Understanding stakeholder involvement in the policy and management of migratory taxa in the Australian marine environment: A case study approach

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Thesis Abstract

Managing threats towards marine migratory species is difficult because the movements of these species are not limited by political jurisdictions. Effective governance of these species requires collaborative and adaptive interventions that are designed and implemented by multiple governance bodies across levels (e.g. local, state, federal government agencies; NGOs; industry bodies). However, although the involvement of diverse stakeholder groups has long been understood to be an integral component of collaborative and adaptive governance of natural resources, it does not come without its challenges. Thus, in order to promote the effective and efficient governance of threats towards marine migratory species throughout their range, it is important to explore the governance system protecting them.

My research is one of the first studies to focus on the governance of threats towards marine migratory species within Australian waters, with an emphasis on stakeholder involvement in the governance of threats towards these species. I used a comprehensive case study approach of four taxa of Matters of National Environmental Significance: marine turtles, dugongs, humpback whales, and non-threatened migratory shorebirds. I used a mix of qualitative and quantitative social science methods to address the overarching aim of my thesis to better inform the governance of threats towards marine migratory species in Australia by understanding stakeholder involvement in this governance system.

To explore the governance of marine migratory species in Australia, I first explored the formal structures that protect marine turtles, dugongs, humpback whales, and non-threatened migratory shorebirds in Australia. I used social network analysis to analyse policy instruments at a national level and from the east coast states of New South Wales, Queensland, Victoria, and Tasmania. I found that there are gaps in the policy instruments protecting these species throughout their range. Policies and management plans rarely connected to other jurisdictions (e.g. between states and/or between a state and the national jurisdiction). Further, the *Environment Protection and Biodiversity Conservation Act 1999* is the key piece of legislation that connected policies and management plans across jurisdictions. I suggest implementing an intergovernmental memorandum of understanding for listing migratory species under state and territory environmental legislation that can improve the coherence of mitigating threats to marine migratory species as they move throughout their range.

I then used a combination of a document analysis and snowball sampling to identify the stakeholder agencies involved in the governance of marine migratory species in eastern Australia. I also used qualitative, semi-structured interviews and a focus group to identify the values held by each stakeholder agency. I used the results of the interviews and the focus group to conduct qualitative social network analysis of the governance regime and found that the dominant value connecting most actors within the network is the ecological value of marine migratory species. Further, I identified that the governance system is highly centralised. Leveraging the shared values and the role of bridging actors within the network (e.g. independent researchers) could better promote cross-scale collaboration and harmonise the governance of threats to marine migratory species as they move throughout their range.

I also used results of the qualitative, semi-structured interviews and the focus group to identify the barriers to and opportunities for the effective governance of threats towards marine migratory species. I found that the barriers to and opportunities for stakeholder involvement fell under four key themes: 1) decision-making processes, 2) information sharing processes, 3) institutional structures, and 4) participatory pathways. Some means of improving the governance of threats towards marine migratory species and better involving diverse stakeholder agencies could be through the formation of collaborations, better use of technology to link diverse stakeholder agencies, and clearer, less complex pathways for non-government stakeholders to participate in decision-making.

Finally, I evaluated the extent to which collaborative governance is occurring when managing threats towards marine migratory species in Australia by focusing on marine turtles as a case study. I evaluated the *Recovery Plan for Marine Turtles in Australia 2017* and its subsidiary plans for components of collaborative governance and interviewed the Plan's developers and other experts in environmental governance and/or the governance of marine migratory species more broadly. I found that although this Plan is a robust document for governing threats towards marine turtles in Australia, future iterations of the Plan would benefit from explicitly outlining roles for stakeholders who wish to participate in implementing the plan. Introducing an expertise-based (yet representative) steering group of diverse stakeholders could help with outlining the roles available for non-government stakeholder agencies, increase collaboration within the governance regime, and reduce the complexity of the Plan, boosting the overall robustness of the regime.

My combined results highlight the importance of developing better collaborations to promote effective governance of threats towards marine turtles, dugongs, humpback whales, and non-threatened migratory shorebirds in eastern Australia. Such processes can occur through the implementation of a steering group for developing and implementing policy instruments to protect these species, better use of technology to promote cross-scale collaborations of stakeholder agencies, and participatory pathways for non-government stakeholders that are less-complex than the existing pathways. Greater involvement of diverse stakeholder agencies does not come without challenges, but addressing these challenges and involving diverse stakeholders promotes harmonised and efficient governance of threats to marine migratory species. I conclude this thesis by highlighting important areas for future research and by highlighting my key findings.

My original contributions to knowledge arising from this thesis include: 1) a better understanding of the formal structures of the governance system mitigating threats to marine migratory species in eastern Australia and a framework for analysing policy coherence in environmental governance more broadly (Chapter 4), 2) a better understanding of the role that values play in promoting cross-scale collaborations within a governance system (Chapter 5), 3) the barriers to, and opportunities for, effective stakeholder involvement, including identifying 'complexity' as an understudied barrier to stakeholder engagement in environmental governance (Chapter 6), and 4) a new framework for promoting the collaborative governance of marine migratory species with large ranges (Chapter 7).

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Glossary of Acronyms

Term	Acronym
Australian Dollars	AUD
Biodiversity Conservation Act 2016	*BCA 2016*
China – Australia Migratory Bird Agreement	CAMBA
Commonwealth Scientific and Industrial Research Organisation	CSIRO
Convention on Biological Diversity	CBD
Convention on International Trade in Endangered Species of Wild Fauna and Flora	CITES
Convention on the Conservation of Migratory Species (Bonn Convention)	CMS
Cooperative Research Centre (for the Great Barrier Reef	CRC/ CRC Reef
Department of the Environment and Energy	DotEE
Exclusive Economic Zone	EEZ
Environment Protection and Biodiversity Conservation Act 1999	*EPBC Act 1999*
Flora and Fauna Guarantee Act 1988	*FFGA 1988*
Great Barrier Reef	GBR
Great Barrier Reef Marine Park	GBRMP
Great Barrier Reef Marine Park Authority	GBRMPA
Great Barrier Reef World Heritage Area	GBRWHA
International Union for the Conservation of Nature	IUCN
Japan – Australia Migratory Bird Agreement	JAMBA
Matter of National Environmental Significance	MNES
Nature Conservation Act 1992	*NCA 1992*
New South Wales	NSW
Queensland	Qld
Republic of Korea – Australia Migratory Bird Agreement	ROKAMBA
Social Network Analysis	SNA
Species Profile and Threats Database	SPRAT
Tasmania	Tas
Threatened Species Protection Act 1995	*TSPA 1995*
Torres Strait Regional Authority	TSRA
Traditional Use of Marine Resource Agreement	TUMRA
Victoria	Vic

Glossary of terms used in this thesis

Term	Definition
Actor	All stakeholders involved in the governance of marine migratory species, including stakeholder agencies (e.g. a government agency) and individuals that participate in and/or influence decision-making (e.g. individual researchers; Bodin and Crona 2009)
Adaptive management	A cyclical process of employing experimental management strategies and using those results to inform and reform policies and management plans (see Holling 1978; Stringer et al. 2006)
Betweenness centrality (betweenness)	How many ties pass through a specific actor (Bodin and Crona 2009)
Centralised governance	Involves a single governance body, usually a high-level government body, making decisions that affect other governance bodies within the regime (de Loë et al. 2009)
Collaboration	Active participation that promotes the deliberate exchange of ideas between multiple groups of stakeholders within the governance system (Arnstein 1969; Rowe and Frewer 2000; Reed et al. 2009)
Collaborative adaptive governance	A decentralised, hybridised form of adaptive governance in dynamic systems (Lemos and Agrawal 2006; Plummer et al. 2013)
Collaborative governance	The processes and arrangements of public decision-making and management across multiple levels of government, public agencies, and the private sector (Emerson et al. 2012)
Co-management	A partnership between governing bodies and local resource users and a means of dealing with the shortcomings associated with top-down natural resource management (e.g. Berkes 2009; Nursey-Bray and Rist 2009; Marin and Berkes 2010).
Common pool resources	Large-scale resources, either natural (e.g. forests; fishing areas) or manmade (e.g. parking garages; bridges), where it is difficult and costly to exclude potential resource users from benefitting from the resource (Ostrom 1990)
Decentralised governance	Involves sharing governance and decision-making responsibilities amongst multiple governance bodies (including non-government stakeholders) to design and implement governance interventions (de Loë et al. 2009)
Decision-making processes	Characteristics that describe decision-making within the governance regime, including power distribution and the ability to make evidence-based decisions within the system

Deductive research	Begins with a previously identified theory or framework and moving towards a testable hypothesis that eventually leads to a confirmation (or not) of the original theory (e.g. general to specific; Elo and Kyngas 2008; Trochim 2006)
Environmental governance	A 'whole of government' approach, encompassing legislation, policy, and management (e.g. at local, regional, and national scales) and stakeholder involvement to appropriately address environmental problems (Lemos and Agrawal 2006; Lockwood 2010)
Governance	The system in which decision-making takes place, including identifying who is involved in decision-making, describing the power dynamics within the system, and identifying who is accountable for decisions (Graham et al. 2003; Lockwood et al. 2010).
In-degree	Number of ties directed towards an actor (Weiss 2011)
Inductive research	Begins with an observation, which then leads to broader patterns, generalisations, and theories (e.g. specific to general; Elo and Kyngas 2008; Trochim 2006)
Information sharing processes	Existing pathways of information sharing and communication between stakeholder agencies within the governance regime (e.g. the communication of research; communication of decisions; trust)
Institutional structures	Legislation and other policy documents (e.g. management plans) and other policy processes that support governance and decision-making within the governance regime
Instrumental stakeholder analysis	Explains how the behaviour of stakeholders can be managed, either by organisations or decision-makers, to achieve the desired governance outcomes (Jones and Wick 1999; Reed et al. 2009)
Interdisciplinary management	Involves multiple actors making decisions in varied, yet context-specific situations (Klein 2008)
Interdisciplinary research	Involves two or more distinct academic fields and uses multiple methods and data sources to address a problem or research question (e.g. Aboelela et al. 2007; Rosenfield 1992)
Migratory species	Species that perform cyclical movements between breeding and non-breeding areas (de Klemm 1994; Gilmore et al. 2007; Robinson et al. 2009)
Mixed-methods research	A research design that is robust and allows for supplemental methods to be used to collect data that would not be collected through a single research method (Leech and Onwuegbuzie 2009; Wisdom and Cresswell 2013)
Network density	The number of actual ties in a network divided by the number of possible ties (Bodin and Crona 2009)

Normative stakeholder analysis	Recognises stakeholders as inherently important to achieving a specific goal (Donaldson and Preston, 1995; Reed et al. 2009)
Out-degree	Number of ties directed away from an actor (Weiss 2011)
Participatory processes	The existing means for which government and non-government stakeholders can participate in developing and implementing governance interventions (e.g. the capacity and the complexity of allowing stakeholder agencies to participate in governance)
Policy coherence	Complementary legislation that works between and within legislative sectors to achieve mutually-decided policy outcomes (Nilsson et al. 2012)
Polycentric governance	Governance systems that include actors operating at the same level of governance (e.g. a municipal government interacting with other municipal governments) and actors operating at different governance levels (e.g. a municipal government interacting with a national government) (see Armitage et al. 2008; Termeer et al. 2010; Young 2002)
Scale mismatch	Occurs when management and governance interventions are inappropriately implemented to address a socio-ecological problem (e.g. applying a broad-scale approach to generate outcomes on a smaller scale; Benham 2017; Guerrero et al. 2015)
Social learning	Allows a governance regime to adapt, develop new bodies of knowledge, and develop new skills for governing within the regime (Mostert et al. 2007)
Social network analysis	Exploring relationships between network actors and the overall governance structures in a system (Bodin and Crona 2009; Prell et al. 2009; Wasserman and Faust 1994)
Social network	Groups of actors interacting within a governance regime to address an environmental problem
Stakeholder	Any state or non-state actor affecting or affected by an issue (e.g. Freeman 1984)
Stakeholder agencies	Groups of stakeholders with shared values and interests (e.g. Prell et al. 2009)
Triangulation	Validation of data across multiple, usually two or more, sources of evidence (Bowen 2009; Morse 1991; Patton 1999)

Chapter 1

General Introduction

This introductory chapter outlines the rationale for my research and reviews the relevant literature. Stakeholder engagement is a key component of effective natural resource governance, particularly when managing large-scale natural resources, such as marine migratory species. Therefore, it is important to understand stakeholder involvement in the governance of threats to marine migratory species. In this chapter, I: 1) reviewed the literature on environmental, adaptive, collaborative, and polycentric governance, and the role of stakeholders in natural resource governance; 2) identified gaps in this literature and 3) discussed where my research fits into the overall environmental governance literature.

1. General Introduction

Natural resource management incorporates the biophysical and social characteristics of a socio-ecological system when addressing environmental problems and issues (Roughley and Salt 2005). Large-scale natural resource management (e.g. management across scales and/or jurisdictions) is complex and characterised by competing interests (e.g. political and economic interests; environmental interests; Roughley and Salt 2005; Tear et al. 2005). Increasingly, there has been emphasis on exploring human-nature relationships and meaningfully engaging stakeholders in decision-making within socio-ecological systems, as anthropogenic stressors negatively affect ecosystems worldwide (Cote and Nightingale 2012; Leenhardt et al. 2015; Mace 2014). In this thesis, I define stakeholders as government and non-government actors that affect or are affected by a natural resource management issue (Freeman 1984; Prell et al. 2009).

My thesis explores stakeholder involvement in the context of the policy and management (henceforward, governance) of threats to marine migratory species in eastern Australia, using marine turtles, dugongs, humpback whales, and non-threatened migratory shorebirds as case studies (see Chapter 2). In doing so, my thesis makes an important and novel contribution to the environmental governance literature, particularly to the knowledge of stakeholder involvement in the governance of large-scale natural resources. Marine migratory species are important species to consider because their movement across scales and jurisdictions creates complexity within the governance system and also exposes these species to cumulative threats that might not be considered by individual jurisdictions throughout the range states of these species. Engagement of government and non-government stakeholders throughout the range of migratory species may help harmonise management of threats to these species and improve their long-term protection.

This first chapter provides the background information necessary for understanding the concepts and theories surrounding environmental governance and stakeholder involvement in governance. Though there are several types of governance considered in this thesis, I introduce and discuss the concepts of adaptive, collaborative, and polycentric governance systems, and outline some of the challenges in governing threats to marine migratory species.

1.1 Environmental governance

Policy design is often considered a process conducted only by government agencies (Althaus et al. 2007; Thomas 2007; Dunn 2012). Government involves formal, centralised bounded public entities (e.g. local councils; state and federal governments) that are ideally coordinated with one another to make decisions (Reed and Bruyneel 2010; Shapiro 2001). On the other hand, governance is defined as the system in which decision-making takes place, describing the power dynamics within the system, and identifying who is involved in decision-making and accountable for decisions (Graham et al. 2003; Lockwood et al. 2010). Governance is a broad concept, and for this reason, I focus on the aspect of governance that encompasses legislation, policy, management, and stakeholder engagement across multiple scales and governance levels (Figure 1.1; de Loë et al. 2009). Further, governance represents a shift towards decentralised decision-making by blurring the boundaries of administration and increasing collaboration between government and non-government stakeholders in decision-making processes (Figure 1.1; Lemos and Agrawal 2006; Lockwood et al. 2010; Rhodes 1996; Shapiro 2001).

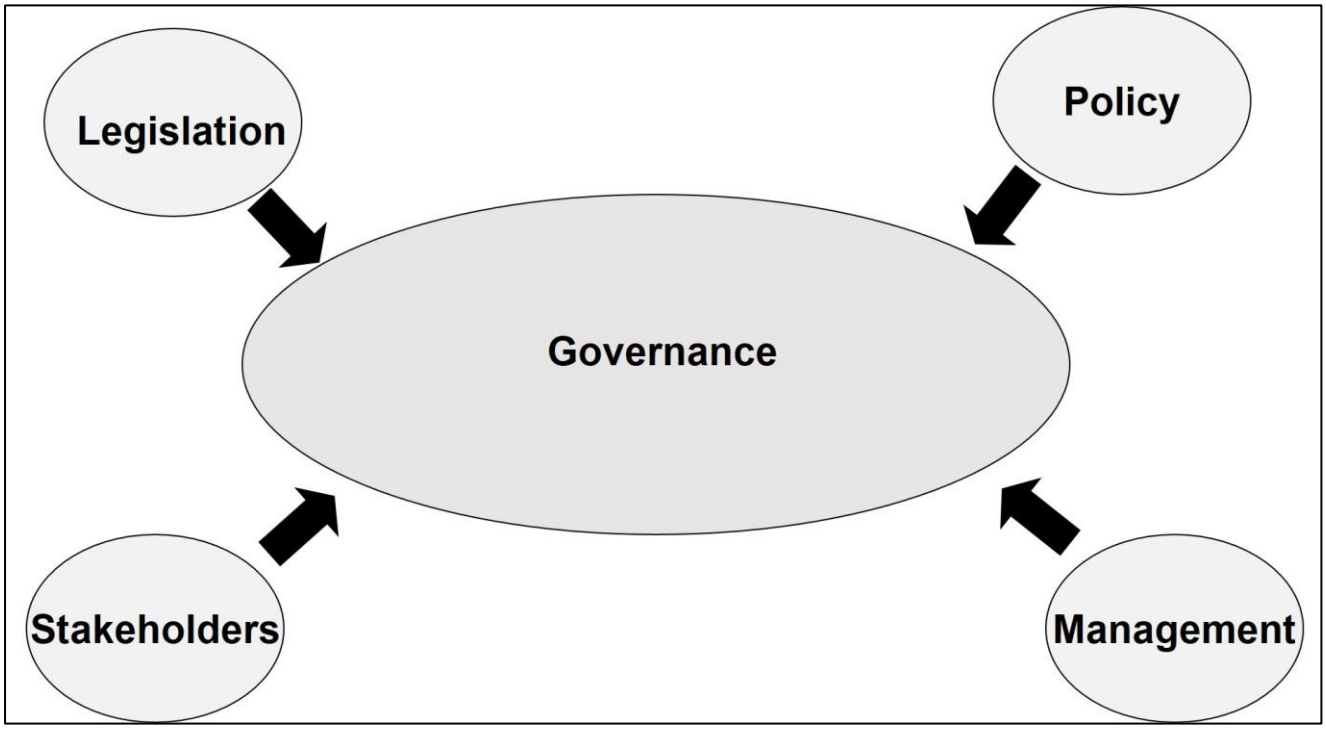


Figure 1.1. This figure represents one aspect of governance. The 'whole of government' approach encompasses legislation, policy, management (e.g. at local, regional, national and/or international scales), and stakeholder engagement that is encompassed by 'governance.' Governance involves coordination between government and non-government actors during the decision-making process.

Environmental governance emerged as a means to increase collaboration between stakeholder groups for addressing complex environmental problems (Lockwood 2010). Like other forms of governance, environmental governance includes all state and non-state stakeholder groups in decision-making (e.g. community groups; industry bodies; Lemos and Agrawal 2006). Environmental governance can take place at any scale, including local, national, or international scales (Lemos and Agrawal 2006; Reed and Bruyneel 2010).

Environmental governance can take many forms, including centralised (top-down) or decentralised (bottom-up) approaches. Centralised governance involves a single governance body, usually a high-level government body, making decisions that affect other governance bodies within the regime (de Loë et al. 2009). Top-down responses in natural resource governance can potentially cause controversy, as different socioeconomic and political contexts can make it difficult for the universal application of environmental solutions across multiple scales (Farrier et al. 2007; Koetz et al. 2012; Young 2006). For instance, local governments are often hesitant to implement large-scale, generic approaches (designed by higher-levels of governance) to localised environmental problems because these approaches tend to overlook the concerns of the lower levels of governance charged with implementing these interventions (Young 2006).

Many natural resource governance regimes are moving towards decentralised governance, because centralised governance often lacks the flexibility and multi-scale organisation to deal with environmental problems as they arise (Cumming et al. 2006). Decentralised governance involves sharing decision-making responsibilities amongst multiple governance bodies (including non-government stakeholders) to design and implement appropriate interventions (de Loë et al. 2009). Decentralisation requires that organisations appropriately outline goals and respective roles for stakeholders, are transparent, and hold accountable all players involved (see Chapter 7; Ross and Dovers 2008; Bennett and Dearden 2013). Decentralised governance can: 1) promote sustainable socio-ecological relationships, 2) produce results that are inclusive, and 3) be responsive to stakeholder needs (Young 2006). A decentralised governance regime can promote innovation and adaptation within a complex, socio-ecological system (described in Section 1.2; Lemos and Agrawal 2006).

1.2 Adaptive and collaborative governance

Adaptive management is a cyclical process (Figure 1.2) of employing experimental management strategies and using those results to inform and reform governance interventions (see Holling 1978; Stringer et al. 2006). Adaptive management generally applies to large-scale, socio-ecological problems because this approach can be more flexible than a pre-determined management framework (Armitage et al. 2008; Berkes 2009). The flexibility of adaptive management allows for the uptake of the latest scientific information (or expert knowledge; see Chapter 7) for developing appropriate indicators for evaluating management strategies and promoting structured decision-making using these evaluations (Olsson et al. 2004; Failing et al. 2013). Additionally, flexibility aids in integrating diverse values from an array of stakeholder agencies and promoting the collaborative governance of large-scale environmental issues, like those that marine migratory species face across their range (Chapters 5 – 7; Dietz et al. 2003; Stringer et al. 2006; Failing et al. 2013).

