in interprofessional emergency management teams, education and training has largely occurred in professional silos or assumed to be learned during scenarios (Innis et al., 2021). Emergency management and emergency service disciplines are taught almost exclusively in isolation from other emergency responders who experience the h-a-e interface. Animals in emergencies are not included in emergency management, emergency services, veterinary, animal science, agriculture or environmental science curricula (Squance, 2011). The lack of interprofessional education and poor curriculum integration amplifies

differences in organisational cultures and reinforces barriers to effective interagency collaboration.

If collaborative practice is to become the norm, change will be needed in attitudes, systems and operations. By embedding interprofessional education and collaborative practice into legislation, accreditation requirements and/or registration criteria, policy-makers and government leaders can champion change and endorse interprofessional collaboration (WHO, 2010). Leaders, who choose to contextualise, commit and champion interprofessional education and collaborative practice, position their emergency management system to facilitate achievement of the Sendai Framework priority of strengthening disaster risk governance (UNDRR, 2015).

The potential for working relationships in emergency management to be in flux due to the rise and complexity of emergency events, new occupations, professionalisation of emergency management, and challenges to the historically dominant single profession makes the present an ideal time to promote collaborative practice and implement interprofessional education.

Interprofessional education and training should promote complementary approaches to emergency management and include core interprofessional practice competencies across disciplines whilst being sympathetic to the conceptual and practical differences.

7.5 One Welfare champions

The shift to a OW emergency management framework will require a significant shift with stakeholders expected to operate in a context of collaborative practice with different organisational cultures coming together and working towards a common goal. The success of such a challenge, requiring commitment over a long period of time (dos S. Ribeiro et al., 2019), is critically influenced by the presence of strong and innovative champions of change

(dos S. Ribeiro et al., 2019; Olson et al., 2020; Pfadenhauer et al., 2017; Sergeeva & Zanello, 2018). Transformation of new cross-sector ideas and concepts without transdisciplinary champions rarely have the impetus needed for successful implementation (Day, 1994).

Successful champions have the courage to break down barriers, take risks and broker opportunities for collaborative practice whilst creating engagement and trust among all stakeholders (dos S. Ribeiro et al., 2019). They exhibit influence, ownership, physical presence during interactions, persuasiveness and a participative leadership style (Bonawitz et al., 2020; Demes et al., 2020; Sergeeva & Zanello, 2018). Facilitating a process to improve the current state to a desired future level (Bonawitz et al., 2020; Demes et al., 2020; Sergeeva & Zanello, 2018), champions use their mana[2], knowledge, resources and influence to help navigate the complex socio-political maze within their organisations. Using language that their discipline understands, they address resistance to new ideas and build organisational coalitions (Parkes et al., 2005; Sergeeva & Zanello, 2018).

OW champions will be needed to work within and across organisations experiencing the h-a-e interface before, during and after emergencies. This includes all levels of government, emergency services (police, fire), emergency responders (emergency management officers, response teams, lifelines and utilities), defence forces, human service organisations, veterinary professionals, human and animal welfare charities, primary sector, and geological and environmental practitioners.

Champions for OW must understand the challenges their organisations experience due to h-a-e interdependencies, know how to connect between multiple actors, domains and levels, forge change through transdisciplinary collaborative practice and be able to shift the focus

[2] In Māori, mana refers to a person's prestige, authority, control, power, influence, status, spiritual power, charisma, https://maoridictionary.co.nz/word/3424

from business-as-usual to innovative practice. Collectively champions need to be able to identify and utilise strengths, opportunities and comparative advantages of disparate disciplines and organisations whilst engendering co-creation central to OW initiatives (dos S. Ribeiro et al., 2019; Gongal & Ofrin, 2020; Sergeeva & Zanello, 2018).

If OW champions, representative of all levels within organisations and all key stakeholders, are engaged from the outset through the entire process, initiatives can be planned, designed and implemented in a collaborative manner across all sectors so that deeper and sustainable change can be achieved for AWEM and EM.

7.6 Animals as a conduit to the community

Central to the OW concept is an integrated and holistic approach to solving complex problems through recognition of the vital interdependencies between humans, animals and the environment. It is clear that during emergencies, human decision-making and actions are strongly influenced by their relationship with their animals (Thompson et al., 2014; Trigg et al., 2017; Westcott et al., 2020; Westcott et al., 2017a). Given over 60% of urban and 90% of rural households in developed countries own animals (Squance et al., 2018; Taylor et al., 2015c; Westcott et al., 2017a), a failure in emergency management to acknowledge this is a failure to consider the whole person, and measures intended to protect human life and wellbeing may, in fact, be counter-productive (Squance et al., (2021) in review).

During disasters, animal attachment can pose a risk to human safety but conversely, it can be leveraged through community engagement strategies to increase disaster preparedness (Thompson, 2015; van Manen et al., 2021). Shifting the balance from the negative influence of the human-animal bond to more positive outcomes will require a transdisciplinary approach to develop innovative strategies to engage with and motivate animal owners to better prepare for and respond to disasters.

Animal support organisations have a unique opportunity to create connections with people due to mutual connection with animals. This indirect social benefit of animal ownership can bridge the gap between people and facilitate coordinated, cooperative actions for mutual benefit (Darroch & Adamson, 2017; Wood et al., 2005).

In emergencies, people cannot always express their emotional needs and innovative engagement strategies are needed to ensure equitable access to available resources (Thompson et al., 2014). Asking about animals can be an 'icebreaker' in a social setting and provides a means of building rapport (Evans & Perez-y-Perez, 2016) and trust between newly acquainted people (Wood et al., 2005). This mutual, relatively 'safe' topic of conversation can elicit important information about relationships and family functioning (Walsh, 2009) and can be used to help individuals establish social connections.

This is particularly true for hard-to-reach members of the community, such as the elderly, people affected by a mental illness or drug dependencies, refugees, indigenous people, women, single parents, people with disabilities and the homeless (Every & Thompson, 2014; Thompson et al., 2014). Though socially isolated and/or vulnerable individuals may possess the skills to function on a day-to-day basis, they may lack the resilience to cope with a crisis situation. Where connectedness to others within a community may be lacking, the support people feel from animals can strengthen the emotional resilience of socially isolated individuals (Friedmann & Son, 2009).

During the recovery phase of disasters when communities can become fragmented and social support networks lost, there can be a rise in the number of socially isolated and/or vulnerable people. It is during this time that people need appropriate psychosocial assistance, but many may not know where to seek help or believe that they are not entitled to it (Reich, 2006). As many animal owners are motivated to look after their animals before themselves and have high trust and pre-existing relationships with animal service organisations, these

organisations play a valuable role in the psychosocial recovery of communities such as the role of navigators.

A navigator's role is to link people to other agencies providing support services and help people navigate their way through the complex support systems that activate in emergencies, such as financial assistance, temporary accommodation, psychosocial services, insurance support. Animal welfare support organisations may not be aware of support services available or have training in psychological first aid, therefore navigators require collaborative multiagency, multidisciplinary support which includes experts in psychosocial recovery.

Animal ownership offers a unique opportunity for communicating with and motivating people to engage in resilience building behaviours that promote survival for themselves and their animals and facilitate recovery from a disaster. Animal service organisations can act as conduits for hard-to-reach community members and have an important role to play as recovery navigators. It is important to note, however, that as front-line workers in emergencies, those providing animal welfare support may experience mental health consequences as a result of exposures to secondary trauma (Benedek et al., 2007; Guilaran et al., 2018; Vaughan et al., 2016; Wells, 2019), and may themselves require support.

7.7 Conclusion

Emergency management requires many different individuals and organisations to work together towards common goals under extraordinary circumstances. Unfortunately, professional silos and a lack of understanding of the importance of h-a-e interdependencies means AWEM remains largely disconnected from emergency management overall (Squance et al., (2021) in review).

This paper argues that by adopting a OW framework and creating a sustained practice of engaging and partnering with others across the h-a-e interface, AWEM responses can be greatly improved. However, as seen with OH, there will be significant challenges moving from theory to practical implementation. To overcome the challenges and optimise the outcomes for AWEM, a number of key strategies are suggested.

Effective interdisciplinary collaboration is vital if OW is to work in practice, yet current legislation and policy incorporate much that is counter to this. Change at this level is vital and must underscore all other change initiatives. Agencies involved with the human-animal interface during an emergency must be supported to develop positive transdisciplinary relationships through business-as-usual interactions, rather than waiting until a crisis which is not conducive to building trust and understanding. Interprofessional education and training also has a critical part to play in improving interdisciplinary collaboration by increasing knowledge of the multiple roles and responsibilities within AWEM and by developing skills for functioning as practice-ready interprofessional teams.

The implementation of a OW framework is transformational change. Engaging committed and skilled change champions representative of all stakeholders and levels within organisations will be essential across all phases of implementation. Finally, the human-animal bond should be harnessed as a valuable conduit for communication and engagement with communities and significant stakeholders central to the OW concept.

8 Discussion and Conclusion

This final chapter unifies the individual components of the thesis through a comprehensive discussion and conclusion. The first section outlines how the thesis has addressed the initial research questions. The discussion then progresses through the implications, impacts and limitations of the research and possible areas for future research before the final concluding reflections are provided.

8.1 Research Overview

As a relatively novel research topic, there is limited literature on Animal Welfare Emergency Management (AWEM) and much of that focuses on why animals should be included in the emergency management system. Little is known about the effectiveness of multiagency collaboration in AWEM or the degree to which current AWEM frameworks are fit-for-purpose.

The three research questions and five associated research objectives posed in Chapter 1 of this thesis have been addressed in three manuscripts and one report (included as 4 of the 8 chapters). The alignment between the chapters and the research questions and objectives is outlined in Chapter 1 (see Table 1.1).

The first research question this doctoral research set out to answer was – *Is the current animal welfare emergency management framework inclusive of all relevant agencies in the public and private sector who contribute to AWEM?*

The thesis has shown that there are gaps in the current AWEM framework in Aotearoa, New Zealand because it does not reflect the full range of agencies that experience the human-animal interface during events as the framework only includes animal service organisations. However, an element unique to the New Zealand AWEM framework is the inclusion of different animal categories (companion animal, production animal, wildlife, zoo animals, and animals in teaching and research facilities). This is recognised internationally as being of great value. By including all animals rather than select animal groups, such as production animals or companion animals, animal interdependencies which include food security and psychosocial support are protected collectively, reducing public health issues, enhancing resilience and protecting local livelihoods (Dalla Villa et al., 2020).

The first manuscript, included as Chapter 3, presented background literature on AWEM and reviewed literature on the Port Hill fires to identify which agencies experienced the human-animal interface during the event and what animals were impacted by the event. This information guided the selection of individuals and agencies invited to contribute to the focus groups and/or semi-structured interviews. It also contributed to a deeper understanding of the issues reported in media and official documentation.

A case study of the 2017 Port Hill fires and Eastern Bay of Plenty flood was used to address the second research question – *What are the key issues impacting effective multiagency collaboration in AWEM?* Mixed qualitative methods were used, including document analysis, focus groups and semi-structured interviews with first responders and organisations who experienced the human-animal interface in these events.

The results of the study are presented in Chapter 4 (2nd Manuscript). Four interrelated themes described key factors impacting multiagency collaboration during animal emergency responses: emergency management context; behaviour in emergencies; the knowledge base of responders; and connection. The findings were consistent with previous research

highlighting challenges and barriers to achieving integrated and coordinated disaster response generally; however, connection including human-animal-environment (h-a-e) interdependencies, transdisciplinarity, and networks, relationships and trust was identified as a new, predominant theme. Additionally, it was determined that animals need to be integrated throughout the emergency management system rather than just included in emergency management frameworks as an 'add on' component. Therefore, while all four themes are interrelated, understanding connections is pivotal to improving multiagency collaboration in AWEM. In response to the finding that achieving effective collaboration among stakeholders involved in AWEM requires a shift in emergency management to a transdisciplinary approach that understands and incorporates the human-animal-environment interface, a third research question was developed.

Chapter 5 addresses the third research question – *Is there an existing framework that enhances transdisciplinary collaboration between cross-sector actors involved in the human-animal-environment interface?* The components of connection, including h-a-e interdependencies and transdisciplinary approach in emergency management, are discussed in greater detail. The One Health (OH) and One Welfare (OW) frameworks/concepts were developed by cross-sector actors who experienced the h-a-e interface. OH represents an approach for addressing complex global health problems related to climate change, environmental sustainability, and zoonotic and infectious diseases based on the engagement of professionals from many disciplines to develop and sustain broad transdisciplinary collaboration (dos S. Ribeiro et al., 2019; Woods & Bresalier, 2014). However, it is argued that although OH has sparked an evidence-based body that goes beyond individual disciplines, the strong health focus lacks a vision of a set of social, cultural, economic and environmental outcomes whose interdependence is similarly acknowledged, thus creating a significant gap in welfare-focused approaches (dos S. Ribeiro et al., 2019; Pinillos, 2018a). OW was developed as a broader concept to embrace an interdisciplinary approach (Lerner &

Berg, 2017; Mills & Hall, 2014; Pinillos, 2018b). OW is better suited to the emergency management context as it is not solely focused on health and, by encompassing social, economic, environmental and cultural interdependencies, is more holistic.

The OW framework is identified as having the potential to provide the theoretical underpinning for enhancing transdisciplinary collaboration within emergency management, and therefore improving human, animal and environmental outcomes. Furthermore, the OW approach is identified as an obvious fit within the New Zealand emergency management context due to New Zealand's distinct features, such as strong economic dependency on agriculture and the physical environment, high pet ownership, and an existing indigenous Māori worldview that emphasises holism and interconnectivity. By providing a range of perspectives through a transdisciplinary approach that draws on a full range of relevant disciplines, knowledge systems (including indigenous knowledge), professional groups and community networks, OW can also contribute to a better understanding and definition of complex problems such as those experienced in emergency management.

In line with the principles of action research and reflexivity, the report in Chapter 6 provides examples of OW in emergency management using a case study approach with two wildfire events (Port Hill fires 2017 and Pigeon Valley fires 2019). Participants of the focus groups and semi-structured interviews reflected on what worked well and what could have been improved during the response to, and recovery from, these events and OW concepts were tested. Positive aspects of the responses, reflective of OW, included the presence of an AWEM coordinator in the emergency operations centre (EOC), animal welfare representation in the incident management team (IMT), animal welfare representation on the cordon management team and at the physical cordons. The Pigeon Valley fire focus group also discussed potential issues with a OW approach as shown in the new CIMS 3rd edition.

Participants identified the key challenge as knowing how to implement and operationalise OW to support the necessary shift in practice.

Acknowledging that a paradigm shift is challenging, Chapter 7 (3rd Manuscript) presented five strategies for implementing OW in EM through an animal lens. Proposed strategies include legislation and policy, including human-animal-environment interface interactions as business as usual, improving knowledge through interprofessional education and training, incorporating One Welfare champions, and recognising the role of animals as vital conduits into communities. Strategies were developed from the experience of the researcher as a AWEM practitioner and informed by cross-disciplinary literature, including accounts of challenges experienced in the implementation of the OH concept. To ensure they were practical and fit-for-purpose, strategies and ideas were repeatedly tested through cross-sector stakeholder conversations, including discussions with stakeholders in AWEM workshops in New Zealand and Western Australia and subsequent emergencies.

8.2 Implications

AWEM is a nascent concept that has been formally introduced in some countries through the appointment of agencies responsible for animals in emergencies, in part to protect public safety and food security. The limited research that considers AWEM frameworks tends to focus on individual components, rather than overall frameworks and is largely conceptual and theoretical in nature. While the importance of multiagency collaboration in AWEM has been acknowledged, research has not explored how effective multiagency collaboration might be achieved in AWEM, or if current frameworks support this goal.

This doctoral research provides three major contributions to the study of AWEM by highlighting that:

1. Rather than being simply included, AWEM needs to be fully integrated throughout the emergency management framework.

2. A paradigm shift is needed away from a human-centric compartmentalised view in emergency management towards a holistic perspective that values human-animal-environment *pou* (pillars in Māori) and a transdisciplinary approach.
3. One Welfare, a human-animal-environment transdisciplinary framework, should be implemented in emergency management and strategies have been suggested to support this.

In the following sections, the implications of the research are discussed further, using examples of how the work has contributed to the evolution of AWEM in New Zealand during my PhD journey.

8.2.1 AWEM: from inclusion to integration

Reflecting increasing calls in the research literature, a number of countries, for example, Australia, New Zealand, the United States of America, Italy and Costa Rica, have included animals in their emergency management frameworks (Austin, 2013; Dalla Villa et al., 2020; MCDEM, 2015a; Pawsey, 2015; Rogers, 2016; Taylor et al., 2015a; Trigg et al., 2021). However, as evidenced in Chapters 3 and 4, it is problematic that not all organisations that experience the human-animal interface are included in AWEM frameworks.

This doctoral research contributes to the body of knowledge for AWEM by providing evidence that simply including animals in emergency management frameworks with the appointment of an agency responsible for animals in emergencies is not enough to protect public safety. Further, such an approach has artificially compartmentalised AWEM within emergency management generally and has led to barriers to effective AWEM response and recovery (Chapter 4).

While literature argues for the inclusion of animals in emergency management frameworks and a multiagency approach, the focus has been on animal agencies. Reflecting this narrow interpretation, all agencies and organisations identified as having roles and responsibilities

for animal welfare in the New Zealand AWEM context are animal-focused. Other organisations that experience the human-animal interface, such as emergency services (Chapter 3), have not been taken into account. This persistent view that animal welfare needs will be addressed by animal organisations alone has created silos within emergency management, particularly during response and recovery.

This doctoral research has highlighted a number of significant problems with this siloed approach – it is ineffective, it results in inadequate resources to address animal welfare needs, public safety is not protected, and collaborations limited to animal welfare organisations limits AWEM effectiveness (Chapter 4). Additionally, the approach does not consider the animal welfare impacts of decisions made by non-animal welfare organisations, such as evacuations, animal rescue and sheltering (Chapter 4). As argued in Chapters 4, 5 and 7, legislation and policy must reflect an integrated approach as a critical step to addressing interagency fragmentation and competition and breaking down barriers created by the bureaucratic division of responsibility.

Issues raised in the wider AWEM and EM literature that complement and align with the findings of this PhD research are elaborated below:

- The integration of animals throughout emergency management **legislation and policy** would greatly benefit animal owners and communities (Heath & Linnabary, 2015; Trigg et al., 2021). Nevertheless, the interpretation of integration has primarily focused on appointing animal organisations responsible for animals and developing animal emergency management plans (Austin, 2013). As highlighted in the case study (Chapter 4), this focus on inclusion rather than integration has led to fragmented policies and plans and siloed AWEM, meaning that the intended outcome of protecting public safety, animal welfare, the economy and biodiversity is not

achieved. The strategies discussed in Chapter 7 include considerations for shifting legislation and policy from animal-inclusive to integrated.