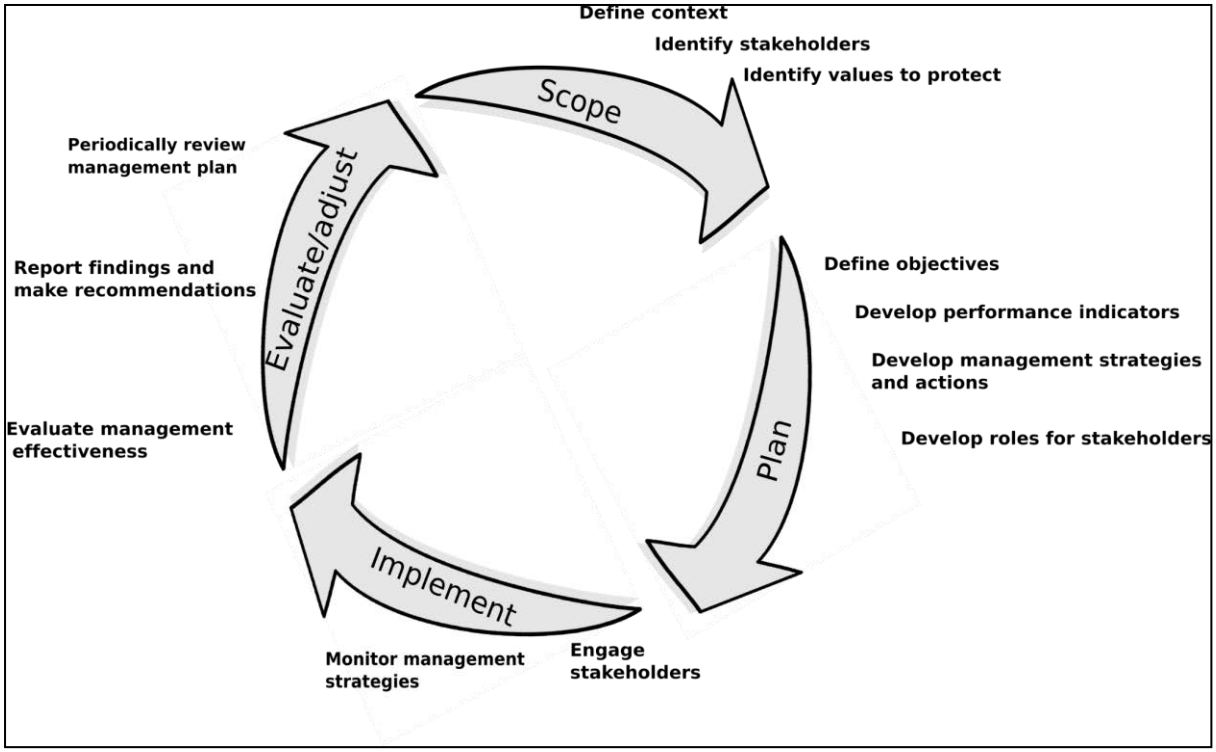


Figure 1.2. The adaptive management cycle used in natural resource management (Adapted from Jones 2005, 2009; Hockings et al. 2006; Williams 2011).

Collaborative governance describes the processes and arrangements of decision-making across multiple levels of government, public agencies, and the private sector (Emerson et al. 2012). Each governance body brings knowledge that can help decision-makers identify a problem and develop policy to address it (van Buuren 2009). Incorporating different

knowledge types into policy requires that non-state actors (e.g. non-government organisations; industry) play an active role in decision-making. Non-state actors will be responsible for complying with and/or implementing policy outcomes and are more likely to comply with decisions if they play an active role in designing and/or implementing decisions (Ansell and Gash 2008; Bouwen et al. 2004; Carlisle and Gruby 2017). For marine migratory species, several different stakeholder groups interact with these species as they migrate and thus, the conservation of marine migratory species would benefit from greater insight from non-government stakeholders (e.g. Traditional Owners; industry bodies; non-government organisations) to ensure greater compliance with decisions.

Collaborative adaptive governance represents a movement from centralised environmental governance towards hybridised (and decentralised) adaptive governance (Lemos and Agrawal 2006; Plummer et al. 2013). Collaborative adaptive governance regimes in socio-ecological systems are characterised by: 1) high uncertainty, 2) complex environmental problems (e.g. governing marine migratory species with large ranges), 3) interconnectedness (e.g. across management scales), and 4) dynamic change (Scarlett 2013). The challenge of collaborative adaptive governance is that socio-ecological systems change on temporal and spatial scales; therefore, such governance regimes depend on adaptation and collaboration at matching spatial and temporal scales within a polycentric system (Chapters 4 – 7; Susskind et al. 2012).

1.3 Polycentric governance systems in natural resource management

Polycentric governance systems are systems that include actors operating at the same level of governance (e.g. a municipal government interacting with other municipal governments) and actors operating at different governance levels (e.g. a national industry body interacting with a state non-government organisation; Armitage et al. 2008; Termeer et al. 2010; Young 2002). Natural resource governance systems are frequently characterised by polycentricity in that they comprise interactions between multiple, independently-operating governance bodies, involving both state and non-state actors (e.g. non-government organisations coordinating community groups and government agencies; Lockwood 2010; Ostrom et al. 1961; Ostrom 2012). Some governance bodies in polycentric systems play an active role in decision-making (e.g. they have the powers to make rules within a specific governance domain), and are supported by other governance bodies that lack the power to make rules

within a system (e.g. community groups; Carlisle and Gruby 2017; McGinnis and Ostrom 2012).

Polycentric governance systems can balance centralised and decentralised governance processes because governance bodies can organise themselves using top-down or bottom-up processes of learning and adaptation (Carlisle and Gruby 2017; Imperial 1999; Morrison 2017). Polycentric governance systems can be more effective than individual governance bodies at: 1) matching governance interventions to the appropriate scale of an environmental issue, 2) allowing for greater information flow between stakeholder agencies and governance levels, and 3) having better capacity to adapt to changes within a socio-ecological governance regime (Carlisle and Gruby 2017; Marshall 2009; Wyborn 2015). Such systems can also facilitate the adaptive, collaborative governance of resources (described in Section 1.2) because of the linkages between stakeholders across different governance levels.

Polycentric governance regimes can emerge to address threats towards a large-scale natural resource, such as marine migratory species with large ranges (Lockwood 2010; Wyborn 2015). A benefit of largescale natural resource governance is that it builds legitimacy into decision-making by coordinating relationships between the governance bodies and stakeholder agencies affected by decisions (Lockwood et al. 2010; Wyborn 2015). These coordinated relationships can be organised into: 1) a distinct number of jurisdictions within a single spatial scale that encompasses governance responsibilities (e.g. multiple municipal councils), or 2) an unlimited number of jurisdictions to address different facets of a policy problem (e.g. non-government organisations from all governance scales; Hooghe and Marks 2003; Newig and Fritsch 2009; Wyborn 2015).

By definition, polycentric governance systems require governance bodies to maintain their autonomy. Nonetheless, decisions may be influenced by the actions and decisions of other governance bodies within the regime (Carlisle and Gruby 2017; Mewhirther et al. 2018; Newig and Fritsch 2009). Additionally, coordination and collaboration between governance bodies is not without difficulties (Wyborn 2015). For example, despite the benefits of involving multiple governance bodies in decision-making, there can be high costs (e.g. financial and temporal) affiliated with forming these systems (e.g. Newig and Fritsch 2009; Mewhirther et al. 2018; Wyborn 2015). Further, polycentricity may be reflected in the structure of decision-making processes (e.g. legislation), but not necessarily translated to on-

the-ground implementation of governance interventions (Chapters 4 and 5; Morrison 2017; Wyborn 2015). Therefore, good natural resource governance, including at international scales, benefits from directed and deliberate cooperation within a polycentric governance system (Chapters 5 – 7).

1.4 International and national governance of natural resources

Biodiversity loss is a global environmental issue and anthropogenic impacts are leading threatened species to extinction at an unprecedented rate (Diaz et al. 2019; Hartter et al. 2012; Myers et al. 2000; Wardell-Johnson et al. 2016). As such, there are several tools to guide the management of threats to threatened species internationally (Table 1.1; Ortega-Argueta et al. 2011; Possingham et al. 2002). Several of these international conservation tools influence policy at a national level, especially in Australia where such agreements are the rationale for the federal government's involvement in environmental matters (Table 1.1).

The Australian Commonwealth Government and the *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act 1999*) are constrained by the Australian Constitution, as the Australian Constitution does not explicitly give the Commonwealth Parliament the power to create environmental legislation (Hawke 2009). The Commonwealth Government derives its power over the environment through Australia's requirement to enforce its international obligations. Australia is a signatory party to the Convention on Biological Diversity (CBD) and each party to the CBD is required to develop and implement national environmental and biodiversity policies under Article 6 of that convention (Australian Government: UN Convention on Biological Diversity). To fulfil this obligation, Australia enacted the *EPBC Act 1999*, which is designed to protect nationally important flora, fauna, and environments while also considering Australia's socioeconomic needs (described in greater detail in Chapter 2; *EPBC Act 1999*; Australian Government 1999; Farrier et al. 2007).

Table 1.1. An example of international conservation tools designed to protect biodiversity (in alphabetical order); all of these conservation agreements and partnerships list Australia as a partner or pertain to the Australasian region.

Conservation Tools	Purpose	Description
International Union for Conservation of Nature (IUCN) Red List of Threatened Species	To classify taxonomic, distribution, and conservation information on described species (IUCN)	Membership union
Convention on Biological Diversity (UNEP/CBD) Strategic Plan for Biodiversity (2011-2020)	To support biodiversity conservation in the United Nations system and their partners	Convention
Convention on Conservation of Migratory Species (CMS) Action Plans	To promote global conservation and sustainable use of migratory species	Convention
Convention on Conservation of Nature in the South Pacific (Apia Convention)	Parties agree to maintain lists of threatened indigenous flora and fauna to better aid in conservation (Art. 5)	Convention
Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR)	To protect Antarctica's natural resources and to prevent the overexploitation of its resources	Convention
Indian Ocean–Southeast Asian Marine Turtle Memorandum of understanding (IOSEA MoU)	To protect and conserve marine turtle populations throughout the Indian Ocean and Southeast Asia	Memorandum of Understanding
Agreement between the Government of Australia and the Government of Japan for the Protection of Migratory Birds in Danger of Extinction and their Environment (JAMBA)	Bilateral agreement between Australia and Japan to protect migratory birds in danger of extinction	Treaty
Agreement between the Government of Australia and the Government of the People's Republic of China for the Protection of Migratory Birds and their Environment (CAMBA)	Bilateral agreement between Australia and China to protect migratory birds in danger of extinction	Treaty
Agreement on the Conservation of Albatrosses and Petrels	To promote the conservation of albatrosses and petrels at sea and at breeding grounds	Treaty
Agreement with the Government of the Republic of Korea on the Protection of Migratory Birds, and Exchange of Notes (ROKAMBA)	Bilateral agreement between Australia and the Republic of Korea to protect migratory birds in danger of extinction	Treaty
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	A voluntary agreement to protect wild animals and plants that are commonly traded	Convention

International Platform on Biodiversity and Ecosystems (IPBES)	To address global biodiversity issues, particularly on regional and local scales, through the involvement of stakeholders (Beck et al. 2014; Opgenoorth et al. 2014).	Independent intergovernmental body
International Whaling Commission (IWC)	To regulate whaling and conserve international whale stocks (IWC.int)	Convention
The Antarctic Treaty	To promote peace over Antarctica, the continuation of scientific investigation in Antarctica, and to promote the sharing of scientific discoveries in Antarctica	Treaty
The Partnership for the Conservation of Migratory Waterbirds and the Sustainable use of their Habitats in the East Asian–Australasian Flyway (Flyway Partnership)	Partnership designed to promote the sustainable use and conservation of sites used by migratory shorebirds in East Asia, Southeast Asia, and Australasia	International partnership

One tool designed to help diverse stakeholders gain the knowledge needed to promote sustainable development alongside conservation is the International Union for Conservation of Nature (IUCN) Red List (IUCN.org). The IUCN Red List (2016) uses nine categories to classify the global conservation status of threatened species (see listing criteria here: http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria#categories): Extinct (EX), Extinct in the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Least Concern (LC), Data Deficient (DD), and Not Evaluated (NE). In Australia, national threatened species management is defined by the *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act 1999*), which broadly follows the IUCN Red List categories and criteria (Chapter 2).

In addition to the IUCN Red List, there are other tools that guide the international management of threats to threatened species including the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and the Convention on Conservation of Migratory Species (CMS or Bonn Convention; Ortega-Argueta et al. 2011; Possingham et al. 2002). These systems assess risk and allocate resources to threatened species conservation (including at a national level; Possingham et al. 2002; Soulé and Orians 2001; Hooker and Gerber 2004). Some threatened species are also migratory species, which pose different challenges for natural resource managers (Section 1.6; de Klemm 1994; Gärdenfors 2001; Martin et al. 2007).

1.5 Governance of migratory species

Ecologically, migratory species are species that perform cyclical movements between breeding and non-breeding areas; these movements play a large role in habitat connectivity (de Klemm 1994; Lascelles et al. 2014; Unsworth et al. 2015; Tol et al. 2017). Migratory species display high fidelity to their breeding or feeding sites, and can make migrations both within and between countries (Marsh 2000; Hooker and Gerber 2004; Lewison et al. 2004). Additionally, migrations of some marine species (e.g. sooty shearwaters) can cover entire ocean basins and multiple countries (Harrison et al. 2018; Hays et al. 2019). As such, these movements highlight a need for fluid boundaries of protection at an international and national level (e.g. Hays et al. 2019).

Migratory species are protected through legislation, management instruments, as well as international conventions, treaties, partnerships, and agreements (see Table 1.1 for examples). Internationally, the CMS defines migratory species as having a significant proportion of a species' population make cyclical and predictable movements across one or more national jurisdictions (CMS: Convention Text). In Australia, migratory species listed under the *EPBC Act 1999* are native species that are also listed under the Appendices of the CMS, and/or under international migratory bird agreements (Chapter 2 of this thesis; Section 209 of the *EPBC Act 1999*2). Australia is unique in that it has a single legislative instrument to protect both threatened and migratory species (the *EPBC Act 1999*; the United States of America and Canada have Migratory Bird Acts, but no legislation for explicitly protecting other migratory species).

Many migratory species are charismatic and embraced by the public due to their: 1) notable size (Home et al. 2009; Ducarme et al. 2013), 2) "cuddly" or "charming" characteristics (Lorimer 2007; Small 2012; Ducarme et al. 2013) and/or 3) their status as a symbolic or sacred organism (Hunter and Rinner 2004; Ducarme et al. 2013). These species may be important drivers in conservation and serve as 'flagship' species for their environment (Ducarme 2013; Home et al. 2009; McClenachan et al. 2012; Skibins et al. 2013; Small 2012). However, though these species have the potential to influence conservation because of their high profile, governing threats to these species is not without challenges, particularly when these species are also marine species (see also Chapters 4 – 7).

Migratory species may move across multiple legislative boundaries, while conservation resources typically apply within political boundaries (de Klemm 1994; Gärdenfors 2001; Martin et al. 2007). It is hard to delineate and locate boundaries in the sea because there are often no physical boundaries (Boersma and Parrish 1999; Reeves 2000; Zacharias and Roff 2001; Hooker and Gerber 2004). Much of the literature featuring marine migratory species emphasises the international governance of these species (particularly migratory bird species; e.g. Gallo-Cajiao et al. 2019; Runge et al. 2017), managing fisheries (including migratory fish species; e.g. Metcalfe et al. 2013; Vince 2007) or using marine protected areas to protect these species (MPAs; e.g. Dulvy et al. 2013; Fidelman et al. 2012; Gruby and Basurto 2013; Jones et al. 2013). There have been few studies on the governance of marine migratory species within Australian waters (e.g. Nursey-Bray et al. 2010; Weiss 2011). Australia has the third largest marine jurisdiction in the world and migrations of some species within the waters of a single state can be equivalent to the distance of an international migration (Geoscience Australia: The Law of the Sea; Pendoley et al. 2014).

Marine migratory species often utilise migratory corridors to move between breeding and non-breeding sites (Hooker et al. 2011; Pendoley et al. 2014). Some migratory corridors overlap with areas of high value for stakeholders and failure to account for anthropogenic threats throughout these areas can be detrimental to the species (Hooker et al. 2011; Pendoley et al. 2014). Large numbers of animals may move through these corridors over a short period as they migrate between foraging and breeding sites, or summer and winter foraging sites, compounding negative impacts on a population from anthropogenic threats (Hooker et al. 2011). For example, mortality due to direct (e.g. fishing or hunting) and incidental capture (e.g. by-catch; entanglement) can be harmful to populations of threatened marine migratory species as most such animals mature at a late age and reproduce slowly (Baum et al. 2003; Lewison et al. 2004; Wallace et al. 2010). Therefore, appropriately governing threats to these species requires coordination and collaboration between diverse stakeholder agencies (in addition to legislation and management instruments) across governance scales, both internationally and nationally within Australia (Chapters 4 – 7; Gallo-Caijao et al. 2019; Riskas et al. 2016; Runge et al. 2017).

1.6 Stakeholder engagement in environmental governance

Engaging stakeholders in natural resource governance ranges from nonparticipation to active participation (e.g. Arnstein 1969; Figure 1.3). Each form of participation has a place in environmental governance. Nonparticipation is the lowest level of involvement. Stakeholders can participate, but that participation involves a power imbalance and communication is often one-way (Figure 1.3; Arnstein 1969; Green and Hunton-Clarke 2003). Power holders and decision-makers aim to "educate" or "cure" stakeholders during nonparticipation (Arnstein 1969; Green and Hunton-Clarke 2003).

Passive participation, such as consultation, can help government agencies meet their legislative requirements, but efforts are often tokenistic because stakeholders provide feedback or information on governance processes, but they are not directly involved in decision-making (Figure 1.3; Chapters 5 – 7; Arnstein 1969; Reed et al. 2009; Rowe and Frewer 2000). Additionally, under the *Australian Environment Protection and Biodiversity Conservation* (*EPBC*) *Act 1999*, the consultation process focuses primarily on factual errors rather than true stakeholder engagement (see Chapters 5 – 7). Thus, though stakeholders do participate in decision-making and convey their concerns to decision-makers, there is no guarantee that these concerns will be incorporated into a decision (Arnstein 1969).

Active participation (what I refer to as 'collaboration' throughout this thesis) promotes the deliberate exchange of ideas between multiple groups of stakeholders (Figure 1.3; Arnstein 1969; Rowe and Frewer 2000; Reed et al. 2009). When stakeholders actively participate in decision-making, there is often a shift from a more centralised approach to a more decentralised approach (Arnstein 1969). Stakeholders are empowered and can have real influence when they actively engage in decision-making (Arnstein 1969; Green and Hunton-Clarke 2003). However, it is important to note that while stakeholder participation is generally viewed as beneficial to generate high quality solutions to environmental problems (e.g. Luyet et al. 2012), stakeholder engagement can be cumbersome. Therefore, participatory techniques must be chosen carefully to ensure that engagement is useful and produces decisions that are socially equitable and biologically appropriate (explored further in Chapters 5 – 7).

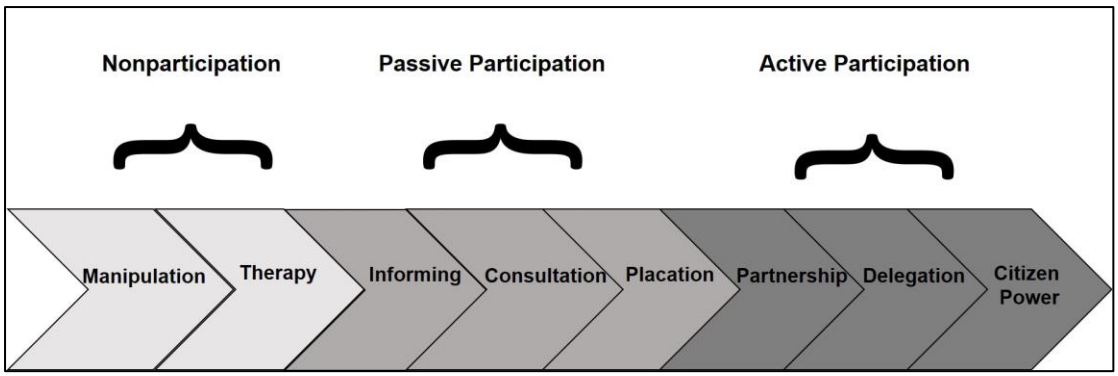


Figure 1.3. Means of engaging stakeholders in natural resource governance decisions (adapted from Arnstein 1969). Lighter colours signify lower levels of participation by stakeholders in decision-making than darker colours.

Increased stakeholder involvement may mean that natural resource managers are able to capture diverse values and management concerns, and better "match" the scale of governance interventions to the scale of the problem, reducing scale mismatch issues (Benham 2017; Dietz et al. 2003; Folke et al. 2005). Scale mismatch occurs when governance interventions are inappropriately implemented to address the scale of a socio-ecological problem (e.g. applying a broad-scale approach to generate outcomes on a smaller scale; applying short-term interventions to a long-term problem), resulting in negative impacts on multiple socio-ecological processes (e.g. only protecting individual resting sites of migratory shorebirds species versus regional protection of sites; Benham 2017; Cumming et al. 2006; Guerrero et al. 2015).

Social or ecological problems can arise when social organisations and environmental dynamics do not align (Cumming et al. 2006). Many management strategies are situation-specific and cannot be generalised, highlighting a need for: 1) a structured approach to improve public participation in governance at all levels, scales, and jurisdictions, and 2) creating effective ecosystem-based management (Bellamy et al. 2001; Gerber et al. 2007; Ruckelshaus et al. 2008). Involving diverse groups of stakeholders (across scales and jurisdictions) is one mechanism that would allow these to occur because it can force a change in management, irrespective of whether the approach is bottom-up or top-down (Cumming et al. 2006). Because marine migratory species move across jurisdictions and governance scales, understanding the relationships between stakeholders across all scales can help improve knowledge sharing and cross-scale collaboration (Adger et al. 2006; Weiss et al. 2012).

1.7 Stakeholder networks in environmental governance

Social networks (e.g. groups of stakeholders (actors) interacting within a governance regime to address environmental problems) can play a large role in encouraging participation within socio-ecological systems (Bodin and Crona 2009). Networks can differ between governance regimes, including in size, density, and the types of actors involved (Newig et al. 2010). Networks also play an important role in coordinating the governance of large-scale natural resources, such as marine migratory species, and incorporating a range of actors throughout the governance regime, including across scales and jurisdictions (Newig et al. 2010). Thus, exploring social networks allows for researchers and managers to: 1) identify the stakeholders involved, 2) better capture the nature of the problem, 3) identify boundaries, and 4) explore the relationships between different stakeholder agencies within a governance regime (Bodin 2017; Hjortso et al. 2005; Newig et al. 2010).