- **Role clarity** is noted as an important mechanism in facilitating multiagency collaboration (Curnin et al., 2015), as a poor understanding of roles can impede decision-making, information sharing and general coordination (Power, n.d.). Chapters 4 and 6 highlighted the implications of the lack of role clarity in AWEM responses. Chapter 7 proposes strategies to enable effective collaborative practice through greater understanding of the roles and responsibilities of others: interprofessional education and training and normalising the presence of h-a-e interface networks and relationships.
- Animal owners are hesitant to follow **evacuation** orders if they will be separated from their animals (Heath et al., 2001). Local-level evacuation plans must be broadened to include the presence and evacuation of animals in impact zones (Farmer et al., 2016). A recommendation in Chapter 6 refers to the need for lead agencies to develop triggers for evacuations that integrate logistical considerations related to the time required to evacuate pets and livestock.
- AWEM literature commonly states no animals should be left behind, similar to no man left behind in military literature, as a philosophical stance (Thompson et al., 2014)**.** However, some AWEM authors and practitioners have interpreted this sentiment literally (Leonard & Scammon, 2007), resulting in unrealistic expectations that all animals should be evacuated or rescued from impact zones (Leinenga, 2020) with the consequence of not considering the animal welfare implications of evacuating animals. This doctoral research highlights that **managing animals on properties** should be considered as a viable alternative, particularly large animals on rural properties, that could have better animal welfare outcomes and be less resource intensive rather than a blanket expectation of evacuating all animals.

Furthermore, intensive animal housing facilities, such as poultry and pig farms, cannot be evacuated due to biosecurity and animal welfare issues. As an important new concept, Chapter 6 suggests the development of an integrated evacuation plan which pre-identifies animal housing facilities that cannot be evacuated and highlighted as assets to protect. Chapter 6 also extends the existing literature by recommending the development of an evidence-based decision matrix to assist with evacuation planning to evaluate animal welfare impacts of evacuating animals compared to managing them on owners' properties.

- Due to the complex and multilayered implications of their placement in emergencies, **cordons** create tensions (Shrestha et al., 2021) that are exacerbated when animal owners are separated from their animals (Underwood et al., 2020). Findings from the case studies (Chapters 4 and 6) highlight such tensions and the need for an animal integrated cordon management system.
- Stakeholder **liaison officer roles** in emergency management coordination have been noted as being pivotal in strategic EOCs for situational awareness, sharing of intelligence sources and effective decision-making (Curnin et al., 2015). Issues encountered by animal responders, such as being disconnected from the overall emergency response and accessing relevant intelligence to assist with their operations (Possenti et al., 2020), were also highlighted in the present study (Chapter 4). Evidence is provided that both issues can be addressed by embedding a Fire and Emergency New Zealand (FENZ) liaison officer in the animal response team.
- Heath and Linnabary (2015) have argued that rather than focusing on response issues which generally expose underlying systemic vulnerabilities in a community, it would be more beneficial to include animals into an overall emergency management strategy. Dalla Villa et al (2020) suggest that the inclusion of animals could be achieved by using frameworks such as **One Welfare** to address connections between

animal welfare and wellbeing and human welfare and wellbeing. Similarly, Chapter 4 argues that connections including human-animal-environment interdependencies, transdisciplinary approach, and networks, relationships and trust are key to improving collaboration in AWEM by integrating animals across all components of emergency management.

8.2.2 Human-animal-environment interdependencies and transdisciplinary approach

Emergency management is complex and multifaceted, yet the emergency management system is artificially compartmentalised and is not understood in the context of dynamic interdependencies. Emergency management has become increasingly reductionist in its approach, resulting in blind spots in thinking and decision-making and, as a consequence, it cannot deliver "whole-of-system" and "whole of person" outcomes in its current form.

The Sendai Framework for Disaster Risk Reduction (DRR) recognises that effective DRR requires a holistic focus including animals (UNISDR, 2013). Similarly, Ismail-Zadeh et al. (2017) propose a fundamental shift in approaches to DRR science from focusing on individual domains to a more comprehensive systems approach that facilitates the ability of diverse stakeholders to provide complementary perspectives. Although the current DRR literature highlights complexities and holistic transdisciplinary approaches, it is not explicit about h-a-e interdependencies. Chapter 5 establishes that understanding an entire system in the context of h-a-e interdependencies is key to effective collaboration in AWEM.

H-a-e interdependencies have recently appeared in academic literature as a "whole-of-person" and "whole-of-society" approach to addressing complex and challenging problems (Destoumieux-Garzón et al., 2018). Harrison et al. (2020) argue the h-a-e philosophical underpinnings are not new as existing indigenous worldviews emphasise holism, transdisciplinarity and interconnectivity between humans, animals and the environment. Durie (2001) argues that a Western discourse has seen the separation of the h-a-e philosophy

into individual silos. As shown in Chapters 4 and 5, emergency management also engages in a Western discourse of separation. Similarly, this thesis argues that emergency management requires a fundamental shift to a transdisciplinary approach that draws on a full range of relevant disciplines, knowledge systems (including indigenous knowledge), professional groups and community networks to understand increasingly complex systems and challenges that impact emergency management.

Much of the literature referring to a transdisciplinary approach in emergency management relates to DRR science (Ismail-Zadeh et al., 2017; Matsuura & Razak, 2019; Sherman-Morris et al., 2018). It is conceptual and theoretical in nature with limited transfer of knowledge to practitioners and other end users (Aguirre & El-Tawil, 2020). This thesis contributes to the emergency management academic literature by offering practical examples of a transdisciplinary approach which acknowledge h-a-e interdependencies that have been tested in responses and recovery in New Zealand.

Issues raised in the wider AWEM and EM literature that complement and align with the findings of this PhD research are elaborated below:

- **Emergency Operation Centres (EOC)** are fundamental for effective collaboration and coordination in emergencies (Lutz & Lindell, 2008). Although the animal response is reliant on information and intelligence for effective coordination of the response (Possenti et al., 2020), organisations responsible for animal welfare are not generally represented at the EOC (Dalla Villa et al., 2019). As evidenced by this doctoral thesis (Chapters 4 & 6), the presence of an animal welfare coordinator in the EOC is vital to the success of AWEM response. Animal welfare representation in the EOC assisted with better integration of the animal welfare response with the overall response, facilitated access to valuable information and intelligence, offered opportunities to advocate for the inclusion of animals in decision-making and articulated the

consequences of decision-making on animal welfare and animal owner behaviour. Furthermore, AWEM presence in the EOC represented a h-a-e transdisciplinary approach to the response.

- There is increasing attention in the emergency management literature on **Incident Management Team** (IMT) capabilities, including sense-making and consequence management (Owen et al., 2018). However, there are gaps in the literature in terms of IMTs considering dynamic interdependencies, such as h-a-e interdependencies, present in complex response environments and the consequences of the decisions made on these interdependencies. Chapter 6 provides evidence of the important strategic integration of animal representatives in the IMT to assist with a holistic h-a-e transdisciplinary approach to decision-making during a response.
- **Managing cordon access** is a complex exercise (Shrestha et al., 2021) yet there is limited literature about the decision-making (including locations) and impacts of cordons (Underwood et al., 2020). The AWEM literature describes how delayed access through cordons impacts animal welfare and subsequently human wellbeing and the need to directly reference animals as a key consideration when identifying early access through cordons to ensure animal welfare needs are addressed as a priority (Pawsey, 2015). This thesis highlights the tension around access through cordons (Chapter 3 and 4), but also provides evidence (Chapter 6) in support of a h-a-e transdisciplinary approach to cordon management with the successful inclusion of animal welfare in the cordon management team and presence at physical cordons.
- **Animals as social conduits** as suggested by Thompson et al (2014) could provide novel access to the community for disaster resilience activities. It is clear that during emergencies, human decision-making and actions are strongly influenced by their relationships with their animals (Trigg et al., 2017). Additionally, Durie (2001) explores the role of navigators in complex health systems which are now reflected as social

service roles during the recovery phase of emergencies in New Zealand. This doctoral thesis contributes to the emergency management literature by combining these three concepts into a strategy (Chapter 7) in which animals are used as social conduits during response and recovery, with animal organisations playing vital roles as recovery navigators for the community.

The research has argued that in the context of DRR, a transdisciplinary approach is required to address the complexity of emergencies (Peek et al., 2020). Harrison et al. (2020) argue that a h-a-e health approach is the most appropriate direction in Aotearoa to improve transdisciplinary collaboration to improve human, animal and environmental health. Building on this theory, this doctoral thesis has provided evidence of the need to shift the reductionist approach currently dominant in emergency management in Aotearoa to a transdisciplinary approach, such as OW, which has h-a-e interdependencies and transdisciplinarity at its core.

8.2.3 One Welfare approach in emergency management

OW is a concept that describes the interrelationships between animal welfare, human wellbeing, and the physical and social environment (Pinillos et al., 2016). OW is a nascent concept which offers a platform for professionals and disciplines to work together to achieve common goals to improve human and animal wellbeing while taking into consideration social, cultural, economic and political connections. Pinillos (2018) argues that the OW concept highlights the impact of both disasters and civil war on human and animal wellbeing, whilst Dalla Villa et al. (2020) suggest the OW approach provides an opportunity to address connections between humans and animals and to support the argument for including animals in emergency management frameworks. The focus of OW in emergency management literature to date has been the h-a-e connections, in that animals need to be included alongside people, rather than how OW could provide a platform for integrating

animals across the EM system using a h-a-e transdisciplinary approach. A reason the EM literature has not progressed beyond utilising a OW approach to address connections between h-a-e can be attributed to the lack of inclusivity of animals in EM systems internationally.