Exploring social networks is an informative technique for monitoring the success of collaborative governance regimes (Cundill and Fabricius 2010). Some collaborative governance regimes have been unsuccessful because of inadequate consideration of the stakeholder network during the decision-making process (Crona and Hubacek 2010). Additionally, analysis of social networks can identify which processes support or hinder the collaborative governance of natural resources (Bodin and Crona 2009; Bodin 2017). Understanding the dynamics of a network can improve the robustness of the governance regime and help address uncertainty by incorporating a variety of knowledge types into decision-making (e.g. Olsson et al. 2007).

Social networks can help identify and incorporate different sources of knowledge to facilitate social learning (e.g. Newig et al. 2010). Integration of stakeholder agencies from all governance scales demonstrates a willingness to share and develop knowledge across disciplines and with groups from different backgrounds (Roughley and Salt 2005; Newig et al. 2010). Additionally, stakeholder involvement ensures that governance interventions are socially equitable and consider diverse values (Bennett 2018; Law et al. 2018; van Riper et al. 2012). To date, there has been minimal research into the networks protecting marine migratory species within Australia's jurisdiction, with the exception of exploring decision-making processes in the co-management of green turtles and dugongs (Chapter 2, Section 2.2.2.1; e.g. Nursey-Bray et al. 2010; Weiss 2011; Weiss et al. 2012). My thesis addresses

these gaps by investigating the social network protecting marine migratory species within eastern Australia at a broader scale than previous studies.

1.8 Stakeholder values in environmental governance

Environmental values are important in environmental decision-making. The marine environment is one of our planet's more vulnerable ecosystems and holds value to a diverse range of stakeholders (Blasiak et al. 2015; Johnson et al. 2019). However, even though values are often the driving force for stakeholder participation in governance interventions, marine governance values are underrepresented in the literature and often focus on coastal ecosystems (e.g. Farrier et al. 2007; Johnson et al. 2019; Marshall et al. 2018; van Riper et al. 2012). Further, values are rarely explicitly incorporated into policy or management decisions (Fulton et al. 1996; Johnson et al. 2019; Maczka et al. 2019). Incorporating values into decision-making can help develop governance strategies that are ecologically and socially appropriate (Chapter 5; van Riper et al. 2012).

Stakeholder values are likely to influence governance interventions aimed at protecting natural resources, including marine migratory species with large ranges (Barrios-Garrido et al. 2019). Such influence is especially powerful for species that have a great value to the public, such as charismatic megafauna like marine turtles and humpback whales. Consequently, governments often view these species as political priorities (Ducarme et al. 2013; Kim et al. 2016). However, assigning anthropocentric value to species can be problematic, as it may influence the allocation of resources, potentially favouring charismatic megafauna (Farrier et al. 2007; Kim et al. 2016). Additionally, not all stakeholders share the same values, and conflict can arise between different sets of beliefs, making policy development difficult (Fulton et al. 1996; Jasanoff 1997; Thomas 2007). Marine migratory species in Australia are important to various stakeholders for different reasons, including spiritually and economically, so the values of stakeholder agencies involved in the governance of these species cannot be overlooked (Chapter 5; Thomas 2007; Pohl 2008; Bartlett et al. 2009).

1.9 Gaps in the existing literature, thesis objectives, and research questions

Several studies explore the international governance of threats towards some marine migratory species (e.g. migratory shorebirds; Gallo-Cajiao et al. 2019; Runge et al. 2017).

There are few studies that focus on the governance of marine migratory species within Australian waters or overseas (e.g. Weiss 2011), and there are no studies on stakeholder involvement in the governance of threats to these species. My research will investigate the involvement of stakeholders in the governance of four taxa of Matters of National Environmental Significance (MNES) in eastern Australia (Chapter 2). My aim is to better inform the governance of threats to marine migratory species in eastern Australia by understanding the role of stakeholders within this governance system.

In this thesis, I address three primary objectives and their associated research questions, detailed below:

Objective 1: Identify the gaps in managing marine migratory species in Australia

Question 1: *What are the major gaps identified in the current management of marine migratory species in eastern Australia and how do they compare among different Matters of National Environmental Significance?*

Objective 2: Understand the involvement of stakeholders in the governance of four MNES in Australia

Question 2: *Who are the stakeholder agencies involved in the policy and management processes protecting marine turtles, dugongs, humpback whales, and migratory shorebirds in eastern Australia?*

Question 3: *What are the values that motivate different stakeholders to participate in the governance of marine migratory species in eastern Australia?*

Question 4: *What are the barriers to, and opportunities for, involving stakeholders in the governance of threats to marine migratory species in eastern Australia?*

Objective 3: Develop a framework to assess and increase the collaborative governance of threats towards marine migratory species

Question 5: *To what extent is collaborative governance present in a recovery plan developed to protect a marine migratory species in Australia?*

Question 6: *How can the collaborative governance of a marine migratory species be improved?*

I have emphasised stakeholder involvement in my PhD thesis to identify ways to better promote their participation in the governance of threats to marine migratory species in eastern Australia. Stakeholders are often invested in research and management that directly affects them and understanding their role may help improve compliance and promote more effective management of threats to marine migratory species (Behnam and Daniell 2016).

1.10 Overview of thesis structure

My thesis builds on the literature discussed in this chapter by exploring the governance system protecting four taxa of Matters of National Environmental Significance in Australia, using mixed-methods and a case study approach (Figure 1.4; Sections 1.11.1 – 1.11.3; see also Chapters 2 and 3).

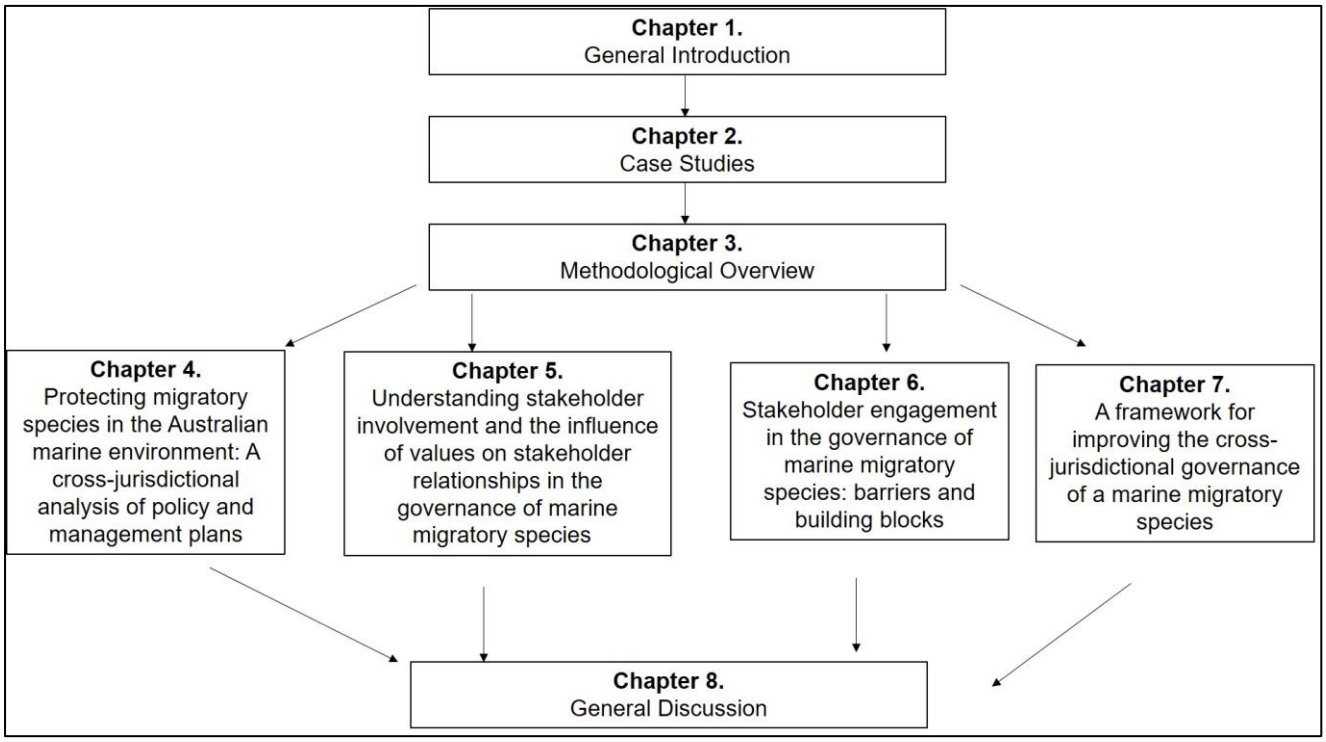


Figure 1.4 A schematic of my thesis structure, including the relationship between chapters. To improve ease of reading, this diagram will preface each chapter, indicating to the reader where they are in the thesis.

1.10.1 Chapters 1-3: Literature Review, Case Study Background, Overall Methodology

In this chapter (Chapter 1), I provide an overarching review of the relevant literature that frames my research. This literature review includes an introduction to natural resource governance, adaptive, collaborative, and polycentric governance systems, and stakeholder participation in natural resource governance.

In Chapter 2, I describe environmental and marine governance in Australia and introduce the case studies I used in my research. I provide the background necessary to understand the life histories of my case study taxa, Australia's governance structures, and some of the key stakeholder agencies with vested interest in each of the case study taxa. I explore the governance system mitigating threats to marine migratory species in eastern Australia in greater depth in each of my four empirical research chapters (Chapters 4 – 7).

Chapter 3 describes the overall methodology I used for my research. I describe the mixed-methods approach used to address my research questions (Section 1.11), including the use of document and thematic analyses, retrospective policy analysis, and social network analysis as my overall analytical tools. The details of specific methods used for data collection are included in the relevant data chapter, where appropriate (Chapters 4 – 7).

1.10.2 Empirical research chapters

In Chapter 4, I examine the relationships between policies and management plans protecting marine migratory species in eastern Australia. I explore the strengths and weaknesses of these relationships and identify how these policy instruments affect the management of threats to marine migratory species in eastern Australia.

In Chapter 5, I identify the stakeholder agencies (actors) involved in the governance of marine migratory species. Additionally, I identify the values of and explore how these values influence the relationships between actors involved in the governance of threats to marine migratory species in eastern Australia. I present a high-level, overarching view of the network involved in the governance system protecting marine migratory species in eastern Australia.

In Chapter 6, I investigate the barriers to, and opportunities for, involving stakeholders in the effective governance of threats to marine migratory species. This chapter explores how to increase stakeholder involvement for the effective management threats towards marine migratory species in eastern Australia.

In Chapter 7, I use existing collaborative governance frameworks to identify the extent to which collaborative governance occurs in managing threats towards marine turtles in

Australia. I present a framework to improve the collaborative governance of threats to marine turtles (and other marine migratory species) in Australia, including increasing stakeholder participation within the governance regime.

1.10.3 Chapter 8: General Discussion and Conclusions

The final chapter synthesises the findings of my empirical research chapters and presents an analysis of stakeholder involvement in the governance of marine migratory species in eastern Australia. I also discuss how my research fits into the overall environmental governance literature. I conclude by summarising my research findings, identifying the limitations of my research, and recommending areas of future research that emerged from the findings of my thesis.

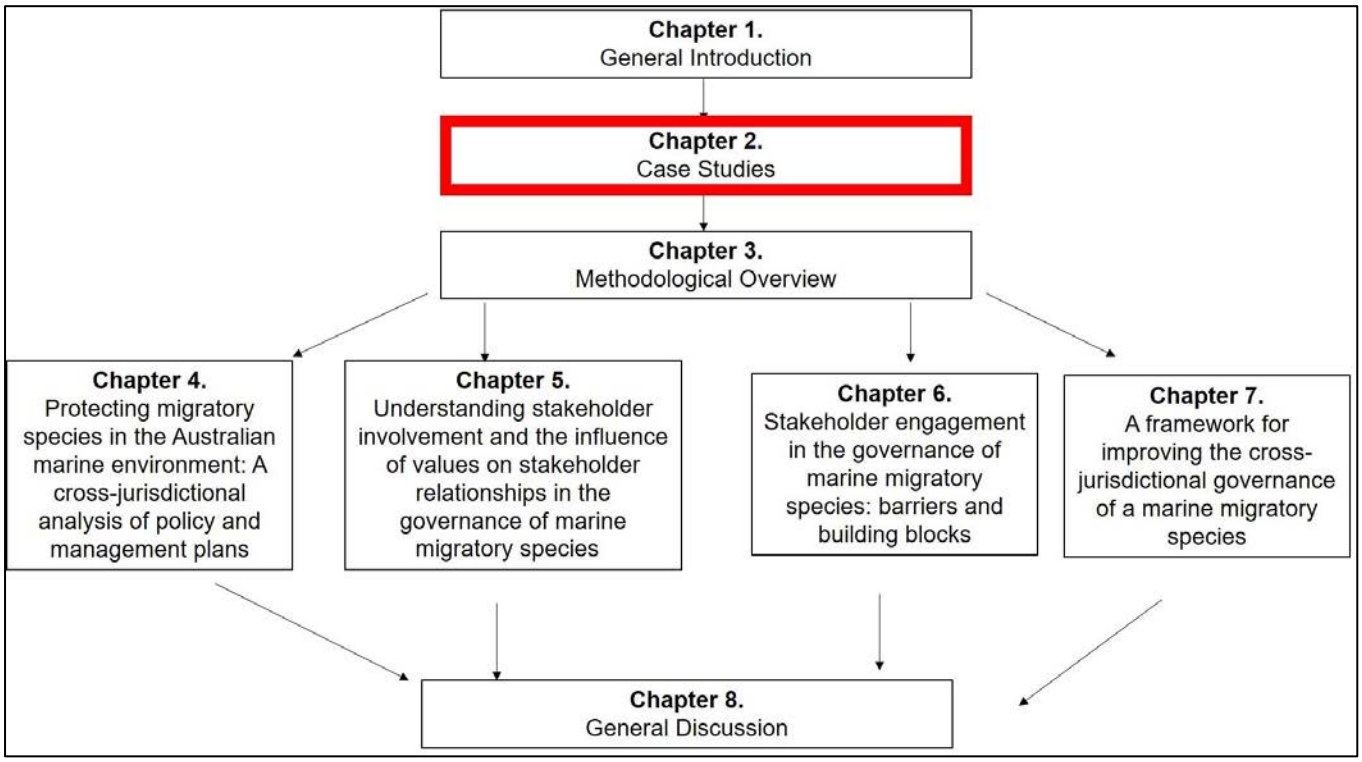
1.11 Summary

- In this chapter, I provided the background information for understanding the existing literature on environmental, adaptive, and collaborative governance systems, and the importance of including stakeholder agencies in environmental governance, including managing threats to marine migratory species.
- I also presented the gaps in the existing literature. There are few studies describing the governance system protecting marine migratory species at a national level within Australia, or overseas, or stakeholder involvement within this governance regime. My thesis would contribute to filling some of the knowledge gaps in this area.
- I described the aims and objectives of my PhD thesis, how my research fits into the overall governance literature, and the overall structure of my thesis.
- In the next chapter, I describe environmental governance in Australia, the scale of my study, and introduce the case studies I used to explore the involvement of stakeholders in the governance of threats to marine migratory species in eastern Australia.

Chapter 2

An introduction to the case studies and study region

In this chapter, I describe the environmental governance structure in Australia, including marine governance within Australia's Exclusive Economic Zone. Additionally, I provide the geographical context of my study region as well as the background information and justification for selecting the case studies I used in my thesis. I also discuss the key policy instruments (e.g. legislation; management plans) that provide the governance structures for each of the case studies. This chapter provides the contextual background necessary for understanding how my research fits into natural resource governance in Australia.



2. An introduction to the case studies and study region

2.1 Environmental governance in Australia

Australia's key piece of environmental legislation is the *Environment Protection and Biodiversity Conservation* (*EPBC*) *Act 1999* (Chapter 1, Section 1.4). The *EPBC Act* regulations include a list of protected species, based on criteria broadly similar to those of the International Union for the Conservation of Nature (IUCN) Red List; 'threatened species' are those species listed as critically endangered, endangered, or vulnerable under the Australian *EPBC Act 1999*. There is also a list of migratory species, based on species listed on Appendices I and II of the Convention of Migratory Species (CMS), the Japan-Australia (JAMBA), China-Australia (CAMBA), and the Republic of Korea-Australia (ROKAMBA) Migratory Bird Agreements. The migratory species list of the *EPBC Act 1999* identifies 159 migratory species in Australia, including birds, mammals, marine reptiles, cetaceans, and sharks; 117 of the listed migratory species live in the marine environment (Australian Government 2016). Species listed as threatened and/or migratory are two of the Matters of National Environmental Significance (MNES), a categorisation that influences the management tools used in their conservation (Table 2.1; Section 2.1.1; Chapters 4 – 8 in this thesis).

I used a case study approach using four taxa classed as Matters of National Environmental Significance (MNES) to explore the governance system mitigating threats to marine migratory species in eastern Australia (Yin 1994). I used purposive selection when choosing my case studies (Yin 1994). I chose my case studies because all four taxa are iconic species or groups of species, and have populations occurring along the east coast of Australia. Iconic species increase the likelihood that multiple stakeholder agencies will be concerned about the management of threats to these species throughout their range.

For my research, I chose to consider: 1) marine turtles (six species), 2) dugongs (*Dugong dugon*), 3) humpback whales (*Megaptera novaeangliae*) and 4) non-threatened migratory shorebirds (27 non-threatened species listed under the *Wildlife Conservation Plan for Migratory Shorebirds 2015*). A benefit of using a case study approach is that it helped me to: 1) understand and compare the governance structures that protect these species, 2) identify

strengths and weaknesses in the governance system, and 3) better understand the barriers to and opportunities for stakeholder involvement in the governance of threats to marine migratory species in eastern Australia. It is important to note that using case studies may also make it difficult to generalise the findings arising from the case studies (Yin 1994). Marine turtles, dugongs, humpback whales, and migratory shorebirds are listed on the Appendices of the Convention on the Conservation of Migratory Species (CMS or Bonn Convention), which is the primary international convention for protecting migratory species (Chapter 1, Section 1.4). Listing on the Appendices of the CMS allows for these species to be listed as migratory (and thus, MNES) under the *EPBC Act 1999*. However, despite their listing on CMS and their status of MNES, these species do not face uniform threats throughout their range and there are many differences in the policy and management arrangements for these case studies (Chapter 4; see Table G1 in Appendix G for a more extensive list of national policy instruments for mitigating threats for each taxon).

To address some of the discrepancies of listing threatened species, the Australian Commonwealth Government is introducing the Common Assessment Method (CAM), an intergovernmental memorandum of understanding designed to harmonise the listing of threatened species at the national and state/territory levels (Australian Government 2015c). Currently under the *EPBC Act 1999*, species that cross between state and territory borders are assessed by that state or territory's environmental legislation, which can lead to discrepancies in the listing of species (see also Chapter 4). The CAM aims to reduce these differences and assess species at a 'national' state of occurrence (Australian Government 2015c). As of January 2019, the Commonwealth Department of the Environment and Energy and all states and territories (with the exception of South Australia) had signed the intergovernmental memorandum of understanding for threatened species as of time of writing (September 2019; Australian Government 2015c).

The CAM is based on the categories developed and used by the IUCN Red List and amended to fit the Australian context (e.g. the categories of 'Near Threatened' and 'Least Concern' under the IUCN do not exist under the *EPBC Act 1999* and species that meet only these criteria will not be listed as threatened under the *EPBC Act 1999*; Table 2.2; Australian Government 2015c). Species that meet at least one of the IUCN Red List criteria (with the exception of 'Near Threatened' and 'Least Concern') are eligible for listing under the CAM categories (Table 2.2). Species listed as 'Conservation Dependent' under the *EPBC Act 1999*

are not nationally 'threatened' in Australia. A species will be listed under the highest category that they are eligible for under national and state/territory environmental legislation (e.g. if a species meets criteria for both endangered and critically endangered under the IUCN guidelines, that species will be listed as critically endangered in Australia; see https://www.iucnredlist.org/resources/summary-sheet for criteria for each category; Australian Government 2015c). Thus, under the CAM, the threat status of some of my case studies (nationally and/or at state/territory level) may change to reflect the harmonised process (see Tables 2.2 – 2.6).

Table 2.1. The categories for listing threatened species under the Common Assessment Method (CAM) in Australia. These categories are based on listing under the International Union for the Conservation of Nature (IUCN) Red List and are amended to fit the existing categories of threatened species listing in Australia. Any species listed under the CAM in Australia is considered a threatened species under the Australian *Environment Protection and Biodiversity Conservation Act 1999*.

IUCN Category[1]	Common Assessment Method Category
Extinct	Extinct
Extinct in the wild	Extinct in the wild
Critically endangered	Critically endangered
Endangered	Endangered
Vulnerable	Vulnerable
-	Conservation dependent
Near threatened	-
Least concern	-
Data deficient	-

[1]For information about the thresholds needed to meet each IUCN category, please visit https://www.iucnredlist.org/resources/summary-sheet

2.1.1 Matters of National Environmental Significance

MNES are protected under the Australian *EPBC Act 1999*; any action that has, or is likely to have, a significant impact on an MNES (Table 2.1) requires approval from the Australian Commonwealth Minister for the Environment (the Minister; see Chapter 2, Part 3, Division 1 of the *EPBC Act 1999*). A significant impact on an MNES is an impact that is 'important, notable, or of consequence, having regard to its context or intensity' (e.g. a development proposed for an important breeding ground used by a critically endangered shorebird; Australian Government 2009). Any action that is likely to have a significant impact on any MNES (Table 2.1) will need to be self-referred (by the proponent) to the Commonwealth Minister for a decision (Australian Government 2009).

If the Minister decides that the proposed action requires approval, the action then becomes a 'controlled action', which requires further assessment (e.g. environmental impact

assessment). Controlled actions may be subject to 'conditions' that must be put into place by the proponent to minimise impacts on an MNES, such as monitoring of sea turtles or shorebirds living in or near the affected area (e.g. Port Curtis and Port Alma Ecosystem Research and Monitoring Program Advisory Panel for the Western Basin Dredging and Disposal Project; Australian Government 2009). Listed threatened species and threatened ecological communities have greater conditions that need to be met before the controlled action can be completed than any other MNES (see also Chapter 6 in this thesis; Australian Government 2009).

Table 2.2. The nine categories of Matters of National Environmental Significance under the EPBC Act 1999 and the criteria for listing under that category.

Matters of National Environmental Significance under the *EPBC Act 1999*	**Criteria for listing**
World Heritage properties	Listing as a World Heritage Site or declaration by the Minister as a World Heritage Site
National Heritage places	Listing as a national, historical, or Indigenous place of outstanding significance
Wetlands of international importance	'A declared Ramsar wetland' under Article 2 of the Ramsar Convention or declaration by the Minister as a Ramsar Wetland
Listed threatened species or ecological community	A species or ecologically community identified as threatened in Australia
Migratory species	A species listed under Appendix I or II of the Convention on the Conservation of Migratory Species of Wild Animals (CMS or Bonn Convention); Listing on the Japan-Australia (JAMBA), China-Australia (CAMBA) or Republic of Korea (ROKAMBA) bilateral migratory bird agreements
Commonwealth marine areas	Any marine area within Australia's Exclusive Economic Zone (from 3 to 300 nautical miles), excluding those within state or Territory waters
The Great Barrier Reef Marine Park	The area declared as the Great Barrier Reef Marine Park (approx. 344,400 km^2) under the *Great Barrier Reef Marine Park act 1975*
Nuclear actions (including uranium mines)	Any matter associated with nuclear activities (including establishing, transporting or disposing) outlined in the EPBC Regulations 2000.
A water resource in relation to coal seam gas or large coal mining development	Per the regulations under the Water Resources – 2013 *EPBC Act* Amendment – Water Trigger

2.1.2 Governance in the marine environment

In Australia, both the Commonwealth and state governments have jurisdiction over the marine environment, with state governments having jurisdiction up to 3 nautical miles from shore and Commonwealth jurisdiction extending from 3 nautical miles to the edge of the Exclusive Economic Zone (EEZ; 200 nautical miles from shore; Geoscience Australia:

Maritime Boundaries). In total, the Australian EEZ covers approximately 10 million square kilometres of ocean and is the third largest marine jurisdiction in the world (Geoscience Australia: The Law of the Sea; Figure 2.1). However, managing marine migratory species can be difficult because boundaries in the sea are not defined physically, even if they may be politically well-defined (Boersma and Parrish 1999; Hooker and Gerber 2004).

An example of where marine governance may be difficult is in the Great Barrier Reef World Heritage Area (348,000 km^2; GBRWHA). In Queensland (Qld), the Commonwealth Great Barrier Reef Marine Park (GBRMP) and the State coastal marine park overlap (Day 2008; 2016). The boundary between the two jurisdictions was unclear because they defined "low water mark" differently, but the *Great Barrier Reef Marine Park Act 1975* granted the Commonwealth Government authority over the entire Great Barrier Reef region. However, the boundary difference was resolved by complementary zoning of adjacent state and Commonwealth marine parks (Day 2016).

2.2 Introduction to the case studies

Due to Australia's large size (approx. 7.7 million km^2; sixth largest country; Geoscience Australia: Australia's Size Compared) and complex environmental governance (Section 2.1), the scope of my PhD research encompassed Commonwealth and eastern state jurisdictions only. I focused on policy instruments and interviewed stakeholders from the Commonwealth Government and from the east coast states of New South Wales (NSW), Queensland (Qld), Tasmania (Tas), and Victoria (Vic; Figure 2.1; see Chapters 3 – 7). I chose these jurisdictions because the Commonwealth Government plays a large role in managing marine migratory species in Australia and because the east coast states are important in the distribution of my four case studies.

Australia is home to six species of marine turtles that migrate into and out of Australia, which are further separated into genetically distinct management units (Figure 2.2A; *Recovery Plan for Marine Turtles in Australia 2017*). Five of the six species of marine turtles in Australia nest on Queensland beaches (*Recovery Plan for Marine Turtles 2017*). Although the dugong's range in Australia extends from Shark Bay in Western Australia to Moreton Bay in southern Queensland (Marsh and Lefebvre 1994; Marsh et al. 1999), the eastern Australian stocks are globally significant (Figure 2.2B; see Section 2.3.2). Additionally, the east coast of

Australia is a major migratory corridor for the east coast subpopulation of humpback whales migrating from Antarctic waters (Figure 2.2C; Chittleborough 1965; Noad et al. 2011) and is part of the East Asian-Australasian Flyway, used by thousands of migratory shorebirds migrating from Russia and Asia (Figure 2.2D; Milton 2003).

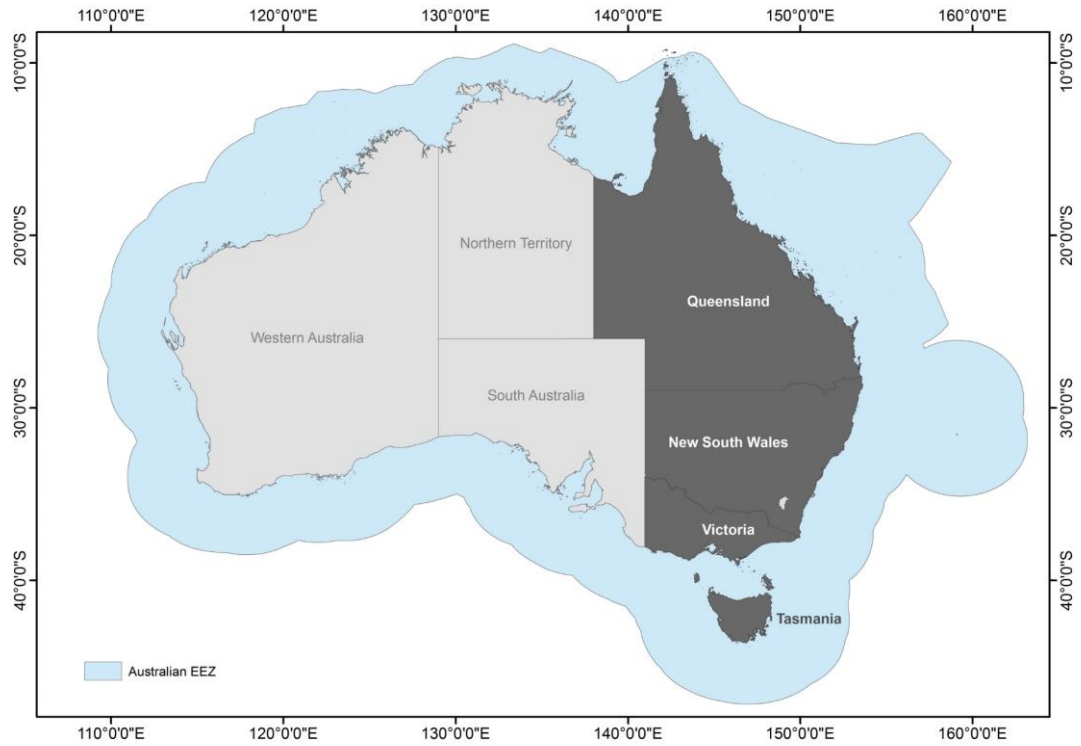


Figure 2.1. A map of the study area, including the Australian Economic Exclusion Zone (EEZ). The Commonwealth Government has jurisdiction over the sea out to the edge of the EEZ, while states have jurisdiction out to three n mi. The East Coast (NSW, Qld, Tas, and Vic) also plays an important role in the distribution of marine turtles, dugongs, humpback whales, and 27 species of migratory shorebirds listed under the *Wildlife Conservation Plan for Migratory Shorebirds 2015*.

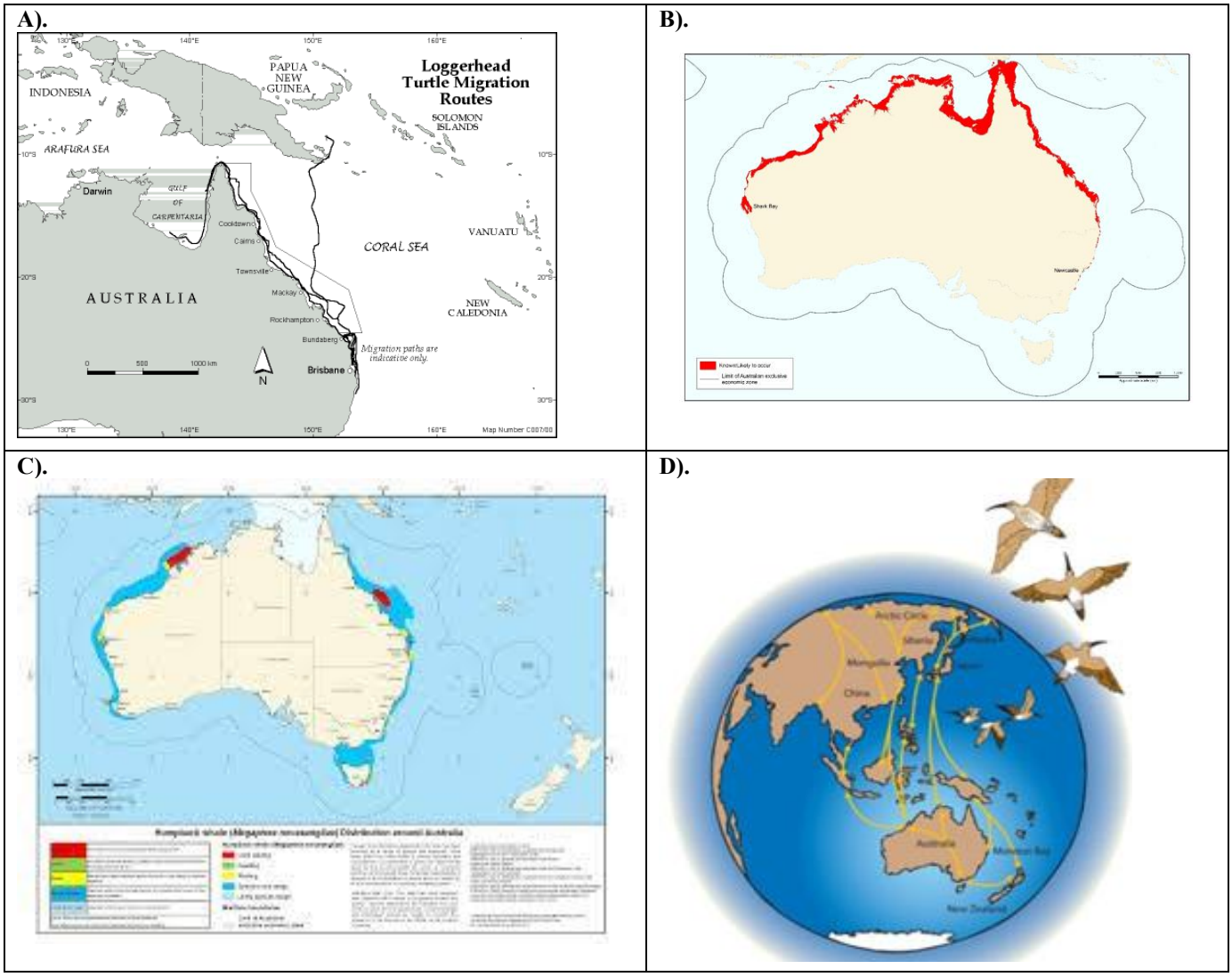


Figure 2.2. A) The migration routes of loggerhead turtles off the east coast of Queensland (image credit: GBRMPA: Loggerhead turtle). B) The distribution of dugongs throughout Northern Australia (image credit: Department of Environment 2019). For my thesis, I considered dugong populations on the east coast of Australia. C) The migration routes of humpback whales in Australia (image credit: Conservation Advice *Megaptera novaeangliae*. For my thesis, I focused on humpback whale populations migrating from Antarctica along the east coast of Australia. D) The East-Asian Australasian Flyway Zone through which the 27 species of migratory shorebirds I considered in this thesis migrate to eastern Australia (image credit: *East Asian—Australasian Flyway, Wetland Info* 2014).

2.2.1 Marine turtles in Australia

Marine turtles are long-lived, slow-growing animals that inhabit tropical and subtropical waters globally (Arthur et al. 2008; Bolten 2003; Pritchard 1997; Senko et al. 2011). These species have highly migratory lifecycles, making cyclical movements between feeding and non-feeding grounds (de Klemm 1994; Limpus et al. 1992; Senko et al. 2011). Female sea turtles can produce hundreds of eggs during a nesting season, but often only breed once every few years (Miller 1997). Additionally, hatching success and hatchling survival to sexual maturity can be very low (e.g. Chaloupka and Limpus 2002; Zug et al. 1995). Long-lived, slow-growing species are highly susceptible to anthropogenic threats (Baum et al. 2003;

Lewison et al. 2004), leading to worldwide protection of marine turtles (e.g. listing under CITES), including in Australia.

Six of the world's seven species of marine turtles spend some part of their lifecycle in Australian jurisdictions: loggerhead (*Caretta caretta*), green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), leatherback (*Dermochelys coriacea*), flatback (*Natator depressus*), and olive ridley (*Lepidochelys olivacea*) turtles (*Recovery Plan for Marine Turtles in Australia 2017*). Marine turtles are protected nationally in Australia, under the *EPBC Act 1999*, and in Queensland, New South Wales, the Northern Territory, and Western Australia (Figure 2.1; Table 2.3). All six species are also subject to a national recovery plan (the *Recovery Plan for Marine Turtles in Australia 2017*), jointly drafted by the Australian Commonwealth Government and the state governments of Queensland and New South Wales (see Chapter 7; Appendix K). Under the *EPBC Act 1999*, a recovery plan is a statutorily-binding instrument that may be created for threatened species (*EPBC Act 1999* Division 5, Section 269A, Subsection 2a). Recovery plans are designed to identify the research and management actions required to stop the decline of, and to aid in the recovery of, declining populations of listed threatened species or ecological communities (Division 5, Section 270, Subsection 1 of the *EPBC Act 1999*; see also Chapter 7 in this thesis).

Table 2.1. The listing of six species of marine turtles under the Australian EPBC Act 1999 and the relevant eastern state legislation.

Species	**Listing under *EPBC Act 1999*[1]**	**Listing under state legislation[2]**
Loggerhead (*Caretta caretta*)	Endangered, marine, migratory	NSW: Endangered (*Biodiversity Conservation Act (BCA) 2016*) Qld: Endangered (*Nature Conservation Act (NCA) 1992*) Tas: Endangered (*Threatened Species Protection Act (TSPA) 1995*)
Green (*Chelonia mydas*)	Vulnerable, marine, migratory	NSW: Vulnerable (*BCA 2016*) Qld: Vulnerable (*NCA 1992*) Tas: Vulnerable (*TSPA 1995*)
Hawksbill (*Eretmochelys imbricata*)	Vulnerable, marine, migratory	Qld: Endangered (*NCA 1992*)[2] Tas: Vulnerable (*TSPA 1995*)

Leatherback (*Dermochelys coriacea*)	Endangered, marine, migratory	NSW: Endangered (*BCA 2016*) Qld: Endangered (*NCA 1992*) Tas: Vulnerable (*TSPA 1995*)[2] Vic: Threatened (*Flora and Fauna Guarantee Act 1988*)[2]
Flatback (*Natator depressus*)	Vulnerable, marine, migratory	Qld: Vulnerable (*NCA 1992*)
Olive ridley (*Lepidochelys olivacea*)	Endangered, marine, migratory	NSW: Vulnerable (*BCA 2016*)[2] Qld: Endangered (*NCA 1992*)

[1] Any species listed as critically endangered, endangered, or vulnerable under the *EPBC Act 1999* is considered 'threatened' nationally

[2] The listing of this species may change under relevant environmental legislation where there are discrepancies between Commonwealth environmental legislation and state/territory legislation after the CAM is implemented

There are several important feeding and breeding grounds for marine turtles within Australia, including along the northern and eastern coasts of Queensland (*Recovery Plan for Marine Turtles in Australia 2017*). For example, Raine Island National Park (Scientific), located off the east coast of Queensland in the GBRMP, supports the largest aggregation of nesting green turtles in the world (Limpus et al. 2003). Turtles breeding in Australia may migrate to international feeding grounds (e.g. Read et al. 2014), while marine turtles living and breeding in the Torres Strait Protected Zone (a remote area between Australia and Papua New Guinea) may cross international boundaries on a daily basis (Hamann and Smith unpublished satellite telemetry data). Additionally, marine turtles are important to several stakeholders throughout their range, including Australian Aboriginal and Torres Strait Islander peoples in Australia.

Marine turtles are culturally important to Australian Aboriginal and Torres Strait Islander peoples in Australia as Traditional Owners in Northern Australia (described in Section 2.2.2.1; Butler et al. 2012; Marsh et al. 2004). Australian Aboriginal and Torres Strait Islander peoples descending from a tribe or ethnic group in a particular area are recognised under Australian law (the *Native Title Act 1993* and the *Torres Strait Treaty*) as Traditional Owners of their land and/or sea country (Marsh et al. 2015). Additionally, Aboriginal Australians and Torres Strait Islander peoples legally harvest marine turtles under the *Native Title Act 1993* (Butler et al. 2012; Marsh et al. 2004; Marsh et al. 2015).

2.2.2 Dugongs

Dugongs are members of the order Sirenia, along with three species of manatees, and are the only extant member of the family Dugongidae (Marsh and Lefevbre 1994). Dugongs are an herbivorous marine mammal that forage on seagrasses (Marsh 1999; Sheppard et al. 2006).

Dugongs inhabit the tropical and subtropical waters of the coastal Indo-Pacific region where there are seagrass meadows (Marsh et al. 1999; Tol et al. 2016). Dugongs are long-lived, reach sexual maturity between 10 – 17 years old, and give birth to one calf at a time after a 14-month gestation period (Kwan 2002; Marsh et al. 1999; Marsh and Kwan 2008). Because of their life history characteristics, dugongs are highly susceptible to anthropogenic threats (such as by-catch or entanglement), which has led to their protection internationally (e.g. listed as 'vulnerable' on the IUCN Red List; listed on CITES Appendix I; Marsh et al. 1999), including protection within countries throughout their range of occurrence, such as Australia.

Australia is home to a significantpopulation of dugongs, including some of the world's most important stocks in Northern Australia and the Torres Strait (Marsh et al. 2012; Marsh et al. 2015). The east coast of Queensland contains several major dugong habitats, including throughout the Torres Strait Protected Zone, Starcke River (near Hopevale in northern Queensland), Shoalwater Bay, the Hinchinbrook Dugong Protection Area (North Queensland), and Moreton Bay (south of Brisbane; Marsh and Lefevbre 1994; Marsh et al. 1999). Dugongs are protected in the east coast states of NSW and Qld, but are not listed as nationally threatened in Australia under the *EPBC Act 1999* (Table 2.4). Additionally, the presence of dugongs, along with marine turtles, in the Great Barrier Reef Marine Park (GBRMP) contributed to the 'Outstanding Universal Value' criteria for designating the GBRMP as a World Heritage Area (Grech and Marsh 2007; GBRMPA 2011; Marsh et al. 1999).

Table 2.2. Conservation status of dugongs nationally and under eastern state legislation in Australia.

Species	**Listing under *EPBC Act 1999***	**Listing under state legislation**
Dugong (*Dugong dugon*)	Marine, migratory[1]	NSW: Endangered (*BCA 2016*)[1] Qld: Vulnerable (*NCA 1992*)[1]

[1] The listing of this species may change under relevant environmental legislation where there are discrepancies between Commonwealth environmental legislation and state/territory legislation after the CAM is implemented

Like marine turtles, dugongs are culturally important to Aboriginal Australians and Torres Strait Islander peoples living in Northern Australia and the rights for Traditional Owners to harvest dugongs in Australia are protected under international treaties, joint agreements (e.g. *Torres Strait Treaty*, as well as nationally under the *Native Title Act 1993* (Marsh et al. 2004; Marsh et al. 2015). Some populations of dugongs are co-managed alongside marine turtles by Traditional Owner groups and the Great Barrier Reef Marine Park Authority (GBRMPA; e.g.

Butler et al. 2012; Weiss et al. 2012) through Traditional Use of Marine Resource Agreements (TUMRAs; e.g. *Girringun Traditional Use of Marine Resource Agreement; Gunggandji Traditional Use of Marine Resource Agreement*; Section 2.2.2.1).

2.2.2.1 Co-management of marine turtles and dugongs in Australia

Australia has an obligation to preserve traditional customs under international conventions, joint agreements (e.g. the *Torres Strait Treaty*), and under national legislation (e.g. the *Native Title Act 1993*; Marsh et al. 2004). As described above, marine turtles and dugongs are cultural keystone species (Sections 2.3.1 and 2.3.2) and are often subject to co-management between a government body and a Traditional Owner group(s). For this thesis, I am defining co-management as a partnership between governing bodies and local resource users. Such management is a means of dealing with the shortcomings associated with top-down natural resource management (eg. Berkes 2009; Nursey-Bray and Rist 2009; Marin and Berkes 2010).

There are several co-management agreements between the Great Barrier Reef Marine Park Authority (GBRMPA) and Traditional Owner groups throughout Northern Australia that co-manage the customary rights of Traditional Owner groups to cultural sea turtle and dugong fisheries (e.g. *Gunggandji Traditional Use of Marine Resources Agreement*). These agreements, called Traditional Use of Marine Resources Agreements (TUMRAs), are developed by individual Traditional Owner groups and accredited by the Great Barrier Reef Marine Park and the Queensland Government[1] (Great Barrier Reef Marine Park Authority: Traditional Use of Marine Resource Agreements). Some of these TUMRAs involve regulated or limited hunting of marine turtles and dugongs (regulated by the Traditional Owner groups; e.g. the *Girringun Traditional Use of Marine Resource Agreement* prohibits dugong hunting but allows limited hunting of marine turtles within specific hunting areas). Other TUMRAs involve a complete moratorium on the harvesting of marine turtles and dugongs within a particular area (e.g. *Gunggandji Traditional Use of Marine Resources Agreement*; Great Barrier Reef Marine Park Authority: Traditional Use of Marine Resource Agreements).

[1] TUMRAs were previously accredited by the Department of National Parks, Recreation, Sport, and Racing (Great Barrier Reef Marine Park Authority: Traditional Use of Marine Resource Agreements). That department is now the Department of Environment and Science (as at September 2019). Some TUMRAs are accredited by Queensland Parks and Wildlife Services (e.g. *Girringun Traditional Use of Marine Resource Agreement*), while others are accredited by the Department of Natural Resources, Mines, and Energy (e.g. *Leekes Creek Traditional Use of Marine Resource Agreement*). All of these departments are part of the Queensland Government.