Aotearoa New Zealand has moved on from a conceptual high-level view of the impacts of disasters on both human and animal wellbeing by including animals in the emergency management framework. However, this study highlights that simply including animals in EM is not an effective approach. The case studies discussed in Chapters 4 and 6 expose issues impacting effective multiagency collaboration in AWEM that are directly attributed to animals being included rather than integrated across all components of emergency management. This is reflected as a lack of understanding of the h-a-e interdependencies and transdisciplinary approach. Thus, this doctoral thesis expands from the current research literature and argues a OW approach will likely address the key issue termed “connection” which impacts on multiagency collaboration in AWEM by offering a platform for a h-a-e transdisciplinary approach, allowing a shift from inclusion of animals to integration of animals across the emergency management system. The doctoral thesis delves deeper by offering practical examples of how a OW approach can be operationalised in an emergency management context (Chapters 4 & 6).

Issues raised in the wider AWEM and EM literature that complement and align with the findings of this PhD research are elaborated below:

- **Consequence management** is a process that exposes the potential consequences of decisions being made with strategies to mitigate the consequences. Traditionally, organisations responsible for decision-making for aspects of an emergency response, such as cordon placement, have taken a unilateral view to decision-making. That is, they are not collaborative and do not institute a consequence matrix to understand

the flow-on effects of cordon placement and subsequent ongoing management. Waugh and Streib (2006) suggest that collaborative decision-making requires diverse subject-matter knowledge including understanding the consequences of decisions being made. Holistic consequence management is the result of promoting a collaborative approach to decision-making. Chapters 4 and 6 highlighted the impact of the lack of understanding of the consequence of decisions being made by non-animal organisations on the animal response. This doctoral thesis contributes to the research literature as it proposes the OW framework as a way to support holistic consequence management through a transdisciplinary approach. Using the OW approach, organisations will be required to collaborate with other organisations and shift to holistic decision-making.

- **Collaborative intelligence** describes the notion of multiple organisations gathering data from a variety of sources to develop situational awareness and share expertise to make collective decisions (Hackman, 2011). Much of the literature focuses on information technology which is used to assist this process. Ley et al. (2014) suggest that the current approach of focusing on one particular organisation or one particular activity, such as resource allocation from an information technology perspective, does not provide for suitable collaborative interfaces required in crisis situations. Possenti et al. (2020) described the development and implementation of a veterinary services information system that was utilised as a spatial and decision tool to address situational awareness gaps in response and recovery impacting animals in Italy. Similarly, this study highlighted the lack of information gathering and sharing and lack of shared expertise were key challenges impacting effective collaboration in AWEM. However, once collaborative intelligence systems were implemented it was identified as integral to the success of the response. While these findings confirm the current research, the doctoral thesis extends on the current literature by offering a

OW approach across organisations and disciplines to gather and share data and expertise for collective decision-making.

8.2.3.1 Implementing a One Welfare framework in emergency management

OW offers a framework for holistic emergency management in which silos that negatively impact AWEM can be addressed. The changes required to implement and operationalise such a transformational framework will be challenging, as evidenced by the experiences operationalising the One Health (OH) concept (Johnson et al., 2018; Lee & Brumme, 2013). Destoumieux-Garzon et al. (2018) argue that to successfully implement a OH approach, it is essential to engage different levels of governance and encourage participative approaches to bring together communities, scientific experts, administrative and other key players. Appropriate legislation and policy which reflects h-a-e interdependencies is required to support the implementation and operationalisation of such frameworks (Lee & Brumme, 2013).

Acknowledging that the implementation of a OW framework in emergency management is novel, this doctoral thesis contributes to the academic literature by exploring what a OW approach might look like in emergency management. Furthermore, Chapter 7 expands on the OH literature by offering implementation strategies for OW in emergency management which could also address implementation challenges for OH.

This research contributes to the body of knowledge about transdisciplinary collaboration in emergency management as well as OW research. It has argued for transformational change to emergency management to improve human, animal and environmental outcomes by shifting the focus from the currently human-centric siloed view of emergency management towards a holistic perspective that values humans, animals and the environment equally.

8.3 Impacts of the research

In this section, I outline some of the publications and engagements that I have already undertaken, and which I believe suggest that my research may have a significant impact.

8.3.1 Dissemination of research

Sharing my research with a variety of audiences has been an integral part of my action research PhD journey. The manuscripts in this thesis have been submitted to or published in international peer-reviewed journals. I have presented and published parts of the research at national and international conferences for emergency management, One Welfare and veterinary audiences, some as a keynote speaker (Appendix 12). I have also delivered a short-format presentation on my research through the Disastrous Doctorates Three-Minute-Thesis. I have been interviewed in print, radio and live TV on different components of the doctoral research. I have also engaged with the broader community through presentations at local civil defence days, primary sector adverse event forums and Massey University.

I am recognised internationally for my experience and knowledge in AWEM and have been invited as a subject matter expert for various international projects that include animals in disasters and to advise other countries during events. For example, I served as an invited member of the ad-hoc working group for the OIE on veterinary services in emergencies, a project partially funded by INTERPOL, OIE and the Food and Agriculture Organisation of the United Nations (FAO). I spent time at the international headquarters in Paris leading discussions on the development of core competencies for veterinary services for agro-crime and agroterrorism. My doctoral research helped shape the core competencies which reflect a One Welfare approach.

I was an invited member for the OIE sponsored Emergency Veterinary Network which stood up during the COVID-19 pandemic. The group met monthly during the early stages of the pandemic and discussed animal welfare impacts and offered the opportunity to advise

member countries on a One Welfare approach to the pandemic. I have also advised various OIE member countries on AWEM during responses such as the La Soufriere volcanic eruption in the Caribbean.

Knowledge from my doctoral research was shared with the Scientific Advisory Board for the Morris Animal Foundation, of which I am an invited member. I also reviewed projects with an emergency management component.

I have delivered 20 AWEM workshops in New Zealand and Australia to animal and non-animal organisations that activate in emergencies, including controllers. The workshops engage robust discussion about suggested approaches to AWEM which have informed and refined recommendations in this thesis. Additionally, following the transdisciplinary sessions, I received positive feedback about my doctoral research, including examples of positive impacts on individual perspectives and practice. For example, an emergency management controller from Western Australia contacted me to relate how when responding to media questions about deaths from bushfires in Perth, he reported that while no human lives had been lost, there were animal casualties. This reflects a significant change in thinking as generally animal loss is not mentioned if no human life has been lost.

An important component of the regional and national animal welfare emergency management coordinator role I have held throughout the PhD journey is attending CDEM Welfare Coordination Group (WCG) meetings. I have presented at the WCG meetings offering the opportunity to disseminate the findings of this research to a wide audience.

8.3.2 Practice-based reflections

I chose an action research approach for my doctoral research because I am an academic, educator and emergency management practitioner. I started with a problem in the field and worked collaboratively with stakeholders, colleagues and the community to generate possible solutions. As a pracademic, I was able to iteratively test ideas and their implications

with stakeholders through a reflective and iterative process of refinement. In this respect, practical impacts have been a significant part of my overall PhD research.

During this PhD journey, due to my experience in AWEM, I was approached by the Ministry for Primary Industries (MPI) to assist as a consultant in the implementation of the AWEM framework in New Zealand. The MPI had been appointed responsible agency for animal welfare in emergency management nine months earlier but had yet to start an implementation process. Furthermore, I was appointed as a national and regional animal welfare emergency management coordinator (NAWC & RAWC respectively), with the North Island being my area of responsibility for the RAWC role, and I had over 50 response activations during this PhD journey. I was thus fully immersed in AWEM in New Zealand from the very early stages and my evidence-based and practice-led doctoral research directly informed MPI's approach to implementation of the AWEM framework.

The case study research provided a rare opportunity to speak with a range of stakeholders and delve more deeply into the three events than a typical event debrief and time and resource constraints that a government agency usually allows. Because I worked part time, I could dedicate my non-work time to identify key issues impacting AWEM which then informed the NAWC and RAWC roles and the development of MPI's National AWEM strategy to address the issues.

After identifying the omission in the AWEM framework of non-animal organisations that experience the human-animal interface, including FENZ and NZ Police, I collaborated with these organisations to work towards addressing the gap. I spent time with them to understand the organisational culture, language, priorities and processes and to work with senior personnel to develop collaborative solutions. This process provided an opportunity to foster relationships, networks and trust with emergency services and MPI, and is reflected in

the positive progress of emergency services considering the presence of animals during responses, thus contributing to the evolution of AWEM in New Zealand.

When I began my PhD journey, animal evacuation was not directly referenced in the animal welfare support service pillars (MCDEM, 2015c) but my PhD research has subsequently highlighted the importance of including evacuation in the AWEM framework. This is evidenced by the fact that, although animal welfare was included as a welfare sub-function 12 months before the Port Hill fire, animals were not included in evacuation or cordon management plans. This resulted in some animal owners breaking cordons to regain access to their animals. Such behaviour created additional challenges for firefighting agencies trying to protect public safety and was highlighted as a key AWEM issue in this research.

On the basis of this research, I have argued that the approach in EM must move from animal inclusion to full integration. That proposal was developed, in part from the results from Chapter 4, discussions with members of the emergency management community about the importance of understanding h-a-e interdependencies and developing relationships with agencies who experience the human-animal interface (Chapters 4 & 5). There is evidence that as a result of those discussions, changes have been made in the management of evacuations and cordons. This is illustrated in the Pigeon Valley fire event with the inclusion of an animal welfare coordinator at the Emergency Coordination Centre, animal welfare representation in the cordon management team and physically at the cordons, and direct referencing of animals in the cordon management plan and in the mass evacuation plan (Chapter 6). Additionally, animal response teams were supported by CDEM and FENZ and given time-critical access through cordons to the impact areas to assess and treat animals.