2.2.3 East-coast subpopulations of humpback whales

Humpback whales are large cetaceans (reaching 15-18 meters in length) and have a near global extent of occurrence (Chittleborough 1965; Conservation Advice *Megaptera novaeangliae*). These whales migrate from polar feeding grounds to tropical calving waters in both the Northern and the Southern Hemispheres (Chittleborough 1965; Findlay et al. 2017). Humpback whales feed on krill, planktonic organisms that live in cold waters (Chittleborough 1965; Findlay et al. 2017) and survive off of their fat reserves as they migrate to the tropics to give birth, giving birth every 2-2.5 years (Conservation Advice *Megaptera novaeangliae*; Meynecke et al. 2013). However, due to these predictable migrations and the life history characteristics of these animals, humpback whale populations were heavily impacted by commercial whaling, which substantially reduced populations worldwide, including in Australia (Bejder et al. 2016; Conservation Advice *Megaptera novaeangliae*).

Australia is signatory to several international obligations protecting humpback whales (e.g. member of the International Whaling Commission; see Table 1.1 in Chapter 1), which influences how these whales are protected in Australia. Commonwealth marine waters (from 3 nautical miles offshore to the edge of Australia's Exclusive Economic Zone) comprise the Australian Whale Sanctuary under the *EPBC Act 1999*, making it illegal to capture or harm whales in any way (Australian Government: Australian Whale Sanctuary). Additionally, humpback whales are protected nationally under the *EPBC Act 1999* and under eastern state legislation (Table 2.5). Humpback whales are also protected by a Conservation Advice, a statutory instrument created under the *EPBC Act 1999* that protects a listed threatened species (Conservation Advice *Megaptera novaeangliae*). The combination of international protection from harvesting and protection within Australia has been important to humpback whale recovery along the east coast of Australia.

Table 2.3. Conservation status of humpback whales under the Australian EPBC Act 1999 and under east coast state legislation.

Species	**Listing under *EPBC Act 1999***	**Listing under state legislation[1]**
Humpback whale (*Megaptera novaeangliae*)	Vulnerable, cetacean, migratory	NSW: Vulnerable (*BCA 2016*) Qld: Vulnerable (*NCA 1992*) Tas: Endangered (*TSPA 1995*)[1] Vic: Threatened (*FFGA 1988*)[1]

[1] The listing of this species may change under relevant environmental legislation where there are discrepancies between Commonwealth environmental legislation and state/territory legislation after the CAM is implemented

There are two distinct breeding populations of humpback whales that migrate along the east and west coasts of Australia (as recognised by the International Whaling Commission; Conservation Advice *Megaptera novaeangliae*); in this thesis, I focus on east coast populations. East coast populations of humpback whales in Australia migrate from their feeding grounds in Antarctica to their breeding grounds in the Great Barrier Reef Marine Park and Hervey Bay (Chittleborough 1965; Noad et al. 2011; Simmons and Marsh 1986). The east coast population of humpback whales in Australia has been recovering at approximately 11% per year and is now estimated to have the world's largest numbers of humpback whales migrating along the coast (Bejder et al. 2016; Conservation Advice *Megaptera novaeangliae*; Meynecke et al. 2013; Noad et al. 2011). This recovery is considered a major conservation success for such a large marine mammal and has designated the east coast of Australia as an important location for humpback whales and whale watching tourism (Bejder et al. 2016).

Eastern Qld has three 'hot-spots' for humpback whales: the southern Great Barrier Reef, Hervey Bay in southeast Qld, and the Gold Coast (south of Brisbane; Australian Government 2017; Meynecke et al. 2013). Whale watching off the east coast of Australia is a major draw for the tourism industry, generating a direct expenditure of approximately $47.1 million Australian Dollars (AUD) annually (e.g. through direct ticket sales for whale watching; 2008 figures cited in Knowles and Campbell 2011). In 2008, humpback whales generated an annual total of approximately $264 million AUD (e.g. ticket sales + generating revenue for other local businesses; 2008 figures cited in Knowles and Campbell 2011). Further, humpback whales are a saltwater totem (known as *mugga mugga*) to the *Woppaburra* people on the Keppel Islands, but unlike marine turtles and dugongs, are not harvested by the *Woppaburra* peoples (GBRMPA 2018). The *Woppaburra* peoples and the GBRMPA co-

manage humpback whales through a TUMRA. However, despite their importance to industry and Aboriginal peoples on the east coast of Australia, managing these species is not harmonised (Chapter 4).

2.2.4 Migratory shorebirds

Many migratory shorebirds that breed in high, northern latitudes (e.g. Russia or the Arctic) migrate from their breeding grounds to their non-breeding grounds in the Southern hemisphere (Piersma and Lindstrom 2004; *Wildlife Conservation Plan for Migratory Shorebirds 2015*). These birds travel over nine specific migratory routes, also known as flyways, that link habitats required by the species in both hemispheres (Piersma and Lindstrom 2004). One of these flyways is the East – Asian Australasian Flyway, which is used by migratory shorebirds that breed in Russia and Asia as they travel to wetlands in Australia to rest and feed (Piersma and Lindstrom 2004; *Wildlife Conservation Plan for Migratory Shorebirds 2015*).

Some species of migratory shorebirds travel through the East – Asian Australasian Flyway to the states of NSW, Qld, Vic, and Tas (*Wildlife Conservation Plan for Migratory Shorebirds 2015*). Migratory shorebirds travel to Australia during their non-breeding season (Austral spring to autumn) and spend their time feeding and gaining weight before returning to their northern hemisphere breeding habitats (*Wildlife Conservation Plan for Migratory Shorebirds 2015*).

Migratory shorebirds face various threats throughout their migration through the East – Asian Australasian Flyway, primarily through habitat degradation in the Yellow Sea (e.g. Murray et al. 2014; Piersma et al. 2016). Thus, coordinated protection of wetlands, including 'staging areas' within Australia, is important to ensure that migratory shorebirds can successfully complete their migrations (Clemens et al. 2016; Szabo et al. 2016; *Wildlife Conservation Plan for Migratory Shorebirds 2015*).

Protection of shorebirds in Australia is largely dictated by Australia's obligations to the Japan – Australia (JAMBA), China – Australia (CAMBA), and Republic of Korea – Australia (ROKAMBA) Migratory Bird Agreements. Several species of shorebirds travel to Australia; 35 of these shorebird species are protected under the *Wildlife Conservation Plan for*

Migratory Shorebirds 2015. Wildlife Conservation Plans are statutory instruments created under the *EPBC Act 1999* and are designed to protect species that are not considered to be threatened nationally, but their conservation would benefit from a threat mitigation plan (see Chapter 5, Subdivision B, Section 275 of the *EPBC Act 1999*).

While the shorebird species protected under the *Wildlife Conservation Plan* are not listed as nationally threatened, some species are listed as threatened under east coast legislation (Table 2.6). I have focused on 27 of the 35 species (Table 2.6) listed under the *Wildlife Conservation Plan* because some species have been listed as threatened since the Plan's development, and thus, they were removed from the *Wildlife Conservation Plan for Migratory Shorebirds 2015*. Threatened migratory shorebirds are entitled to their own recovery plan or conservation advice outside the *Wildlife Conservation Plan for Migratory Shorebirds 2015* (*Wildlife Conservation Plan for Migratory Shorebirds 2015*). Additionally, not all 35 species of birds protected under the Plan migrate to the east coast of Australia.

Table 2.4. A list of the migratory shorebirds used as a case study in this study, adapted from Appendix A of the Wildlife Conservation Plan for Migratory Shorebirds 2015. All species listed here are listed as 'marine' and 'migratory' under the *EPBC Act 1999*. I have excluded birds that have been listed nationally as threatened since 2015 or birds that do not occur along the eastern seaboard.

Scientific Name	**Common Name**	**Listing under state legislation**
Pluvialis fulva	Pacific golden plover	
Pluvialis squatarola	Grey plover	
Charadrius dubius	Little ringed plover	
Charadrius bicinctus	Double-banded plover	
Charadrius veredus	Oriental plover	
Gallinago hardwickii	Latham's snipe	
Gallinago stenura	Pin-tailed snipe	
Gallinago megala	Swinhoe's snipe	
Limosa limosa	Black-tailed godwit	NSW: Vulnerable (*BCA 2016*)[1]
Limosa lapponica	Bar-tailed godwit	
Numenius minutus	Little curlew	
Numenius phaeopus	Whimbrel	
Xenus cinereus	Terek sandpiper	NSW: Vulnerable (*BCA 2016*)[1] Vic: Threatened (*FFGA 1988*)[1]
Actitis hypoleucos	Common sandpiper	
Tringa brevipes	Grey-tailed tattler	Vic: Threatened (*FFGA 1988*)[1]
Tringa incana	Wandering tattler	
Tringa nebularia	Common greenshank	
Tringa stagnatilis	Marsh sandpiper	
Tringa glareola	Wood sandpiper	
Arenaria interpres	Ruddy turnstone	
Limnodromus semipalmatus	Asian dowitcher	
Calidris alba	Sanderling	NSW: Vulnerable (*BCA 2016*)[1]

Calidris ruficollis	Red-necked stint	
Calidris subminuta	Long-toed stint	
Calidris melanotos	Pectoral sandpiper	
Calidris acuminata	Sharp-tailed sandpiper	
Limicola falcinellus	Broad-billed sandpiper	NSW: Vulnerable (*BCA 2016*)[1]
Philomachus pugnax	Ruff	
Glareola maldivarum	Oriental pratincole	

[1] The listing of this species may change under relevant environmental legislation where there are discrepancies between Commonwealth environmental legislation and state/territory legislation after the CAM is implemented. This list is correct as of September 2019.

Migratory shorebirds in Australia are monitored under several programs involving different stakeholder agencies, including citizen science programs like BirdLife Australia's Shorebirds 2020 monitoring program. Shorebirds are often monitored as a 'condition' on an action deemed to have a significant impact on a Matter of National Environmental Significance (see Section 2.3; Australian Government 2009). Additionally, shorebirds are important attractions for birdwatchers (both local and tourists; Lim and McAleer 2002; GBRMPA 2012), making these species important to different stakeholder agencies along the east coast of Australia.

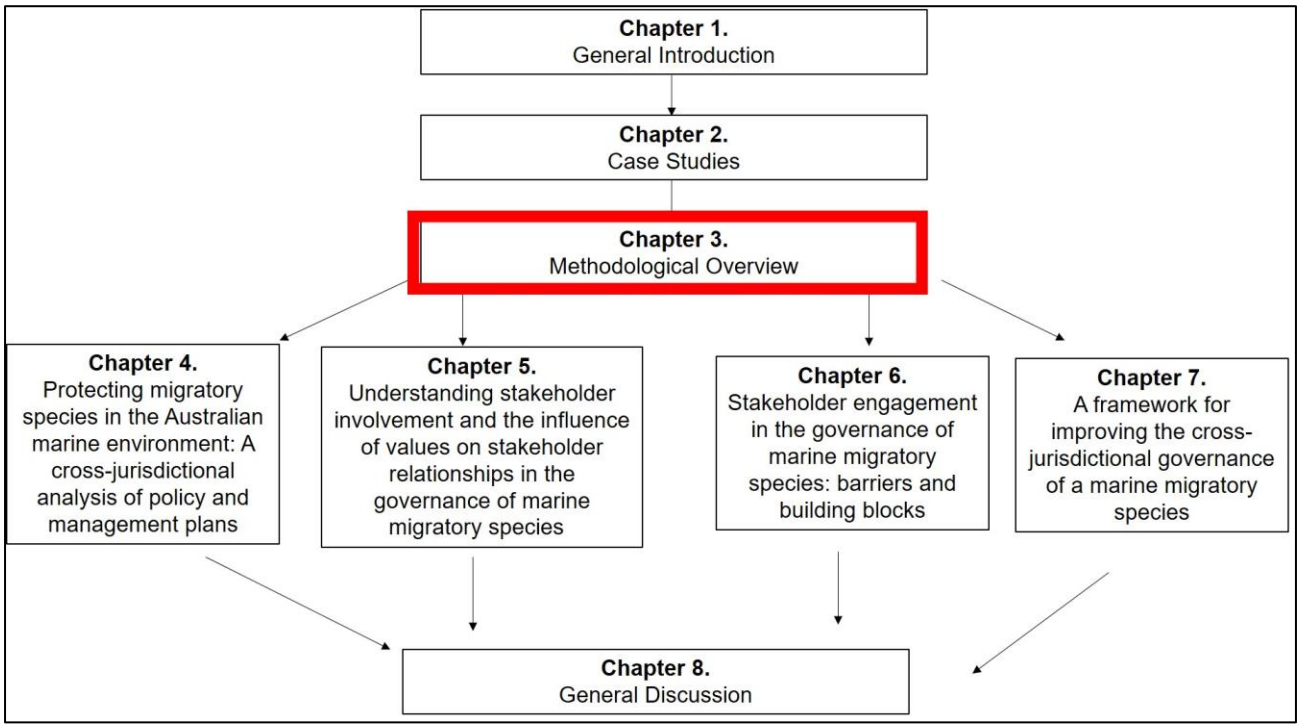
2.3 Summary

- This chapter provides the context of my thesis and describes the case studies I used to explore the complex governance of managing marine migratory species in Australia.
- In this chapter, I discussed the environmental and marine governance structures in Australia, as well as described the four Matters of National Environmental Significance (MNES) that I used as case studies for my thesis: marine turtles, dugongs, humpback whales, and migratory shorebirds on the east coast of Australia.
- Marine turtles and humpback whales are listed nationally as threatened. Dugongs and migratory shorebirds protected under the *Wildlife Conservation Plan* are not considered to be nationally threatened, but are still considered to be MNES.
- Management of all of my case studies requires cross-jurisdictional collaboration of state, Commonwealth, and international jurisdictions. Cross-jurisdictional management increases the complexity of involving different stakeholder agencies and affects management efforts, and is an interesting issue to explore in order to improve the management of threats to marine migratory species in eastern Australia.
- In the next chapter, I describe the methodology and individual methods that I used to address my research questions.

Chapter 3

Methodological Overview

In Chapter 3, I describe the methodology that I used to conduct my research, including my analytical framework, data collection, and data analysis methods. Effectively managing marine migratory species in a large marine jurisdiction requires an interdisciplinary approach and collaboration across multiple disciplines. I describe my mixed-methods approach using both quantitative and qualitative methods, with an emphasis on qualitative methods, to address my research questions and explore the governance system protecting marine migratory species in eastern Australia.



3. Methodological Overview

3.1 General overview – framing my research

Managing marine migratory species is complex, as these species often cross jurisdictional boundaries throughout their migrations, and management often involves multiple stakeholder agencies (e.g. Meek et al. 2011; Chapters 4 – 7). I chose to use an interdisciplinary approach in this thesis because management of threats to marine migratory species is inherently interdisciplinary – that is, it combines various knowledge types (e.g. local/scientific/Traditional Ecological Knowledge) to make decisions in varied, yet context-specific situations (Klein 2008). Interdisciplinary research involves two or more distinct academic fields and uses multiple methods and data sources to address a problem or research question (e.g. Aboelela et al. 2007; Rosenfield 1992). For my research, I draw upon both natural and social sciences to address my research questions (Chapter 1, Section 1.9). The natural science presented in this thesis considers that the biology of the case studies considered in this thesis is important to the effective conservation of these species. Because marine migratory species move across multiple jurisdictions, both within and between countries, exploring and understanding the governance system protecting these species requires an interdisciplinary approach using mixed methods, which I describe below.

To better understand the governance system protecting marine migratory species in eastern Australia, I used a case study approach with four different Matters of National Environmental Significance (described in Chapter 2; Yin 1994). Within each case study, I used a mixed-methods approach of both qualitative and quantitative data collection methods to address my research questions (Chapter 1, Section 1.9). Mixed-method research designs are robust and allow supplemental methods to be used to collect data that would not be collected through a single research method (Leech and Onwuegbuzie 2009; Wisdom and Cresswell 2013). A mixed-methods approach allowed me to use both deductive and inductive data collection and analysis approaches, as I used existing frameworks to analyse some of my data (deductive), but also built an analytical framework from the patterns that emerged from my data (inductive; Figure 3.1).

Deductive research approaches move from general to specific, beginning with a previously identified theory or framework and moving towards a testable hypothesis that eventually leads to a confirmation (or not) of the original theory (Figure 3.1; Elo and Kyngas 2008; Trochim 2006). Inductive research approaches move from specific to general, beginning with an observation, which then leads to broader patterns, generalisations, and theories (Figure 3.1; Elo and Kyngas 2008; Trochim 2006). Most of my data collection and analysis followed an inductive research design (Figure 3.1).

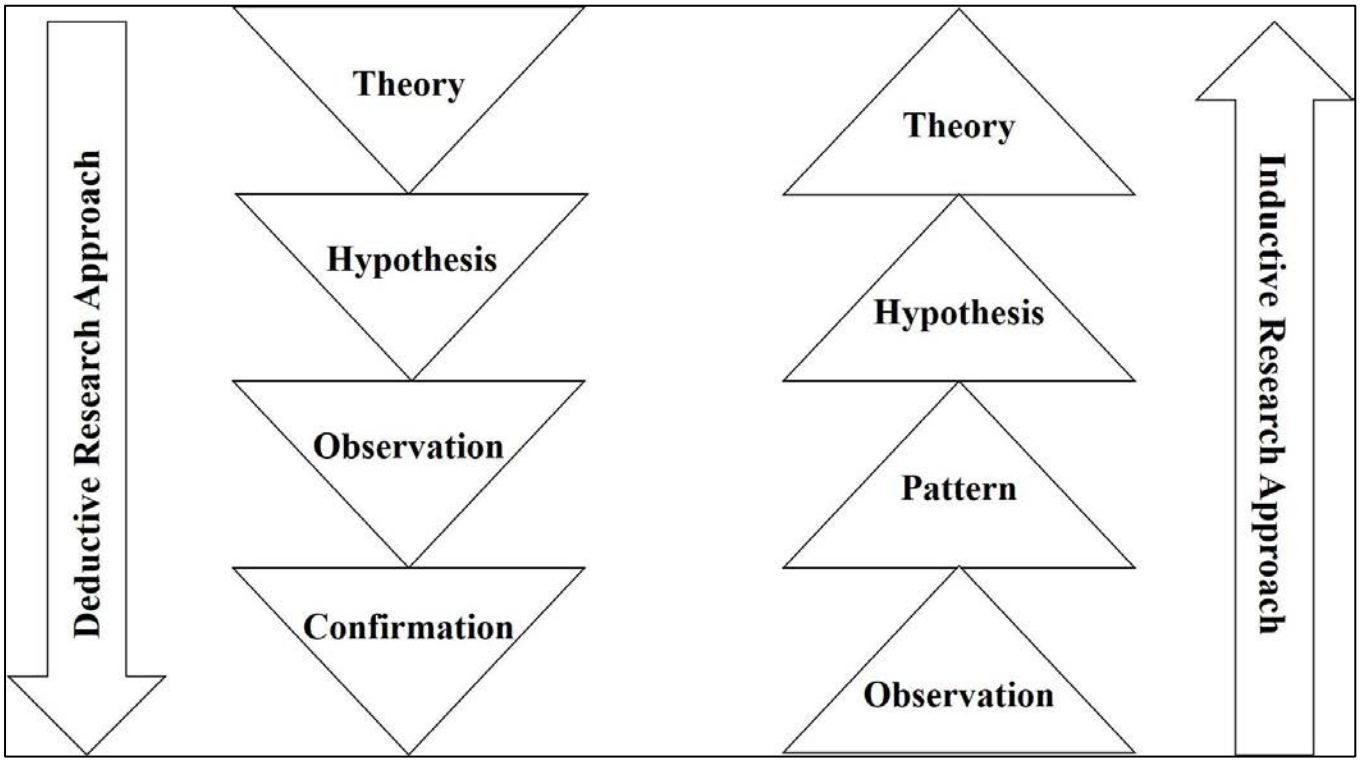


Figure 3.1. An overview of deductive and inductive research approaches (adapted from Trochim 2006). The direction of the arrows indicates the direction of research (e.g. deductive is "top-down" and inductive research is "bottom-up").

A mixed-methods approach allowed me to triangulate across data sources. Triangulation of data sources, usually two or more, is important in qualitative research because it allows the researcher to validate their findings through multiple sources of evidence (Bowen 2009; Morse 1991; Patton 1999). For my research, I triangulated my data using a combination of document analyses, qualitative semi-structured interviews, and a qualitative focus group (described in Section 3.3).

3.2 Research design

As previously stated, I used a case study approach (case studies are described in Chapter 2), involving mixed-methods of quantitative and qualitative tools within each case study, to address my research questions. I framed my data collection and analysis using a retrospective policy analysis methodology (Figure 3.2; Dunn 2012; see below). For this thesis, I use the term 'methodology' to describe the theoretical approach that I used to guide my data collection and analysis and outline the tools (individual methods) I used to answer my research questions (Figure 3.2; Grix 2002).