Chapters 3 and 4 highlighted the importance of animals being integrated into evacuation plans and understanding that intensive animal housing facilities cannot be evacuated. During the Pigeon Valley fire, my evidence-based advice resulted in animals being integrated into

the mass evacuation plan. Furthermore, a poultry farm which was not able to be evacuated was identified as an asset to protect by FENZ, similar to other physical assets such as the sawmill and cell phone towers. This means fire resources would be dedicated to protecting the poultry farm.

Subsequent to these events I was invited to the Coordinated Incident Management System review welfare function working group as an expert in AWEM. Informed by this doctoral research, I successfully argued for a shift from a siloed human-centric approach to a more holistic approach that takes into consideration h-a-e interdependencies by elevating animals from a functional role. The elevation of animals is now reflected in the CIMS 3rd Edition core principle of responsive to community needs / Urupare ki ngā hiahai hapori:

> *"Any response should mitigate and manage the consequences of an incident on the affected individuals, families/whanau and communities, including animals. Response personnel must recognise an individual's rights, treat individuals with fairness and dignity to ensure the needs of affected people and animals are identified and met through the response and into recovery."*

The inclusion of animals in the core principle supports the shift of animal inclusive to integrated throughout emergency response and recovery. Additionally, is it a step towards a holistic OW approach to EM. Colleagues working in AWEM internationally have acknowledged that New Zealand is leading AWEM with this animal integrative approach and providing an example for other countries to follow.

8.4 Limitations and future research directions

While I have utilised AWEM and other terminology as it is generally recognised in the New Zealand context, the language used in AWEM literature lacks a clear definition or shared meaning, in particular, the terms "inclusion" and "integration". Some authors use integration

to describe the inclusion of animals in the emergency management system with the appointment of a responsible agency. This thesis clearly encompasses the full integration of animals and relevant organisations in all aspects of emergency management. In future, a review of the varied language and meaning would be a useful research endeavour to develop consistent terminology for AWEM.

Animals are impacted by disasters in every part of the globe and countries are at varying stages in terms of the inclusion of animals in emergency management systems (Dalla Villa et al., 2020). Countries also have varying levels of animal welfare legislation, with New Zealand being recognised as having high animal welfare standards. However, due to practical constraints, I limited the scope of AWEM experiences to Aotearoa, New Zealand. Therefore, this doctoral thesis may not be reflective of the expectations of different countries due to the importance of animal welfare, differing demographics and the size of the country. Further research could study AWEM in the context of specific countries, including perhaps a comparison between jurisdictions.

Animals were included in the New Zealand's emergency management system in 2015, barely a year before the Port Hill fire and EBoP flood events examined as case studies in this thesis. Therefore, limited time had elapsed between the inclusion of animals in the NZ EM system and the events and subsequent doctoral research. Additionally, the timing of the emergency events and collection of data varied from 2 years to 6 months post-event. A number of issues, including memory recall, debrief fatigue and access to participants has the potential to impact on the quantity and quality of the data. The use of multiple events, one of which occurred two years after the inclusion of animals in the EM system, goes some way towards addressing these issues. Additionally, there was concurrence in the issues identified across all three events, regardless of the timeframe.

The cost of disasters is increasing exponentially, and in a climate of limited resources, there is a need to consider novel approaches, such as valuing the interconnections of humans and animals as potentially more cost-effective and socially acceptable ways of addressing issues rather than using expensive solutions such as working in silos and duplicating effort (Mill and Hall, 2014). Although this doctoral thesis argues for the adoption of h-a-e approaches to reduce the pressure on resources, to date there is little empirical evidence to support this. Future research could consider a cost-benefit approach to the evaluation of h-a-e approaches and practices, such as the pre-emptive evacuation of livestock for predicted flooding events.

Animal evacuation is extensively discussed in the AWEM literature, including a view that no animals should be left behind. However, as noted in Chapter 6 of this thesis, this view is problematic as it does not take into consideration the animal welfare implications of evacuation versus managing animals on properties. Therefore, a valuable future research project would be to explore the merit of developing a decision matrix, including animal welfare impacts, of managing animals on properties rather than evacuation.

Finally, while I acknowledge the community as a key stakeholder in emergency management frameworks, there was only limited community representation among the focus group and interview participants. I did intend to include animal owners, but after completing one interview with a family affected by one of the events it became evident it could be emotionally challenging for participants and as well as myself as the researcher. This would also mean going beyond the intended scope of the research and outside what could be practically achieved in the time frame of the PhD journey. The experiences of animal owners and other community stakeholders would be a valuable and worthy research topic in its own right.

8.5 Conclusion

Two research gaps were identified at the outset of this thesis which the research sought to address. First, the existing studies on AWEM frameworks have not examined if all organisations that experience the human-animal interface in emergencies are represented in AWEM frameworks. Second, there have been no studies identified that have explored key issues impacting multiagency collaboration in AWEM.

This doctoral research provided evidence that not all organisations that experience the human-animal interface in emergencies are represented in the New Zealand AWEM framework and that this contributes to issues impacting effective multiagency collaboration on AWEM.

Using data from a document review and interviews and/or focus groups with 73 responders from 19 different national, regional and local organisations, key issues impacting effective multiagency collaboration in AWEM in New Zealand were identified and elaborated.

The concepts of connection and integration were introduced, highlighting the importance of the "whole-of-person" by considering h-a-e interdependencies and a transdisciplinary approach in emergency management (Chapter 4).

The thesis has proposed the OW framework to provide the theoretical basis to enhance interdisciplinary collaboration for emergency management, and ultimately to improve human, animal and environmental outcomes (Chapter 5). Furthermore, focusing on a local level OW in Aotearoa, New Zealand is an obvious fit within the emergency management context due to New Zealand's strong economic dependency on agriculture and the physical environment, high pet ownership and an existing indigenous Māori worldview that emphasises holism and interconnectivity. As OW is theoretical and conceptual in nature, Chapter 6 examines the suitability of OW in emergency management practice by testing OW concepts in responses.

Acknowledging that such a transformational change will not be easy, this thesis has proposed a number of strategies to overcome the challenges and optimise the outcomes for animal welfare emergency management (Chapter 7).

Despite some limitations, this doctoral thesis has contributed new and original research and advanced the academic discourse in the areas of animal welfare emergency management, emergency management and One Welfare. Early positive indications of the uptake of my work are that my proposed collaborative framework is being formally recognised and integrated into AWEM in New Zealand. Furthermore, over the duration of my PhD, I have seen improvements in how crises have been managed with respect to true collaborations and a transdisciplinary approach.

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Appendix 1: Focus group discussion outline and interview questions

Enhancing multiagency collaboration in animal welfare emergency management

Outline of focus group discussion Port Hill Fire

Aim

To discuss the animal welfare response in the February 2017 Port Hill fires, and use the learnings to contribute to the enhancement of multi-agency collaboration for animal welfare emergency management.

Objectives:

1. Explore the role(s) the agency had in response that involved or was impacted by the human-animal interface
2. Discuss the resources/knowledge/networks/relationships that facilitated the delivery/implementation of these roles
3. Identify the gaps or components that negatively affected the ability to do the role effectively

The following programme was developed to address the aims and objectives for the workshop:

Time	Activity	Comments
1000	Welcome & house keeping	Colin Russel FENZ
1005	Research consent forms	Hayley
1010	Overview of project workshop aim & objectives & introductions	Hayley
1015	What went well generally	Break out session agencies mixed
1040	Discussion	Facilitated by Hayley
1110	What did not go well	Break out session agencies mixed
1135	Discussion	Facilitated by Hayley
1200	AWEM framework in readiness and response	Hayley
1230	Lunch break	
1315	Structure to address animal gaps in fire response	Facilitated by Hayley
1400	What is needed in readiness to achieve the response structure	Facilitated by Hayley
1430	Proposed doctrine discussion	Facilitated by Hayley
1455	Wrap up	Hayley

Enhancing multi-agency collaboration in animal welfare emergency management

Semi-structured interview questions

Government, Non-government and private sector agencies and organisations

What roles did your agency/organisation play in the event and during recovery?

What human animal interface experiences did you have?

In your opinion, what worked well in the response and recovery?

What did not work well in the response and recovery?

Did you identify any gaps that need addressing?

Appendix 2: Participant information sheets

Enhancing multi-agency collaboration in animal welfare emergency management

INFORMATION SHEET FOCUS GROUP – Port Hill Fires & EBoP Floods

Researcher(s) Introduction

My name is Hayley Squance. I am a Doctoral student at Massey University with experience as an emergency management practitioner and veterinary technologist. I have a strong interest in animal welfare in emergency management. This study will contribute towards my Doctoral research - with my supervisors Professor David Johnston and Dr Raj Prasanna from the Joint Center for Disaster Research and School of Psychology and Dr Caroline MacDonald.

Project Description and Invitation

This project explores how animals and animal owners are impacted by two emergency events (fire and flood) along with the experiences of stakeholders who encounter the human-animal interface in emergencies. There is a need to explore the factors involved in the decision-making processes, resource requirements and identified gaps during response and recovery in respect to animal welfare to ensure the framework is fit for purpose and multiagency collaboration is enhanced.

I invite you to participate in a workshop which will help me understand the impacts of wildfire events on animals, their owners, the decision-making process of agencies and organisations during response and recovery and networks utilised during this process, in relation to the 2017 Port Hill Fires.

Participant Identification and Recruitment

You have been invited to participate in this project as you have been identified as actively involved in your organisation during response and recovery as a stakeholder who encountered the human-animal interface during the Port Hill Fires which we are doing a case study on.