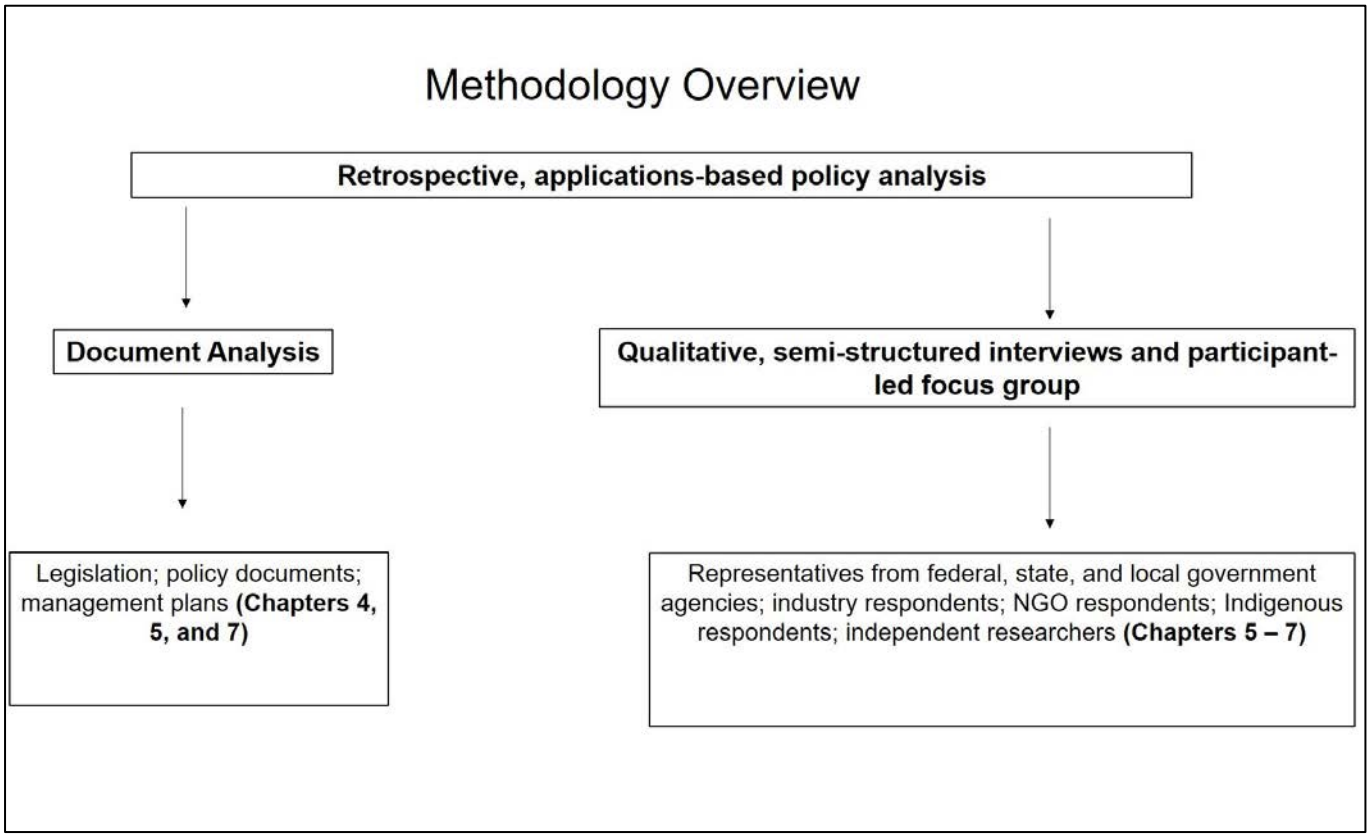


Figure 3.2. An overview of the mixed-methods approach I used to frame data collection and analysis for my thesis. I framed my research using a retrospective, applications-based policy analysis methodology and used a combination of document analyses, qualitative semi-structured interviews and a focus group to collect data for my research questions.

I chose retrospective policy analysis as the methodological framework for collecting and analysing my data because my research occurred *ex-post facto*, meaning that the policy instruments used in the governance of marine migratory species in eastern Australia have already been designed and are already in place (see Dunn 2012). A strength of retrospective policy analysis is that it allowed me to evaluate the effectiveness of the governance system that already exists for managing threats to marine migratory species in eastern Australia using multiple methods (see Sections 3.3.1 – 3.3.5). Additionally, retrospective policy analysis

allowed me to identify the consequences and effects of existing management interventions for marine migratory species (see Dunn 2012). A limitation of using retrospective policy analysis is that it does not prescribe new policies or management instruments (Dunn 2012). However, the results arising from evaluating existing policy instruments (and thus, retrospective policy analysis) can be used to inform future policy instruments (Dunn 2012).

3.3 Data Collection

I used mixed methods to collect my data, beginning with document and thematic analyses. I conducted the semi-structured interviews and the focus group between 2017 and 2018, with the schedule dependent on the availability of respondents (described in Sections 3.3.4 and 3.3.5). I conducted all research in accordance with James Cook University Ethics Guidelines and permit H6876 (Appendix A).

3.3.1 Document analyses

Document analyses involve systematically reviewing or evaluating documents (e.g. policy instruments), that are then organised into themes or categories (Bowen 2009; Labuschagne 2003). Document analysis is an important qualitative research method that can provide context about the system in which potential research respondents operate and identify the research questions needed to address gaps in the literature (Bowen 2009). I used document analyses to triangulate my data, an approach that has been used in other mixed-methods research (Bowen 2009; Patton 1999). Additionally, conducting document analyses allowed me to better understand the structures involved in governing the Australian marine environment and identify the types of questions I needed to ask respondents in order to address gaps in the management of marine migratory species in eastern Australia (Chapters 4 – 7).

I performed a comprehensive review of literature and 138 policy and management documents, including policy and management instruments from the national level and from the east coast states of Queensland (Qld), New South Wales (NSW), Victoria (Vic), and Tasmania (Tas; see Chapter 4). The literature and policy instruments I reviewed were current (up to 2019) and relevant to the governance of threats to marine migratory species in east Australia, specifically marine turtles, dugongs, humpback whales, and non-threatened

migratory shorebirds (Chapter 2). I reviewed operational policies and management plans because I focused on current applications of management tools rather than the development or historical practice of environmental policy in eastern Australia. I defined a policy as statutory legislation and/or regulations that describe how the government will protect the environment and a management plan as a document that outlines the implementation of a policy or policies, while still protecting the environment (Chapters 4 and 5).

I collated national and state-level policies and management plans through an online search, supplemented by requests to the appropriate departments for missing documents (primarily from industry agencies). All potentially relevant (e.g. environmental policies from any of the locations used in this study) environmental policies and management plans (including terrestrial) from the study area were collated and reviewed using a key word search (Table 3.1). I eliminated policies and plans that did not protect any of the four case studies (Chapter 2) and/or their habitats.

Table 3.1. Key words used to collate environmental policies and management plans in Australia related to four taxa of marine migratory species.

Category	Key Words
Location	Australia, Qld, NSW, Vic, Tas
Case Studies	Migratory, marine turtles, sea turtles, turtles, dugongs, humpback whales, whales, migratory shorebirds, shorebirds, waders
Environments	Marine, coastal, intertidal, seagrass, beach, mangroves, wetlands, marshes

I determined environmental policies and management plans that were not eliminated by the key word search to be potentially relevant to the protection of the migratory taxa that I used as case studies in this thesis (Chapter 2). I then developed and applied a framework to conduct a thematic analysis of collated documents using predetermined search criteria in a manner similar to Pullin and Stewart (2006) (Appendix F, Figure F1). I reviewed these environmental policies and management plans using a system of inclusion and exclusion criteria (Appendix F, Figure F1; Pullin and Stewart 2006). I analysed policies and plans based on explicit statements within each document to reduce subjective assessment (Ortega-Argueta et al. 2011). The analysis framework served as a hierarchical filter; I eliminated

policies and plans if they did not meet at least one of the essential criteria (Appendix F, Figure F1).

Policies and management plans that met one or more of the essential criteria were determined relevant and further analysed using additional criteria (Appendix F, Figure F1; Appendix H, Tables H1 and H2).

Examples of relevant environmental management plans included recovery plans, threat abatement plans, and industry plans, among others (see Table G2 in Appendix G for descriptions). I reviewed protected area management plans from each state until I reached data saturation; that is, no new themes emerged while reviewing and coding the plans (Fusch and Ness 2015). The collated documents included the national *Recovery Plan for Marine Turtles in Australia 2017*, which I subsequently reviewed more thoroughly for a second time in Chapter 7 (detailed in Chapter 7, Section 7.2.2).

The results of my document analyses helped me to better understand current management arrangements for my case studies (Chapter 2) and led to the development of a set of questions for the qualitative, semi-structured interviews and focus group that I conducted (detailed in Sections 3.3.4 and 3.3.5).

3.3.2 Stakeholder analysis – identifying who is involved in the governance system

Stakeholders have an integral role in effectively implementing conservation initiatives because humans are altering ecosystems globally (e.g. Diaz et al. 2019; Leenhardt et al. 2015; Mace 2014; Reed et al. 2009). Therefore, the early involvement of diverse stakeholder agencies (e.g. groups of stakeholders with similar interests; Prell et al. 2009) at a variety of levels benefits the governance of complex socio-ecological problems (Diaz et al. 2019; Lebel et al. 2006; Plummer et al. 2013). Identifying all stakeholders affected by an issue is important to successful governance of the issue, because failing to identify a stakeholder agency can introduce bias into the decision-making process (Luyet et al. 2012).

Several different approaches exist for stakeholder analysis (e.g. identifying the stakeholders affecting or affected by an environmental governance issue; Freeman 1984). One approach is the ‘instrumental’ approach. As described in the business literature, instrumental approaches

explain how to manage stakeholders to achieve specific outcomes (e.g. Egels-Zandén and Sandberg 2010; Jones and Wick 1998; Reed et al. 2009). Such approaches emphasise that stakeholders must exhibit specific behaviours to achieve desired governance outcomes (Jones and Wick 1998). Self-interest (e.g. of researchers or corporations) is often the motivation behind using instrumental approaches to stakeholder analysis and engagement; therefore, many researchers are moving towards a normative approach (e.g. Egels-Zandén and Sandberg 2010; Jones and Wick 1998; Reed et al. 2009).

Normative approaches recognise stakeholders as inherently important to achieving a specific goal (Donaldson and Preston, 1995; Reed et al. 2009). Such approaches can legitimise environmental decisions and involve representative stakeholder agencies in the decision-making process (Donaldson and Preston 1995; Luyet et al. 2012; Reed et al. 2009). Normative approaches can empower and increase active participation from stakeholder agencies (Figure 1.3; Arnstein 1969; Reed et al. 2009). However, bias of the person conducting the analysis can influence normative approaches; therefore, it is important to ask representatives or stakeholders to rank themselves within the governance network to generate a true representation of the system (see Section 1.8; Luyet et al. 2012). I have used normative approaches to stakeholder analysis in this thesis (see Chapters 5 – 7).

3.3.3 Pilot Interviews

I conducted pilot interviews with professionals working in, or with experience in, environmental governance before formal data collection began. These pilot interviews allowed me to practice the fluency of the interview, address the clarity of interview questions, and edit my interview questions, as necessary.

3.3.4 Qualitative, semi-structured interviews

I conducted 36 semi-structured interviews (e.g. Rose 1994; Whiting 2008) with 38 respondents (Table 3.2; Chapters 5 – 7). Interviews lasted an average of 46 minutes. While most interviews were scheduled with the intent to interview one person at a time (with the exception of one interview with an NGO where the intent was to do an interview with two people), there were two instances where another person who worked for the organisation (e.g. a new employee) joined the interview as an observer. The presence of another person in the interview may have influenced the respondents' answers to the interview questions.

Table 3.2. The affiliation and associated jurisdictions of respondents and the number of respondents from each agency.

Stakeholder Agency and Jurisdiction	Number
Government	
Commonwealth Agencies	3
Queensland Agencies	1
Queensland Local Government Agency	1
New South Wales Agencies	3
Victorian Agencies	3
Tasmanian Agencies	2
NGO	
National	10
Queensland	3
Victoria	1
Independent Researchers	
National	4
Indigenous	
Torres Strait Islander	1
Aboriginal Australian	1
Industry Representatives	
Fisheries	2
Ports	2
Tourism	2

My interview questions were designed to: 1) capture the importance of marine migratory species and their place in the Australian legislative and management processes, 2) identify and understand the role and motivations of specific stakeholder agencies in the policy and management of marine migratory species in east Australia, 3) identify policy influencers (e.g. actors within a network who have the power to influence policy; Weiss 2011)[2], and 4) identify barriers to, and opportunities for, involving stakeholder agencies (particularly non-government) in the governance of marine migratory species. The depth to which respondents provided answers to particular questions was dependent on the background and the expertise of the participant (Table 3.2). Although I had developed a set of questions to ask respondents (Appendix B), there was a slight variance in the questions I asked stakeholders from different agencies due to their differing expertise (e.g. government stakeholders were asked slightly different questions than independent researchers). Further, it is important to note that a

[2] Though I intended to identify policy influencers within the governance network protecting marine migratory species in eastern Australia, I was unable to capture these data meaningfully through my qualitative interviews. As such, this would make an interesting area of future research.

respondent's role within their affiliated organisation likely influences and/or constrains their responses to interview questions (Newig et al. 2010; Weiss 2011).

I used a combination of purposive and snowball sampling to identify potential respondents (e.g. Patton 1990; Teddlie and Yu 2007). I first identified potential respondents through the document analyses I conducted (Section 3.3.1). All individuals invited to participate in an interview either worked in environmental policy and/or governance or worked in the management of threats to marine turtles, dugongs, humpback whales, and/or non-threatened migratory shorebirds in eastern Australia. Potential respondents were provided with an information sheet and allowed to give informed consent (Appendices C and E), or to decline an interview. At the end of each interview, I asked respondents to recommend additional experts who may be interested in participating in my research or who would have key insight into my research questions.

I conducted most interviews by telephone, but also conducted interviews in-person and via video-communication links (e.g. Skype), where appropriate. With permission, in-person and telephone interviews were recorded on an iPad Pro (using SoundNote Reader), and interviews conducted via video-communication were recorded on a hand-held dictation device. Limited funding and the uncertain schedules of respondents affected how often I could conduct in-person interviews. While convenient and easily readjusted for scheduling conflicts, telephone interviews add a layer of complexity to interviews because it may be more difficult to establish rapport than with face-to-face interviews (Irvine et al. 2013). However, telephone interviews can save money and time because travel is not needed to meet in-person (Irvine et al. 2013). Interviews conducted via video-communication links also allow respondents who are limited by time or geographic location to participate in interviews (Janghorban et al. 2014).

I transcribed all interview audio then organised and iteratively coded transcripts into themes using NVivo (Version 11.4.3; see Chapters 5 – 7). Transcribing my own data enabled me to familiarise myself with interview responses and preliminarily code data before I began formal data analysis (Castleberry and Nolen 2018). I used a grounded theory approach to identify key (and representative) concepts that were grounded in the data from the responses (described in Section 3.4; Corbin and Strauss 1990). I conducted interviews until I reached data saturation and no new themes emerged from my analysis (Fusch and Ness 2015).

3.3.5 Qualitative focus group

In addition to semi-structured interviews, I conducted a qualitative focus group with the Department of the Environment and Energy (Commonwealth). Focus groups are important to grounded theory development, as they allow the facilitator to understand: 1) what the participants view as important, 2) the participants' language, and 3) participants' worldviews (Kitzinger 1994).

I chose to use a pre-existing group (e.g. colleagues in the same branch of the same department) because the participants' familiarity with each other helped them relate to each other's comments and also provided me with insight into environmental decision-making and the internal dynamics of the participating agency (Kitzinger 1994). Additionally, choosing a pre-existing group meant that I could capture the viewpoints of multiple people working within the same department at a single time, consolidating field time and reducing field costs (Reed et al. 2009). Focus group participants were provided with an information sheet and informed consent forms prior to attending the focus group (Appendices D and E). I recorded the focus group on an iPad Pro (using SoundNote Reader and with the permission of the participants) and on a hand-held dictation device to ensure that the voices of all participants were captured to improve the accuracy of my transcription.

In addition to recording the focus group, a research assistant took notes for me (with permission from the focus group participants) on key discussion themes so that I could focus on facilitating the discussion without the distraction of simultaneously taking notes. The research assistant: 1) had previous experience with facilitating focus groups and semi-structured interviews, 2) was provided an information sheet before the focus group, and 3) was versed on confidentiality prior to the commencement of the focus group.

3.4 Data Analysis

I used a mix of grounded (Glaser and Strauss 1967) and adaptive (Layder 1998) theories to analyse my data. Grounded theory is an inductive, qualitative research method used to develop theories that are grounded in systematic data collection and analysis (Glaser and Strauss 1967; Corbin and Strauss 1990). The use of grounded theory allowed me to collect and analyse my data simultaneously, ensuring that all relevant aspects of my research were

captured throughout the process (Corbin and Strauss 1990). Recurring concepts in data sources (e.g. interviews and documents) form the basic analysis unit in grounded theory (Corbin and Strauss 1990). Several related concepts may be grouped together to form higher-level categories that begin to explain a phenomenon (Corbin and Strauss 1990). Multiple related categories can then be grouped together to form a new theory (Corbin and Strauss 1990).

Adaptive theory combines existing theory with new theory that emerges from data analysis (Layder 1998). The combining of existing theory with new theory uses the strengths of existing theory, but also expands the theory by providing new approaches and strategies for data collection and analysis (Layder 1998). I used adaptive theory to address some of my research questions (see Chapter 1, Section 1.9; Chapter 7) because some of my research built on the existing, robust theory in collaborative and adaptive governance in environmental management, rather than developing new theory.

3.4.1 Analysis of relevant documents during document analysis

As described above, I used a mix of grounded theory and adaptive theory to analyse the policies and management plans I used in this thesis. For Chapters 4 and 5, I based my analysis on a grounded theory approach. Please see Chapters 4 and 5 for detailed analyses of how I analysed documents in each chapter.

For the document analysis that I conducted in Chapter 7, I used a two-part gap analysis using an adaptive theory approach (Layder 1998). Through this document analysis, I was seeking evidence for existing adaptive and collaborative governance frameworks in the *Recovery Plan for Marine Turtles in Australia 2017* and its component plans. Please see Chapter 7 for a detailed explanation of how I analysed these plans.

3.4.2 Social Network Analysis

Social network analysis involves understanding relationships between network actors in a system and is often used to understand governance structures in natural resource management (Bodin and Crona 2009; Prell et al. 2009; Wasserman and Faust 1994). Actors in a social network can be individuals or collective entities (Wasserman and Faust 1994). In this thesis, I use the term ‘actor’ to describe all stakeholders involved in the governance of marine

migratory species, including stakeholder agencies (e.g. a government agency) and individuals (e.g. individual researchers; Bodin and Crona 2009).

Network analysis can be used to identify the roles and power of actors within a system (e.g. Bodin and Crona 2009; Prell et al. 2009) and to explore connections between different human actors (or stakeholder agencies; e.g. Bodin and Crona 2009; Mbaru and Barnes 2017; Weiss et al. 2012). Social network analysis can be both quantitative (e.g. Bodin and Crona 2009; Freeman 1979) and qualitative (e.g. Ahrens 2018). Quantitative social network analysis often focuses on understanding the structural properties of social networks (Ahrens 2018; Bodin and Crona 2009; Freeman 1979). Qualitative social network analysis also analyses the structural properties of social networks, but emphasises the qualitative properties of a network (e.g. personal interactions from an 'insider' perspective) that quantitative social network analysis does not capture (Ahrens 2018). In this thesis, I use a mixture of quantitative and qualitative social network analysis.

3.4.2.1 Network structures and measurements

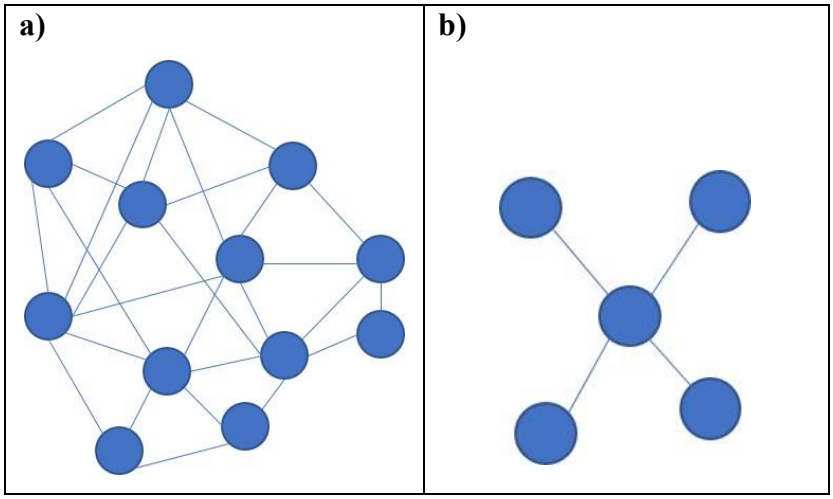
Social network analysis allows researchers to visualise and map relationships within a network, with each actor (e.g. stakeholder agency) represented by a node (Carlsson and Sandstrom 2008). Network structure is thought to have an influence on the actors within a system and on the overall governance structure of that system (Ahrens 2018; Bodin and Crona 2009; Crona and Hubacek 2010). Analysing social networks can help identify how social structures affect collaborative governance initiatives within a natural resource governance regime (Bodin and Crona 2009). These structures can be empirically measured to generate a better understanding of the overall governance system.

Several measurements describe network structure and relationship strengths (Table 3.3; Bodin and Crona 2009; Crona and Hubacek 2010; Freeman 1979; Weiss 2011). Network density describes the proportional number of ties in a network and how closely tied nodes are to one another (Figure 3.3a; Prell et al. 2009; Wasserman and Faust 1994). Dense networks are categorised by closely tied nodes with potential overlap, while sparse networks are categorised by loose ties between nodes (Crona and Hubacek 2010; Weiss et al. 2012). Centrality describes how 'central' a network actor is to other actors within its immediate vicinity; actors that are more 'central' in a network usually have higher power within a

system than other actors (Figure 3.3b; Scott 1988; Weiss 2011). However, centrality does not necessarily mean that the most central actor is in the 'middle' of the graph, but rather that an actor with high centralisation will have close ties to the other nodes in its vicinity (Scott 1988). Betweenness measures how many relationships pass through a specific actor to connect another two disconnected actors (Figure 3.3c; Bodin and Crona 2009; Prell et al. 2009).

Table 3.2. A definition of the measurements describing a network's structure and relationship strengths.

Descriptor	Definition
Network density	The number of actual ties that exist in a network divided by the maximum number of potential ties; measures how closely tied nodes are to one another (Prell et al. 2009; Wasserman and Faust 1994)
Centrality	Describes how close a network actor is to other actors within its immediate vicinity (Scot 1988; Weiss 2011)
Betweenness	The number of relationships that pass through a specific actor to connect another two disconnected actors (Bodin and Crona 2009; Prell et al. 2009)



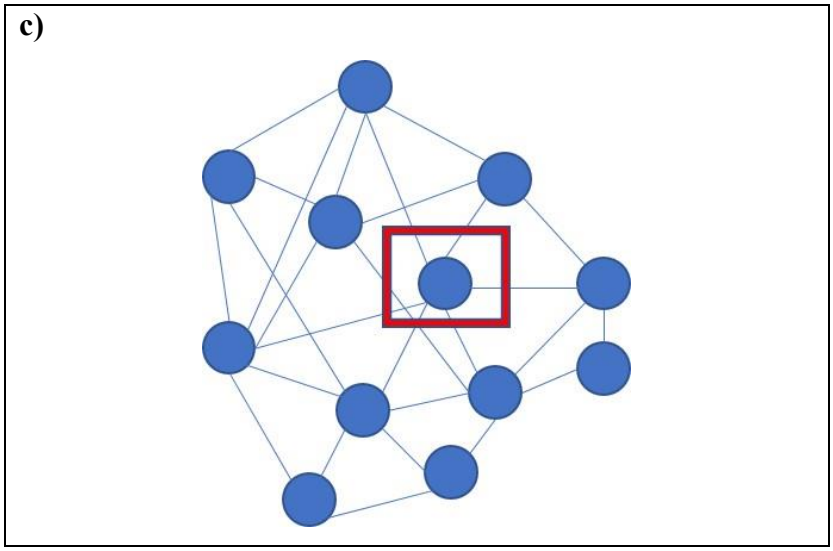


Figure 3.3. Examples of network measurements used in this thesis (adapted from Bodin and Crona 2009): a) density; this network has a high density, b) centrality; this network is highly centralised and the actor in the middle has higher centrality than the other actors, and c) betweenness: the red box around this actor displays how betweenness can be measured; the actor in the red box connects several other actors within the governance system.

3.4.2.2 Network measures used in this thesis

For each network analysis, I adjusted the display of the relationships based on centrality and betweenness (see Chapters 4 and 5). I chose to focus on these particular network characteristics because they can be used to describe the structure of the network (e.g. Bodin and Crona 2009; Borgatti et al. 2009; Weiss 2011). These measures are a good indicator of how connected a network actor (e.g. a policy or management plan; a stakeholder agency) is to other network actors (Bodin and Crona 2009). Further, centrality and betweenness helped me to identify the relative importance of an actor in the governance system protecting marine migratory species in eastern Australia (Table 3.3; Chapters 4 and 5).

I used social network analysis to analyse and display the relationships between policy instruments protecting marine migratory species in eastern Australia (Chapter 4). Analysing the relationship between policy instruments helped me to identify the strengths and weaknesses of the existing governance framework and framed the remainder of my thesis. Through my document analysis, I was able to identify explicit relationships between policies and management plans at a national level, as well as within and between states on the east coast of Australia. I considered a relationship explicit if there was a clear explanation within a policy document of how that policy connected to another. I mapped relationships between policies and management plans using UCINET 6 and NetDraw (Chapter 4).

I also used social network analysis to explore and map relationships between stakeholder agencies at a high-level based on the data I collected from the semi-structured interviews and the focus group (Chapter 5). I iteratively coded and categorised the transcripts from the interviews and focus group in NVivo into relationship types based on participant responses (e.g. if they worked with state government agencies; independent researchers; Table I1 in Appendix I). These categories provided qualitative data about whom stakeholders worked with or which agencies respondents felt they could not work with in the governance of marine migratory species in eastern Australia (Chapter 5).

I then used the qualitative relationship data to map relationships between stakeholder agencies using UCINET and NetDraw (Borgatti et al. 2002). I only included relationships in my analysis where the respondent gave specific names of stakeholder agencies that they considered to be in their network (e.g. naming a specific NGO or government department), or where they gave examples of the types of stakeholder agencies they worked with (e.g. state government agencies or environmental NGO; Figure 5.3 in Chapter 5).

3.4.3 Analysis of qualitative interviews

I transcribed interviews and assigned all transcripts a high-level, unique code in order to de-identify responses. The code consisted of the date of the interview, the stakeholder type, and the interview number (e.g. 05092018INI01; Table 3.4). I also recorded what jurisdiction the respondent was from (e.g. National, NSW, Qld, Tas, and Vic). These transcript codes are high-level for maintaining the anonymity of the respondents.

Table 3.3. A list of the codes assigned to transcripts to identify stakeholder types for the analysis of interviews. This list is a condensed list of the codes used to conduct social network analysis (Chapter 5; Table I1 in Appendix I) and represents only the stakeholder agencies who participated in a semi-structured interview.

Stakeholder type	**Code**
Commonwealth Government agency	CGA
State government agency	SGA
Local government agency	LGA
Independent researcher	IR
Indigenous representative	INGR
Industry representative	IND

National non-government organization	NNGO
State non-government organisation	SNGO
Local non-government organisation	LNGO

I then uploaded the transcribed interviews into NVivo (QSR International – Version 12) to organise and iteratively code the interviews. I used an iterative-grounded theory approach when coding the interviews, analysing themes as I uncovered them, rather than beginning with pre-established criteria (Glaser and Strauss 1967; Corbin and Strauss 1990). I coded my interviews into overarching themes based on the responses of respondents; I also generated sub-themes from my data that were more specific than the overarching theme (Figure 6.1 in Chapter 6). Connecting quotations from interview responses to themes or sub-themes allowed me to quantify how often a particular topic was discussed, infer the themes' importance to managing threats to marine migratory species in eastern Australia, and ground my data in theory by linking themes together (Corden and Sainsbury 2006).

3.4.4 Analysis of qualitative focus groups

I transcribed the audio from the focus group, then organised and iteratively coded the transcript into themes using NVivo (QSR International – Version 12; Figure 6.1 in Chapter 6). I used the notes written by the research assistant as a thematic framework to guide the initial coding of the transcripts (Rabiee 2004). From there, I used the participants' responses to code the transcribed data into further themes and subthemes. It is important to note that group dynamics may have influenced the responses from focus group participants, either positively or negatively (e.g. Kitzinger 1994; Guest et al. 2017).

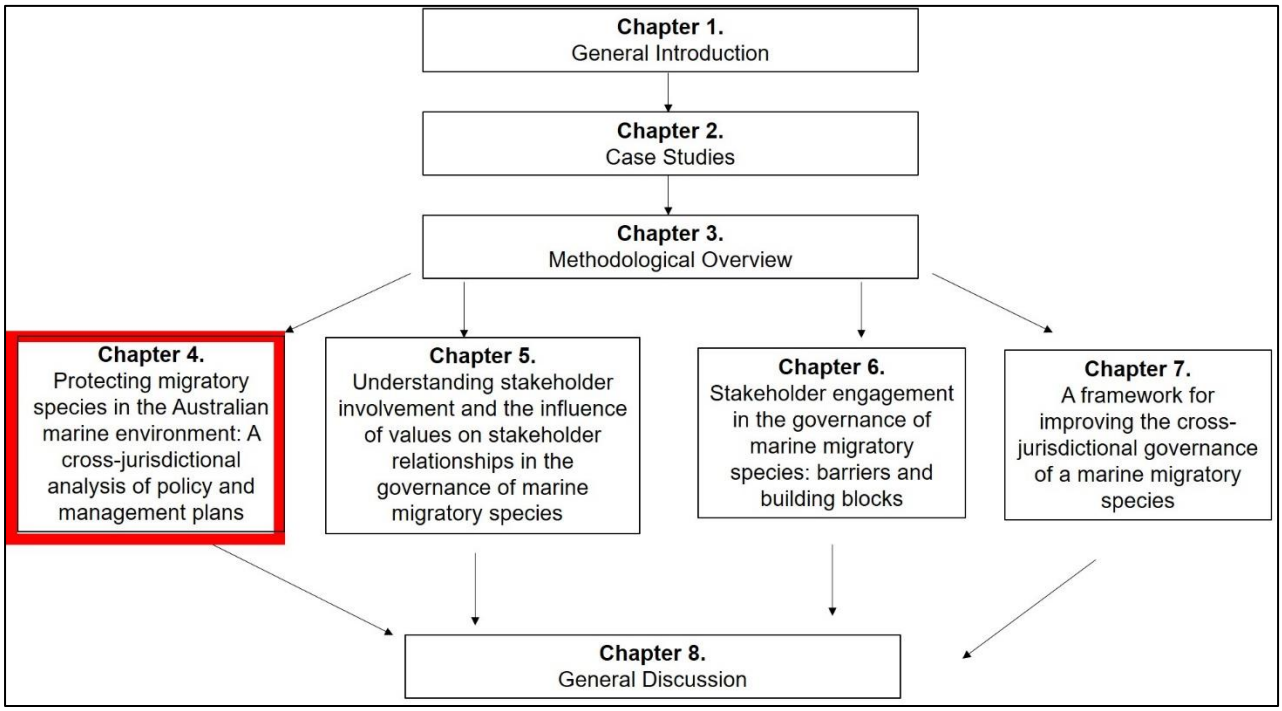
3.5 Summary

- In this chapter, I discussed my mixed-methods approach to understanding the existing governance framework and role of stakeholders in protecting marine migratory species in Australia. I framed my research using retrospective policy analysis and a mixture of qualitative and quantitative data collection and analysis methods.
- I framed my analyses using grounded and adaptive theories, iteratively coding interview data for new and emerging themes and building on existing collaborative and adaptive governance frameworks.
- This chapter also described the detailed methodologies I used in Chapters 4 through 7.
- In the next chapter, I review the policy instruments used to protect marine migratory species in eastern Australia in order to evaluate the effectiveness of formal structures in the governance regime mitigating threats to these species.

Chapter 4

Protecting migratory species in the Australian marine environment: A cross-jurisdictional analysis of policy and management plans

In this chapter, I review environmental policies (n=23) and management plans (n=115) relevant to marine turtles, dugongs, humpback whales, and non-threatened migratory shorebirds in order to identify the coherence of policy and management plans for managing threats to marine migratory species in eastern Australia. This chapter describes the formal governance structures protecting marine migratory species in eastern Australia. I conclude Chapter 4 by using my findings to recommend harmonisation of marine migratory species management in eastern Australia.



Manuscript associated with this chapter:
Miller, R.L., Marsh, H., Cottrell, A., & Hamann, M. 2018. Protecting migratory species in the Australian marine environment: A cross-jurisdictional analysis of policy and management plans. *Frontiers in Marine Science* 5: Article 229. doi: 10.3389/fmars.2018.00229

4. Protecting migratory species in the Australian marine environment: A cross-jurisdictional analysis of policy and management plans

4.1 Introduction

As explained in Chapter 1 (Section 1.5), migratory species, both terrestrial and marine, are defined as species with life cycles characterised by cyclical movements between breeding and non-breeding areas (de Klemm 1994; Gilmore et al. 2007; Robinson et al. 2009). These migrations are driven by biological (e.g. the need to mate) or ecological factors (e.g. low resources or optimal/suboptimal climate; Gilmore et al. 2007; Robinson et al. 2009; Lascelles et al. 2014) and have important roles in habitat connectivity (Unsworth et al. 2015; Tol et al. 2017). For example, in the Coral Sea, off the northeast coast of Australia, nesting green sea turtles (*Chelonia mydas*) tagged in Australia migrate to international feeding grounds in New Caledonia and back to their nesting grounds in Australia, crossing state, national, and international boundaries as they migrate (Read et al. 2014). Within Australia, some dugongs cross state jurisdictions when they make seasonal migrations between Queensland and New South Wales (Allen et al. 2004; Sheppard et al. 2006). Disconnect between governance levels can complicate the management of migratory species, as state and national legislation and management can conflict (Ruckelshaus et al. 2008; Read et al. 2014) and fail to take account of the cumulative impacts on migrating animals.

Migratory species can be subjected to multiple anthropogenic threats and varying levels of protection as they move between protected and non-protected areas (Lascelles et al. 2014; Pendoley et al. 2014). Conservation policies, such as protected area legislation, are often constrained by political boundaries (de Klemm 1994; Gärdenfors 2001; Martin et al. 2007), whereas migratory species are unrestricted by jurisdictional boundaries (Boersma and Parrish 1999; Hooker and Gerber 2004). Different jurisdictions may have conflicting legislation and policy differences, which can increase the governance difficulties in sustainably managing threats to migratory species, especially in the marine environment (Chapter 1, Section 1.5).

In total, the Australian EEZ covers approximately 10 million square kilometres of ocean (Geoscience Australia: The Law of the Sea; Figure 2.1 in Chapter 2). Both the Australian Commonwealth and state governments have jurisdiction over the marine environment, with

state governments having jurisdiction up to 3 nautical miles from shore and Commonwealth jurisdiction extending from 3 nautical miles to the edge of the Economic Exclusion Zone (EEZ; Geoscience Australia: Maritime Boundaries; Chapter 2). Thus, this situation is an example of a polycentric governance system in the marine environment (Chapter 1, Section 1.3).

Polycentric governance systems are defined in Chapter 1, Section 1.3. Their success in addressing environmental problems supports the need for policy coherence: complementary legislation that works between and within legislative sectors to achieve mutually-decided policy outcomes (Nilsson et al. 2012). Policy coherence is necessary in the marine environment and the need is intensified by the presence of threatened marine migratory species that may not face uniform threats across their range (Fraser et al. 2017; Riskas et al. 2016).

4.1 Purpose of this chapter

Effective management of threats to migratory species typically requires policy linkage and harmonisation across the jurisdictional boundaries of the range states of these species. The current status of protection across the range of marine migratory species in Australia is unknown. In this chapter, I explore the coherence between the policies and management plans used by Australian Commonwealth and state governments to manage nationally-listed marine migratory species in Australia using a case study approach and document analysis (Chapter 2; Chapter 3, Section 3.3.1). I review national and state government environmental policies and management plans relating to six species of marine turtles, dugongs, humpback whales, and 27 species of non-threatened migratory shorebirds, all of which are Matters of National Environmental Significance (Chapter 2). Because the resources available for conservation are limited (Farrier et al. 2007; Kim et al. 2016), it is important to identify key differences in conservation strategies for marine migratory species as a component of effective marine conservation.

4.2 Methods

I used a grounded theory approach (detailed in Chapter 3, Section 3.4) using a document analysis (Chapter 3, Section 3.3.1) and comparative case studies (Chapter 2) to assess the policy and management instruments used to mitigate threats towards marine migratory

species in eastern Australia (Appendix H, Tables H1 and H2). In Chapter 3, I detailed how I defined, identified and collated relevant environmental policies and management plans in Chapter 3 (see Section 3.3.1).
I also used a comparative approach, using carefully selected case studies, to illustrate the differences in managing different taxa, including the coherence of the instruments used to manage these species (Chapter 2).

4.2.1 Analysis of relevant policy and management instruments

I emphasised policy coherence in the document analysis I conducted in this chapter (detailed in Chapter 3, Section 3.3.1). Policy coherence emphasises the interactions between policy commitments and outputs to reach mutual objectives (Benson and Lorenzoni 2017; Nilsson et al. 2012). Further, policy coherence has been shown to promote synergy between the policies of developed and developing nations in the realm of sustainable development (Benson and Lorenzoni 2017; OECD 2013). I chose to analyse policy coherence in this chapter because marine migratory species interact with several governance levels (that may not be coordinated) throughout their migrations.

I numerically coded relevant policies and management plans uncovered by the document analysis for the presence/absence of specific components of the framework (Chapter 3, Section 3.3.1; Figure F1 in Appendix F). Components that were "present" in a policy and/or management plan were coded with a 1, while components that were "absent" were coded with a 0. I used IBM SPSS Statistics (Version 24) to calculate frequencies of the quantitative data of the framework (see Figure F1 in Appendix F). For qualitative data analysis, I used NVivo (QSR International – Version 12) to organise and iteratively code repeated themes identified during the systematic review and to supplement the quantitatively coded data of the framework (described in Chapter 3, Section 3.4.1; Table 4.1). These codes fell under specific themes that I then used to generate theory about the effectiveness of the policy instruments protecting marine migratory species in eastern Australia. I used UCINET 6 and NetDraw (Borgatti et al. 2002) to create the network graphs illustrating the relationships of policies and management plans managing marine migratory species in eastern Australia (Figures 4.2 and 4.3). I adjusted network graphs for centrality and betweenness (Chapter 3, Section 3.4.2.1; Table 4.2).

Table 4.1. The iterative coding system used for the qualitative analysis of data collected in this study. For international agreements, nodes were created only when an international agreement was identified in the text of the reviewed document (as such, the list is non-exhaustive); "other" refers to agreements that do not protect the case studies (e.g. Fish Stocks Agreement for Highly Migratory Fish).

Theme Code	Node Code	Subcode	Instrument Coded
Case Studies	Marine turtles, dugongs, humpback whales, migratory shorebirds	N/A	Policies, Plans
Habitats	Dry, Interdial, Subtidal, Wetlands	Bioregional, Conservation Advice, Conservation Plan, Industry, Other, Protected Area Management, Recovery, Threat Abatement Plan	Plans
Jurisdiction	Commonwealth, Joint, NSW, Qld, Tas, Vic	N/A	Policies, Plans
Relationships	Commonwealth - Commonwealth, Commonwealth - State, Intrastate, Interstate	Relationships to other reviewed policies (node for each specific) and to other reviewed plans (node for each specific)	Policies, Plans
International Agreements	Antarctic Treaty, Apia Convention, Biodiversity Convention, Bonn (CMS), CAMBA, CITES, East-Asian Australasian Flyway, IUCN, IWC, JAMBA, London Protocol, Marpol, Other, Ramsar, ROKAMBA	N/A	Policies, Plans

Table 4.2. An identification and description of the measurements describing a network's structure and relationship strengths used in this chapter. Please see Chapter 3, Section 3.4.2.1 for a full description of network measures used in this thesis.

Descriptor	Definition
Centrality	Describes how close a network actor is to other actors within its immediate vicinity (Scot 1988; Weiss 2011)
Betweenness	The number of relationships that pass through a specific actor to connect another two disconnected actors (Bodin and Crona 2009; Prell et al. 2009)

4.2.2 Limitations

In this chapter, I focused on explicit statements in environmental policies and management plans and did not make any inferences. This approach may have eliminated some conservation tools used for protecting the case studies or their habitats, but were not clearly identifiable within the policy or management plan. Additionally, some plans were not available despite extensive efforts to obtain them, a situation that may have excluded some plans that are used in protecting marine migratory species in eastern Australia. While the use of network graphs to visualise relationships between policy instruments (rather than human actors) is a relatively recent approach in exploring environmental governance (e.g. Bainbridge 2014), I identified the presence of relationships between policy instruments based solely on available data collected from the document analysis. Thus, data to analyse relationship strength were unavailable.

4.3 Results

In total, I deemed 23 environmental policies and 115 management plans (total documents = 138; see Tables H2 and H3 in Appendix H for full list) to be relevant: Commonwealth (n=4 policies; n=25 plans), Bilateral (Joint; n=3; n=2), New South Wales (n=6; n=16), Queensland (n=4; n=34), Tasmania (n=4; n = 20), and Victoria (n=2; n=18).

4.3.1 Analysis of environmental policies and management plans protecting marine migratory species in eastern Australia

Protected species were not a focal point of the reviewed environmental policies. At least one policy in each state included a protected species list; less than one-third (n=7) of the 23 reviewed policies specifically identified individually-protected species. Only one policy, the *EPBC Act 1999*, included a list of migratory species. Ten policies and 51 plans aligned with key threatening processes as defined by either the *EPBC Act 1999* or state legislation (see Table H4 in Appendix H for full list). Thirteen policies protected marine species and four of these protected marine migratory species.

4.3.2 Protection of marine migratory species in Australia

I identified eight policies that protected one or more of the four case study taxa. Marine turtles were protected most frequently (n=7), followed by dugongs (n=5), humpback whales (n=3), and non-threatened migratory shorebirds (n=1). Totals exceed eight because some policies were relevant to more than one case study.

Management plans were the instrument most often used to protect migratory species in eastern Australia. Of the 115 plans reviewed, 101 were relevant to one or more of the taxa. Management strategies for non-threatened shorebird species listed under the *Wildlife Conservation Plan for Migratory Shorebirds 2015* were most frequent (n=59), followed by marine turtles (n=34), dugongs (n=20), and humpback whales (n=18). Totals exceed 101 because some plans were relevant to more than one case study.

Each case study was associated with a specific type of management plan. Marine turtles and dugongs were most commonly protected by industry-generated environmental management plans (n=14, n=10 respectively), while non-threatened shorebirds were protected most commonly by protected area management plans (n=44). Humpback whales were most commonly protected by protected area management plans (n=4) and industry-generated environmental management plans (n=3; Figure 4.1).

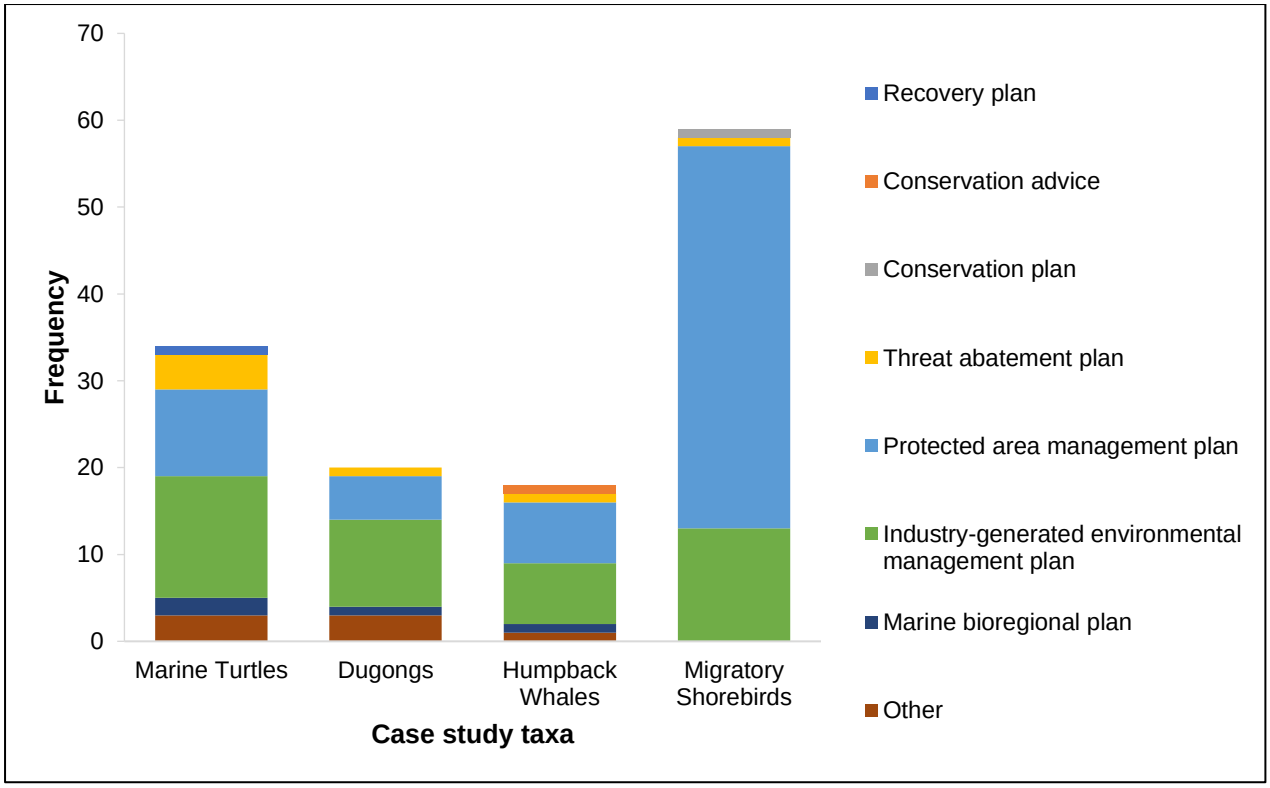


Figure 4.1. The breakdown of relevant management plan types protecting marine turtles, dugongs, humpback whales, and 27 species of migratory shorebirds in Australia. Legend order reflects the colour order (from top to bottom) of the stacked bar graph.