We appreciate that it may be uncomfortable for you to discuss your experience and thank you again for your interest in participating in this study. No identifying information about you or your organisation will be included in any publicly available documents that result from this study.

Project Procedures
To participate in this study:

(1) You will indicate that you agree to participate and sign the attached consent form. I will collect this at the beginning of the workshop.

(2) We will arrange for the focus group to be delivered by a facilitator with various agencies at a time and place that is most convenient for participants.

(3) During the focus group participants will be asked to work through tasks in relation to the 2017 Port Hill fires. The outputs of the discussion will be collected and themes will be identified.

Data Management
Information collected from the focus group via discussions and worksheets will be written up in a workshop report. The report will be de-identified, by changing your name, generically labelling organisations as emergency services, support agency, NGO etc, after being transcribed. You will have an opportunity to view the draft report and make any corrections if you so wish. This may take up to one hour of your time, and we would expect the revised report to be returned to us within two weeks of you receiving it. If, after reviewing the report, you are happy with it as it is you need not return it. If we do not hear from you within this two-week period, we will assume that you agree with the report.

The worksheet, research analysis, and findings will be kept on password protected Massey University computers and servers accessed only by me. The signed form indicating your consent to participate will be stored in a locked office. Information that indicates your identity will not be shared with anyone, unless with your specific consent. The data will be stored for five years and then they will be destroyed.

All reporting on findings will protect your identity – your participation will be anonymous.

Participant's Rights
You are under no obligation to accept this invitation. If you decide to participate, you have the right to:

- decline to answer any particular question.
- withdraw from the study before or during the focus group or until the 1st September 2019.
- ask any questions about the study at any time during participation.
- provide information on the understanding that your name will not be used unless you give permission to the researcher.
- be given access to a summary of the project findings when it is concluded.
- Completion and return of the questionnaire implies consent. You have the right to decline to answer any particular question.

Project Contacts

Please feel free to contact either myself or my main supervisor with any questions regarding this project.

Hayley Squance
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Professor David Johnston
Joint Center for Disaster

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Committee Approval Statement

This project has been reviewed and approved by the Massey University Human Ethics Committee: Southern A, Application 17/54. If you have any concerns about the conduct of this research, please contact Dr Lesley Batten, Chair, Massey University Human Ethics Committee: Southern A, telephone 06 356 9099 x 85094, email humanethicsoutha@massey.ac.nz

Enhancing multiagency collaboration in animal welfare emergency management

INFORMATION SHEET FOCUS GROUP - Pigeon Valley Wildfire

Researcher(s) Introduction

My name is Hayley Squance. I am a Doctoral student at Massey University with experience as an emergency management practitioner, first responder and veterinary technologist. I have a strong interest in animal welfare in emergency management. This study will contribute towards my Doctoral research - with my supervisors Professor David Johnston and Dr Raj Prasanna from the Joint Center for Disaster Research and School of Psychology and Dr Caroline MacDonald.

Project Description and Invitation

This project explores how animals and animal owners are impacted by two emergency events (fire and flood) along with the experiences of stakeholders who encounter the human-animal interface in emergencies. There is a need to explore the factors involved in the decision-making processes, resource requirements and identified gaps during response and recovery in respect to animal welfare to ensure the framework is fit for purpose and multiagency collaboration is enhanced.

I invite you to participate in a workshop which will help me understand the impacts of wildfire events on animals, their owners, the decision-making process of agencies and organisations during response and recovery and networks utilised during this process, in relation to wildfires.

Participant Identification and Recruitment

You have been invited to participate in this project as you have been identified as actively involved in your organisation during response and recovery.

We appreciate that it may be uncomfortable for you to discuss your experience and thank you again for your interest in participating in this study. No identifying information about you or your organisation will be included in any publicly available documents that result from this study.

Project Procedures
To participate in this study:

(1) You will indicate that you agree to participate and sign the attached consent form. I will collect this at the beginning of the workshop.

(2) We will arrange for the focus group to be delivered by a facilitator with various agencies at a time and place that is most convenient for participants.

(3) During the focus group participants will be asked to work through tasks in relation to wildfires. The outputs of the discussion will be collected and themes will be identified.

Data Management
Information collected from the focus group via discussions and worksheets will be written up in a workshop report. The report will be de-identified, by changing your name, generically labelling organisations as emergency services, support agency, NGO etc, after being transcribed. You will have an opportunity to view the draft report and make any corrections if you so wish. This may take up to one hour of your time, and we would expect the revised report to be returned to us within two weeks of you receiving it. If, after reviewing the report, you are happy with it as it is you need not return it. If we do not hear from you within this two-week period, we will assume that you agree with the report.

The worksheet, research analysis, and findings will be kept on password protected Massey University computers and servers accessed only by me. The signed form indicating your consent to participate will be stored in a locked office. Information that indicates your identity will not be shared with anyone, unless with your specific consent. The data will be stored for five years and then they will be destroyed.

All reporting on findings will protect your identity – your participation will be anonymous.

Participant's Rights
You are under no obligation to accept this invitation. If you decide to participate, you have the right to:

- decline to answer any particular question.
- withdraw from the study before or during the focus group or until the 1st November 2019.
- ask any questions about the study at any time during participation.
- provide information on the understanding that your name will not be used unless you give permission to the researcher.
- be given access to a summary of the project findings when it is concluded.
- Completion and return of the questionnaire implies consent. You have the right to decline to answer any particular question.

Project Contacts

Please feel free to contact either myself or my main supervisor with any questions regarding this project.

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Committee Approval Statement

This project has been reviewed and approved by the Massey University Human Ethics Committee: Southern A, Application 17/54. If you have any concerns about the conduct of this research, please contact Dr Lesley Batten, Chair, Massey University Human Ethics Committee: Southern A, telephone 06 356 9099 x 85094, email humanethicsoutha@massey.ac.nz

Enhancing multiagency collaboration in animal welfare emergency management

INFORMATION SHEET INDIVIDUALS - Interviews

Researcher(s) Introduction

My name is Hayley Squance. I am a Doctoral student at Massey University with experience as an emergency management practitioner and veterinary technologist. I have a strong interest in animal welfare in emergency management. This study will contribute towards my Doctoral research - with my supervisors Professor David Johnston and Dr Raj Prasanna from the Joint Center for Disaster Research and School of Psychology and Dr Caroline MacDonald.

Project Description and Invitation

This project explores how animals and animal owners are impacted by three emergency events (earthquake, fire and flood) along with the experiences of stakeholders who encounter the human-animal interface in emergencies. There is a need to explore the factors involved in the decision-making processes, resource requirements and identified gaps during response and recovery in respect to animal welfare to ensure the framework is fit for purpose and multiagency collaboration is enhanced.

I invite you to participate in a semi-structured interview which will help me understand the impacts of events on animals, their owners and the decision-making process of agencies and organisations during response and recovery. Animal owners will be asked to talk about where you were at the time of the event and if you and your animals were impacted by the event (before, during and after). Organisations will be asked to describe their role and responsibilities in these events, any human-animal interface encounters, what worked well from their perspective and any areas that could be done better in relation to the human-animal interface and collaborating with other agencies for AWEM.

Participant Identification and Recruitment

You have been invited to participate in this project as you have been identified as either an owner of an animal or an organisation that encountered the human-animal interface, who experienced one of the events (Kaikoura Earthquake, Port Hill Fires, Edgecumbe Flood 2017) that we are doing a case study on.

We appreciate that it may be uncomfortable for you to discuss your experience and thank you again for your interest in participating in this study. No identifying information about you or your animals will be included in any publicly available documents that result from this study.

Project Procedures
To participate in this study:

(1) You will indicate that you agree to participate and sign the attached consent form. I will collect this at the beginning of the interview;

(2) We will arrange for me to conduct the interview with you at a time and place that is convenient for you;

(3) During your interview I will ask you to tell me about your experiences during and after the emergency event (Kaikoura Earthquake, Port Hill Fires, & Edgecumbe/Whakatane Flood April 2017). The interview is expected to take around 60 minutes.

If you would like to bring a support person (e.g. a friend or family/whānau member) to your interview they will need to sign a consent form as well.

Data Management
I will sound record the interview so that I can analyse the content later. The recording will be de-identified, by changing your name, after being transcribed. You will have an opportunity to view the written transcript and make any corrections if you so wish. This may take up to one hour of your time, and we would expect the revised transcript to be returned to us within two weeks of you receiving it. If, after reviewing the transcript, you are happy with it as it is you need not return it. If we do not hear from you within this two-week period, we will assume that you have given permission to include the interview in the analysis.

The audio recording, research analysis, and findings will be kept on password protected Massey University computers and servers accessed only by me. The signed form indicating your consent to participate will be stored in a locked office. Information that indicates your identity will not be shared with anyone, unless with your specific consent. The data will be stored for five years and then they will be destroyed.

All reporting on findings will protect your identity – your participation will be anonymous.

Participant's Rights
You are under no obligation to accept this invitation. If you decide to participate, you have the right to:

- decline to answer any particular question;
- withdraw from the study before or during your interview or until the 1st April 2018;
- ask for the recorder to be turned off at any time during the interview;

- ask any questions about the study at any time during participation;
- provide information on the understanding that your name will not be used unless you give permission to the researcher;
- be given access to a summary of the project findings when it is concluded*;*
- Completion and return of the questionnaire implies consent. You have the right to decline to answer any particular question.

Project Contacts

Please feel free to contact either myself or my main supervisor with any questions regarding this project.

Hayley Squance
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Committee Approval Statement

This project has been reviewed and approved by the Massey University Human Ethics Committee: Southern A, Application 17/54. If you have any concerns about the conduct of this research, please contact Dr Lesley Batten, Chair, Massey University Human Ethics Committee: Southern A, telephone 06 356 9099 x 85094, email humanethicsoutha@massey.ac.nz

Appendix 3: Request for staff participation

Enhancing multiagency collaboration in animal welfare emergency management

REQUEST FOR STAFF PARTICIPATION

Researcher(s) Introduction

My name is Hayley Squance. I am a Doctoral student at Massey University with experience as an emergency management practitioner and veterinary technologist. I have a strong interest in animal welfare in emergency management. This study will contribute towards my Doctoral research - with my supervisors Professor David Johnston and Dr Raj Prasanna from the Joint Center for Disaster Research and School of Psychology and Dr Caroline MacDonald.

Project Description and Invitation

This project explores how animals and animal owners are impacted by three emergency events (earthquake, fire and flood) along with the experiences of stakeholders who encounter the human-animal interface in emergencies. There is a need to explore the factors involved in the decision-making processes, resource requirements and identified gaps during response and recovery in respect to animal welfare to ensure the framework is fit for purpose and multiagency collaboration is enhanced.

I would like to approach your staff to participate in a semi-structured interview or focus group which will help me understand the impacts of events on animals, their owners and the decision-making process of agencies and organisations during response and recovery. Animal owners will be asked to talk about where they were at the time of the event and if they and your animals were impacted by the event (before, during and after). Organisations will be asked to describe their role and responsibilities in these events, any human-animal interface encounters, what worked well from their perspective and any areas that could be done better in relation to the human-animal interface and collaborating with other agencies for animal welfare emergency management (AWEM).

Project Procedures
To participate in this study:
Individual interview

(1) Participants will indicate that they agree to participate and sign the attached consent form. I will collect this at the beginning of the interview;

(2) We will arrange for me to conduct the interview with the staff member at a time and place that is convenient for them;

(3) During your interview I will ask them to tell me about their experiences during and after the emergency event (Kaikoura Earthquake, Port Hill Fires, & Edgecumbe/Whakatane Flood April 2017). The interview is expected to take around 60 minutes.

If they would like to bring a support person (e.g. a friend or family/whānau member) to the interview they will need to sign a consent form as well.

Focus Group
Various focus groups will be held to discuss the themes and recommendations of this project to assess the viability with the emergency management sector. The focus group will participate in a workshop will be of 2 to 3 hours.

Data Management
I will sound record the interview so that I can analyse the content later. The recording will be de-identified, by changing the participants name, after being transcribed. They will have an opportunity to view the written transcript and make any corrections if they so wish. This may take up to one hour of their time, and we would expect the revised transcript to be returned to us within two weeks of them receiving it. If, after reviewing the transcript, they are happy with it as it is they need not return it. If we do not hear from them within this two-week period, we will assume that they have given permission to include the interview in the analysis.

The audio recording, research analysis, and findings will be kept on password protected Massey University computers and servers accessed only by me. The signed form indicating their consent to participate will be stored in a locked office. Information that indicates their identity will not be shared with anyone, unless with your specific consent. The data will be stored for five years and then they will be destroyed.

All reporting on findings will protect the organisations and their identity – their participation will be anonymous.

Participant's Rights
They are under no obligation to accept this invitation. If they decide to participate, they have the right to:

- decline to answer any particular question;
- withdraw from the study before or during the interview or until the 1st April 2018;

- ask for the recorder to be turned off at any time during the interview;
- ask any questions about the study at any time during participation;
- provide information on the understanding that their name or organisation will not be used unless you give permission to the researcher;
- be given access to a summary of the project findings when it is concluded*;*
- Completion and return of the questionnaire implies consent. They have the right to decline to answer any particular question.

Project Contacts
Please feel free to contact either myself or my main supervisor with any questions regarding this project.

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Committee Approval Statement
This project has been reviewed and approved by the Massey University Human Ethics Committee: Southern A, Application 17/54. If you have any concerns about the conduct of this research, please contact Dr Lesley Batten, Chair, Massey University Human Ethics Committee: Southern A, telephone 06 356 9099 x 85094, email humanethicsoutha@massey.ac.nz

Appendix 4: Participant consent forms

Enhancing multiagency collaboration in animal welfare emergency management

FOCUS GROUP PARTICIPANT CONSENT FORM

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I understand that I have an obligation to respect the privacy of the other members of the group by not disclosing any personal information that they share during our discussion.

I understand that all information I give will be kept confidential, and the names of all people in the study will be kept confidential by the researcher.

Note: There are limits on confidentiality as there are no formal ways to prevent other group participants from disclosing your involvement, identity or what you say to others in the focus group. There are risks in taking part in focus group research and taking part assumes that you are willing to assume those risks.

I agree to participate in the focus group under the conditions set out in the Information Sheet.

Signature: ..... **Date:** .....

Full Name - printed .....

Enhancing multi-agency collaboration in animal welfare emergency management

PARTICIPANT CONSENT FORM - INDIVIDUAL

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I agree/do not agree to the interview being sound recorded.

I wish/do not wish to have my recordings returned to me.

I agree to participate in this study under the conditions set out in the Information Sheet.

Signature: ..... **Date:** .....

Full Name - printed .....

Enhancing multi-agency collaboration in animal welfare emergency management

AUTHORITY FOR THE RELEASE OF TRANSCRIPTS

I confirm that I have had the opportunity to read and amend the transcript of the interview(s) conducted with me.

I agree that the edited transcript and extracts from this may be used in reports and publications arising from the research.

Signature: ..... **Date:** .....

Full Name – printed .....

Appendix 5: Transcriber confidentiality agreement

Enhancing multi-agency collaboration in animal welfare emergency management

TRANSCRIBER'S CONFIDENTIALITY AGREEMENT

I ..... (Full Name - printed) agree to transcribe the recordings provided to me.

I agree to keep confidential all the information provided to me.

I will not make any copies of the transcripts or keep any record of them, other than those required for the project.

Signature: ..... **Date:** .....

Appendix 6: Ethics approval

From: humanethics@massey.ac.nz <humanethics@massey.ac.nz>
Sent: Thursday, February 15, 2018 9:08 AM
To: Squance, Hayley <Hayley.Squants.1@uni.massey.ac.nz>
Subject: Human Ethics Application SOA 17/54 Approved

HoU Review Group
A/Pro Ross Flett
ReviewerGroup
Dr David Johnston
Prof David Johnston

Researcher: Hayley Squance
Title: Enhancing multi-agency collaboration in animal welfare emergency management.

Dear Hayley

Thank you for the above application that was considered by the Massey University Human Ethics Committee: Human Ethics Southern A Committee at their meeting held on 15/02/2018.
On behalf of the Committee I am pleased to advise you that the ethics of your application are approved.

Approval is for three years. If this project has not been completed within three years from the date of this letter, reapproval must be requested.
If the nature, content, location, procedures or personnel of your approved application change, please advise the Secretary of the Committee.

If you wish to print an official copy of this letter, Please logon to RIMS (http://rims.massey.ac.nz) , and under the Reporting section, View Reports you will find a link to run the Ethics Committee Report.

Yours sincerely
Dr Brian Finch, Chair
Massey University Human Ethics Committee

Appendix 7: Contribution statement (Chapter 3)

DRC 16

MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA
UNIVERSITY OF NEW ZEALAND

GRADUATE RESEARCH SCHOOL

STATEMENT OF CONTRIBUTION
DOCTORATE WITH PUBLICATIONS/MANUSCRIPTS

We, the candidate and the candidate's Primary Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate's contribution as indicated below in the *Statement of Originality*.

Name of candidate:	Hayley Etta Squance
Name/title of Primary Supervisor:	Professor David Johnston
In which chapter is the manuscript /published work:	Chapter 3

Please select one of the following three options:

(●) The manuscript/published work is published or in press

- Please provide the full reference of the Research Output:

Squance, H., Johnston D.M, Stewart C., & Riley C.B (2018) An integrative review of the 2017 Port Hill fires' impact on animals, their owners and first responders' encounters with the human-animal interface, Australasian Journal of Disaster and Trauma Studies, 22, 97-108

( ) The manuscript is currently under review for publication – please indicate:

- The name of the journal:

- The percentage of the manuscript/published work that was contributed by the candidate: 80.00

- Describe the contribution that the candidate has made to the manuscript/published work:

The candidate conducted the data collection and analysis, drafted the manuscript, and made subsequent revisions baed on feedback from supervisors and contributing authors.

( ) It is intended that the manuscript will be published, but it has not yet been submitted to a journal

Candidate's Signature:	Hayley E Squance Digitally signed by: Hayley E Squance DN: CN = Hayley E Squance C = NZ O = Massey University OU = JCDR Date: 2021.07.13 10:04:33 +13'00'
Date:	13-Jul-2021
Primary Supervisor's Signature:	David Johnston Digitally signed by David Johnston Date: 2021.07.14 13:46:10 +12'00'
Date:	14-Jul-2021

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Appendix 8: Contribution statement (Chapter 4)

DRC 16

MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA
UNIVERSITY OF NEW ZEALAND

GRADUATE RESEARCH SCHOOL

STATEMENT OF CONTRIBUTION
DOCTORATE WITH PUBLICATIONS/MANUSCRIPTS

We, the candidate and the candidate's Primary Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate's contribution as indicated below in the *Statement of Originality*.

Name of candidate:	Hayley Etta Squance
Name/title of Primary Supervisor:	Professor David Johnston
In which chapter is the manuscript /published work:	Chapter 4

Please select one of the following three options:

○ The manuscript/published work is published or in press

- Please provide the full reference of the Research Output:

◉ The manuscript is currently under review for publication – please indicate:

- The name of the journal:
International Journal of Disaster Risk Reduction

- The percentage of the manuscript/published work that was contributed by the candidate: 80.00

- Describe the contribution that the candidate has made to the manuscript/published work:
The candidate conducted the data collection and analysis, drafted the manuscript and made subsequent revisions based on feedback from supervisors

○ It is intended that the manuscript will be published, but it has not yet been submitted to a journal

Candidate's Signature:	Hayley E Squance Digitally signed by: Hayley E Squance DN: CN = Hayley E Squance C = NZ O = Massey University OU = JCDR Date: 2021.07.13 10:03:03 +13'00'
Date:	13-Jul-2021
Primary Supervisor's Signature:	David Johnston Digitally signed by David Johnston Date: 2021.07.14 13:44:42 +12'00'
Date:	14-Jul-2021

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Appendix 9: Kerridge report feedback

The Bob Kerridge
ANIMAL WELFARE FELLOWSHIP

Bob Kerridge – Board of trustees.

I send my warmest thanks, and congratulations, for your outstanding final report, 'Enhancing multi-agency collaboration for humane animal welfare outcomes - wildfire responses', with which, on first glance, I am absolutely delighted with. I feel you have done an outstanding job on this presentation, which sets the highest standards we could hope for, and epitomises the very essence of the outcomes we hope to achieve through our Fellowship activities. You can be very proud of this work Hayley and again I reiterate my warmest gratitude and congratulations.

The report looks even better in this final form, and again I must congratulate you on the standard and quality of your presentation, thoroughly professional and a testament to your undoubted skills and professionalism. This will be a document that will serve in helping 'animals people and the environment', the three key objectives of the Fellowship, and we have been delighted to work through you to achieve these goals. May you achieve the success you deserve through this document.

So glad also to read you are sharing this with various emergency service personnel and that it is receiving complimentary comments, as indeed it should. I am sure you will share this as widely as possible to help as many as you can in the emergency response services, and of course MPI as you suggest.

Jim Niven – Board of trustees

What a pleasure it is to read a plain language report free from jargon and academic ‘enhancements’.

Real and achievable recommendations cap off a great read and you have set the standard for future Fellows.

Appendix 10: Contribution statement (Chapter 6)

DRC 16

MASSEY UNIVERSITY
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UNIVERSITY OF NEW ZEALAND

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STATEMENT OF CONTRIBUTION
DOCTORATE WITH PUBLICATIONS/MANUSCRIPTS

We, the candidate and the candidate's Primary Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate's contribution as indicated below in the *Statement of Originality*.

Name of candidate:	Hayley Etta Squance
Name/title of Primary Supervisor:	Professor David Johnston
In which chapter is the manuscript /published work:	Chapter 6

Please select one of the following three options:

(●) The manuscript/published work is published or in press

- Please provide the full reference of the Research Output:

Squance, H (2021), Enhancing multi-agency collaboration for humane animal welfare emergency outcomes - wildfire responses, Bob Kerridge Animal Welfare Fellowship Research Report, Hawkes Bay New Zealand

( ) The manuscript is currently under review for publication – please indicate:

- The name of the journal:

- The percentage of the manuscript/published work that was contributed by the candidate: 80.00

- Describe the contribution that the candidate has made to the manuscript/published work:

The candidate conducted the data collection and analysis, drafted the report and made subsequent revisions based on feedback from supervisors

( ) It is intended that the manuscript will be published, but it has not yet been submitted to a journal

Candidate's Signature:	Hayley E Squance Digitally signed by: Hayley E Squance DN: CN = Hayley E Squance C = NZ O = Massey University OU = JCDR Date: 2021.07.13 10:03:03 +13'00'
Date:	13-Jul-2021
Primary Supervisor's Signature:	David Johnston Digitally signed by David Johnston Date: 2021.07.14 13:43:46 +12'00'
Date:	14-Jul-2021

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Appendix 11: Contribution statement (Chapter 7)

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GRADUATE RESEARCH SCHOOL

STATEMENT OF CONTRIBUTION
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Name of candidate:	Hayley Etta Squance
Name/title of Primary Supervisor:	Professor David Johnston
In which chapter is the manuscript /published work:	Chapter 7

Please select one of the following three options:

○ The manuscript/published work is published or in press

- Please provide the full reference of the Research Output:

○ The manuscript is currently under review for publication – please indicate:

- The name of the journal:

- The percentage of the manuscript/published work that was contributed by the candidate: 80.00

- Describe the contribution that the candidate has made to the manuscript/published work:

The candidate conducted the data collection and analysis, drafted the manuscript and made subsequent revisions based on feedback from supervisors

◉ It is intended that the manuscript will be published, but it has not yet been submitted to a journal

Candidate's Signature:	Hayley E Squance — Digitally signed by: Hayley E Squance DN: CN = Hayley E Squance C = NZ O = Massey University OU = JCDR Date: 2021.07.13 10:03:03 +13'00'
Date:	13-Jul-2021
Primary Supervisor's Signature:	David Johnston — Digitally signed by David Johnston Date: 2021.07.14 13:45:29 +12'00'
Date:	14-Jul-2021

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Appendix 12: Research outputs

List of outputs arising from this body of work

Peer-reviewed publications

Squance, H., Johnston, D. M., Stewart, C., Riley, C. B. (2018). An integrative review of the 2017 Port Hill fires' impact on animals, their owners and first responders' encounters with the human-animal interface. *Australasian Journal of Disaster and Trauma Studies*, *22*(Port Hills Wildfire Special Issue), 97–108. https://www.massey.ac.nz/~trauma/issues/2018-2/AJDTS_22_2_Squance.pdf

This published paper is reproduced in Chapter 3 of this thesis.

Squance, H., Enhancing multiagency collaboration for humane animal welfare outcomes – wildfire response research report, Bob Kerridge Animal Welfare Fellowship, February 2021.

This research report is reproduced in Chapter 6 of this thesis.

Squance, H., MacDonald, C., Stewart, C., Prasanna R., and Johnston D.M, Strategies for implementing a One Welfare framework into emergency management. *Animals Journal, 2021,* 11, 3141 https://doi.org/10.3390/ani11113141 .

This paper is reproduced in Chapter 7 of this thesis.

Submitted paper under review

Squance, H., MacDonald, C., Stewart, C., Prasanna R., and Johnston D.M, Collaboration in animal welfare emergency management: Case studies of wildfire and flooding events in Aotearoa New Zealand. *Submitted to the International Journal of Disaster Risk Reduction.*

This paper is reproduced as Chapter 4 of this thesis.

Conference presentations

- Canterbury CDEM Volunteer Conference, March 2021, Christchurch, New Zealand, Key note speaker, Animals in Emergencies: Considerations and Challenges.
- Green Cross Veterinary Symposium, October 2020, Virtual, Like a moth to a flame: Veterinary professional's roles in disaster management.
- World Veterinary Association Congress, April -May 2020, Virtual, One Welfare in Disaster Management.

- South Island Civil Defence Emergency Management Conference, October 2019, Nelson, New Zealand, Animals in Emergencies: Considerations and Challenges.
- One Welfare Conference, October 2019, Sydney, Australia, Enhancing multiagency collaboration in animal welfare emergency management by adopting a One Welfare framework.
- Australian and New Zealand College of Veterinary Scientists College Science Week Scientific Meeting, June 2019, Brisbane, Australia, Animal Welfare, Epidemiology and Veterinary Public Health Chapter, Management of animals in natural disasters.
- World Small Animal Veterinary Association Congress, September 2018, Singapore, Key note speaker One Health stream, Four presentations 1) Collaborative intelligence for veterinary professionals 2) How to develop disaster management plans 3) One Welfare in disaster management: case examples flood, fire and earthquakes 4) Isolated communities and animal welfare emergency management.

Webinars

New Zealand Veterinary Nurse Association, 12th May 2020 & 11th October 2021, Getting through as a pandemic frontline worker in veterinary practice.

Interviews and media articles

- Talking horses, Community Radio Station 91.3 SportFM, 9 October 2019, Western Australia, Preparing horses for disasters
- Breakfast TV1 Interview, 2019, Bob Kerridge Animal Welfare Fellowship and planning for animals in emergencies
- https://www.facebook.com/MPIgovtnz/photos/a.957720640976379/2464864466928648/?type=3&theater
- Stuff, 2019, New Zealand Bob Kerridge Animal Welfare Fellowship
- https://www.stuff.co.nz/national/112578090/kerridge-fellowship-recipient-aims-to-fill-gaps-in-emergency-animal-welfare-response?fbclid=IwAR0fDZT9d49lFJQpI5JBOdpP7hZR5wbUiVI66pr8CUN0LnTFBGstpWUZCGc

Workshops

Civil Defence and Emergency Management Groups, various dates from 2017 to 2021, various CDEM groups, thirteen Animal Welfare Emergency Management Workshops.

Department of Primary Industries and Regional Development, August 2019, Perth & Albany, Western Australia, Local Government Animal Welfare in Emergencies.

Ministry of Civil Defence Emergency Management Conference, June 2017, Wellington, New Zealand, Animal welfare emergency management: its impacts and how it can be integrated into response strategies.

Applied Research in Environmental Sciences Nonprofit Inc (ARIES), July/August 2016, North Slope Borough Alaska, USA, four Preparing the Ark: Hazards & Animal Safety workshops.

Australasian Natural Hazards Conference, October 2015, Perth Western Australia, Animal Welfare Emergency Management - Why bother with integrating into an emergency risk management framework?