4.3.3 Coherence of conservation tools used to protect marine migratory species in Australia

Overall, the coherence and complementarity of conservation tools used to protect marine migratory species in eastern Australia was variable. While policies and management plans tended to display greater coherence with other policies and plans within the same jurisdiction, relationships between state and Commonwealth Government documents, and between domestic policies and international conventions were rarely explicit, as explained below.

4.3.3.1 Coherence with international instruments

Relationships between domestic policies and international conventions were found to be underdeveloped. Of the 23 environmental policies reviewed, six refer to one or more international agreements to which Australia is a signatory party. These include three Commonwealth environmental policies, two bilateral agreements between the Commonwealth Government and Queensland, and one policy from Queensland. International Union for the Conservation of Nature (IUCN) Listings were the most cited (n=3), followed by listings on Appendices from the Convention on the International Trade of Endangered

Species (CITES; n=2), the Torres Strait Treaty (n=2), and the London Protocol (designed to combat marine pollution; n=2).

Relationships with international conventions and agreements were more developed in the management plans than in the policies. Over half (n=60) of the reviewed plans identified relationships to one or more international agreements. The Japan-Australia (JAMBA) and China-Australia (CAMBA) Migratory Bird Agreements were the most frequently cited agreements (n=45 for both), followed by the Republic of Korea-Australia (ROKAMBA) Migratory bird agreement (n=20), and IUCN Listings (n=20). Of the 20 IUCN References, only the *Recovery Plan for Marine Turtles 2017* referred to the IUCN Red List of Threatened Species; the other 19 plans referenced the IUCN Protected Areas Categories System. The Bonn (CMS) Convention is cited 19 times, the Torres Strait Treaty is cited four times, and the CITES Appendices are cited three times.

4.3.3.2 Coherence within Australia

The level of policy coherence within eastern Australia varied. Fourteen policies identified relationships with other relevant east Australian environmental policies. Two Commonwealth policies identified a relationship with other Commonwealth policies, two bilateral agreements connected to Commonwealth and state policies, five state policies identified a connection to Commonwealth policies, eight state policies identified a relationship to other environmental policies within that state, and one state policy, the *Nature Conservation Act 1992* (Qld), connected to a bilateral agreement. No policies connected to policies from another state. The *EPBC Act 1999,* Australia's main piece of environmental legislation, serves as a bridging link between NSW and Qld; without that bridge, there is no connectivity between the states. Tasmania displayed coherence within the state, but none of the reviewed policies directly connected to the *EPBC Act 1999*. Victoria displayed the lowest amount of connectivity, with no connections to other policies, including the other reviewed policies from Victoria (Figure 4.2).

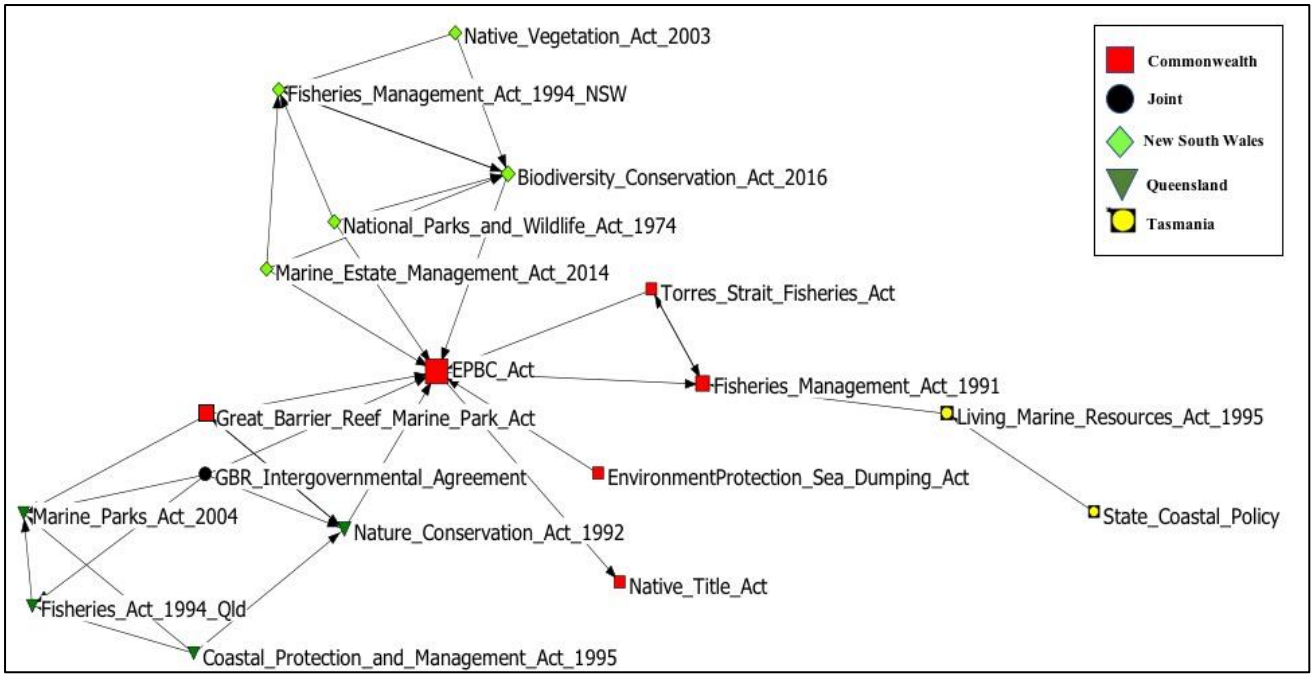


Figure 4.2. The connectedness of environmental policies from multiple levels of governance (symbols represent location) in Australia. Reviewed Victorian legislation is excluded as no policies connected with the reviewed policies of any other jurisdiction or within Victoria. Node position is based on centrality within the network; the *EPBC Act 1999* has the most connections and is the central link for policies within Australia. Node size is based on betweenness – larger nodes serve as a pathway for more policies. Relationships between policies are directional – the arrow points from one policy to another where a relationship has been identified.

The relationships between policies and management plans was more developed than the relationships between policies, with 106 plans identifying a connection to one or more environmental policies. Twenty-three of the Commonwealth plans relate to Commonwealth policies, 56 state plans identify relationships to Commonwealth policies, and 71 state plans refer to policies within that same state. Only two plans, the Australia Pacific Liquid Natural Gas Upstream Project: Pipeline Threatened Fauna Management Plan (industry-generated environmental management plan) and the *Recovery Plan for Marine Turtles in Australia 2017*, operated under multi-state legislation. Despite being jointly made by the relevant Commonwealth, Qld, and NSW ministers, the *Recovery Plan for Marine Turtles in Australia 2017* demonstrated little connection to legislation from Qld and NSW (Figure 4.3a; Chapter 7).

Relationships between management plans were less established than any other relationship type. Eight Commonwealth plans identified relationships with other Commonwealth plans. Nine state plans identified relationships with other plans from the same state. No state plans identified relationships to Commonwealth management plans or to plans from other states. Indirect connections to plans within the same state (or other states) were created by environmental policies at the state or Commonwealth levels (Figure 4.3b).

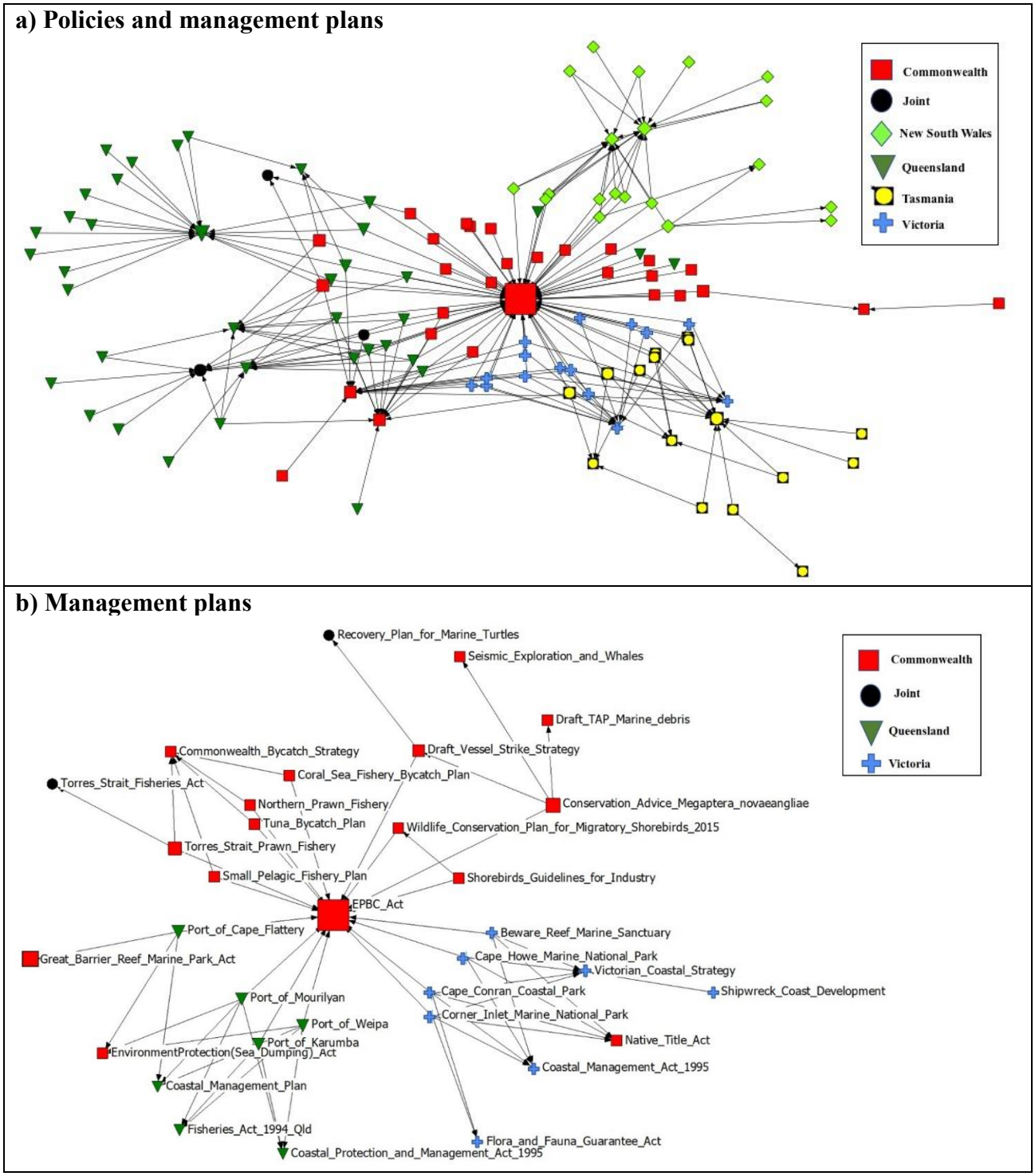


Figure 4.3. a) The relationship between reviewed environmental policies and management plans in eastern Australia and b) The relationship between reviewed plans in eastern Australia, with environmental policies included to show indirect connections. In both figures, symbols represent location. Node size is based on betweenness and node position is based on centrality within the network. The betweenness of policies and management plans (a) and management plans (b) in relation with other policies and management plans in eastern Australia identifies the focal role of the *EPBC Act 1999*. Relationships are directional – the arrow points from one policy instrument to another where a relationship has been identified.

4.4 Discussion

In this chapter, I used a grounded theory approach to provide a thematic analysis of eastern Australian policy and management plans related to six species of marine turtles, dugongs, humpback whales, and 27 species of non-threatened migratory shorebirds (listed under the *Wildlife Conservation Plan for Migratory Shorebirds 2015*). I identified biases towards certain species in eastern Australian policies (statutory) and management plans (non-statutory, with the exception of recovery plans, conservation advices, wildlife conservation plans, threat abatement plans, and protected area management plans) and disconnect between management tools operating at different governance levels. Additionally, these results emphasise the importance of the *EPBC Act 1999* in Australian natural resource governance and reinforces the argument for coherent policy and management in eastern Australia to promote sustainable populations of marine migratory species.

4.4.1 Protection of marine migratory species in Australia

Protection of marine migratory species in eastern Australia is limited, represented by only four environmental policies. In eastern Australia, the large, highly charismatic species (marine turtles, dugongs, and humpback whales) were protected under a greater number of statutory environmental policies than non-threatened migratory shorebirds, despite the migratory shorebirds being the subject of specific international agreements (Chapter 1, Section 1.4). The bias towards protecting marine turtles, dugongs, and humpback whales may be due to the perceived charisma of these species to the general public and the listing of each species under the *EPBC Act 1999*.

Charismatic species are typically large vertebrates that appeal to humans for a specific aesthetic or symbolic trait (Small 2012; Ducarme et al. 2013), and are often prioritised in conservation actions (Chapter 1, Section 1.5; McClenachan et al. 2012; Woinarski et al. 2017). Charismatic megafauna, such as marine turtles and dugongs, are regularly chosen as flagship and umbrella species for their environment and they are used to protect other species or gain conservation attention (Home et al. 2009; Marsh et al. 1999). Additionally, many species of charismatic megafauna chosen as flagships or umbrella species are endangered (Home et al. 2009), which influences national environmental policy (Chapter 1, Section 1.5).

Marine turtles and humpback whales are listed as threatened under the *EPBC Act 1999* (Chapter 2) and while less than one-third of the reviewed policies listed protected species, threatened species listings often drive conservation actions and are used to prioritise the resources used for protecting threatened species (Possingham et al. 2002; Parsons 2016). The dugong is not a nationally-listed threatened species in Australia, but it is still recognised as a Matter of National Environmental Significance (MNES) and, along with marine turtles, holds high traditional value to Aboriginal and Torres Strait Islander People living in Northern Australia (Chapter 2; Marsh et al. 2004). Australia is required to preserve traditional customs under international conventions, joint agreements (e.g. the Torres Strait Treaty), and under national legislation (e.g. the *Native Title Act 1993*; Chapter 2; Marsh et al. 2004), in addition to protecting the dugong under the *EPBC Act 1999*. Furthermore, the presence of iconic species like marine turtles and dugongs in the Great Barrier Reef Marine Park contributed to the "outstanding universal value" criterion for the original listing of the Great Barrier Reef as a World Heritage Area (Chapter 2; GBRMPA 2011).

The 27 species of non-threatened migratory shorebirds I used as a case study (listed under the *Wildlife Conservation Plan for Migratory Shorebirds 2015*; Chapter 2) are included in international agreements (e.g. JAMBA/CAMBA/ROKAMBA), but are not listed as threatened in Australia and are not well-represented in Australian environmental policy. This lack of representation in Australian environmental policies does not extend to all management tools for shorebirds, as migratory shorebirds (both threatened and non-threatened) were protected by the greatest number of management plans. However, some of these management plans are not statutory, and the exclusion of migratory shorebirds from statutory environmental policy suggests that protection of migratory shorebirds is not as effective as the protection of other marine migratory species, despite the fact that migratory shorebird species trigger referral under the *EPBC Act 1999* at a high rate[3].

Previous research has identified that there is considerable support for the protection of shorebirds (Glover et al. 2011), even though such support is not reflected in eastern Australian statutory instruments. Migratory shorebirds are highly susceptible to habitat loss through coastal development and protecting critical habitats used by migratory shorebirds is

[3] For example, Latham's snipe (*Gallinago hardwickii*) has triggered the *EPBC Act 1999* 67 times since the Act has been in place. This species has the fourth highest trigger rate for the *EPBC Act 1999* of all migratory species (pers. comm. Threatened Species Scientific Committee).

essential in the context of increasingly intensive coastal development (Buler and Moore 2011; Dhanjal-Adams et al. 2016). Australia has followed global conservation trends and has developed a large number of statutory protected area management plans, primarily terrestrial, to protect areas as a means of conserving biodiversity (Bull et al. 2013; Dhanjal-Adams et al. 2016). Protected areas do benefit marine migratory species (Dobbs et al. 2008; Palumbi 2004), but many protected areas are static "paper parks" (Cullen-Unsworth et al. 2016). "Paper parks" often fail to address the habitat connectivity of migratory species that actively use non-protected areas during parts of their lifecycles (Bull et al. 2013; Dryden et al. 2008; Runge et al. 2015; Szabo et al. 2016).

There appears to be a reliance on the implementation of protected areas as the main instrument for conserving biodiversity in Australia, as reflected by the large number of protected area management plans in New South Wales, Queensland, Tasmania, and Victoria. However, most of the reviewed protected area management plans were terrestrial. There is overlap in the different habitat types used by marine turtles, dugongs, humpback whales, and migratory shorebirds, and coastal ecosystems do not exist in isolation from neighbouring habitats (Duarte et al. 2008). Terrestrial protected areas and their associated plans will only protect nesting sea turtles and roosting shorebirds that use the protected areas and provide no direct protection for the strictly aquatic humpback whales and dugongs.

4.4.2 Policy coherence

The need for cross-jurisdictional, complementary legislation regarding marine migratory species is evident (McClenachan et al. 2012; Riskas et al. 2016) and is highlighted by the geographic range of marine turtles, dugongs, humpback whales, and non-threatened migratory shorebirds. Australia is the world's sixth largest country on the basis of land area (Geoscience Australia: Australia's Size Compared), with states and territories larger than many countries, so animal movements even within state jurisdictions can span hundreds of kilometres. Additionally, for dugongs and marine turtles that inhabit the Torres Strait (a protected area between Australia and Papua New Guinea; see Chapter 2), international migrations between the waters of Australia and Papua New Guinea may happen daily. Thus, effectively managing marine migratory species requires a polycentric governance system and cooperative legislation. Non-uniform listing and protection between governance levels may affect species' conservation and recovery (McClenachan et al. 2012; Welsh 2004). Previous

research has identified that much of the conservation of migratory species in Australia focuses on horizontal conservation (e.g. between nations) rather than vertical (e.g. between governance levels in the same nation; Runge et al. 2017). I identified both horizontal and vertical gaps in marine governance in the conservation of marine migratory species in eastern Australia (explored further in Chapters 5 – 7).

4.4.3 International coherence

Much of the effort to protect migratory species has concentrated on coordinating international agreements (de Klemm 1994; Runge et al. 2017). In Australia, listings created by the International Union for Conservation of Nature (IUCN) were the most referenced international conservation tool in the reviewed policies and the third most referenced (tied with ROKAMBA) in management plans. However, most references were to the IUCN Protected Area Categories System, rather than the Red List of Threatened Species, which is interesting because many nations base their threatened species lists and statutory instruments on the IUCN Red List (see Chapter 1, Section 1.4 in this thesis; Farrier et al. 2007; Gärdenfors 2001). However, even though the IUCN Red List of Threatened Species was included less often than the Protected Areas Category System in the reviewed eastern Australian policies and management plans, it does not necessarily translate to less protection for marine migratory species in eastern Australia. The IUCN Protected Area Categories System can be applied to both terrestrial and marine environments, indicating that species may be protected if they are using those protected areas.

International agreements pertaining to non-threatened migratory shorebirds (e.g. JAMBA/CAMBA) that use the East Asian-Australasian Flyway were the most prevalent in management plans, a situation expected as migratory shorebirds were the most highly represented case study in the reviewed plans. However, ROKAMBA, another migratory bird agreement, was not included in as many management plans as JAMBA and CAMBA. JAMBA and CAMBA were signed in 1974 and 1986, respectively, whereas ROKAMBA dates from 2007 and some plans have not been revised since Australia signed ROKAMBA. Management plans should be updated to include ROKAMBA (and thus, reflect cooperation with the Republic of Korea), as international cooperation in protecting migratory shorebirds that make use of the East Asian-Australasian Flyway is necessary to support local

conservation successes in the face of large population declines (Clemens et al. 2016; Szabo et al. 2016).

The Torres Strait Treaty between Australia and Papua New Guinea was also underrepresented in the reviewed policies and management plans, despite its importance for managing marine turtles and dugongs. The Torres Strait Treaty maintains traditional hunting rights for Australian Aboriginal and Torres Strait Islanders inside the Torres Strait Protected Zone, as hunting turtles and dugongs is a key component of traditional customs for Australian Aboriginal and Torres Strait Islander Peoples (Chapter 2; Kwan et al. 2006; Butler et al. 2012). The relationships are also undeveloped between the *Torres Strait Fisheries Act 1984* and other reviewed policies and management plans. The *Torres Strait Fisheries Act 1984* and the Torres Strait Treaty both address the traditional fishing rights of Australian Aboriginal and Torres Strait Islanders and weak integration of these rights into eastern Australian environmental policy and management suggests that Australia is not effectively meeting its obligations to preserve both traditional customs and threatened species under international conventions.

4.4.4 Coherence within Australia

National approaches to conservation can guide coordinated efforts for the conservation of marine migratory species (Runge et al. 2017). This approach is particularly critical in a Commonwealth system, where state legislation may not apply to the entire range of a threatened species (Welsh 2004). Australia is striving towards a coordinated approach to conservation and for uniform threatened species listing across all levels of governance (discussed briefly in Chapter 2). This coordinated approach has been implemented as a Common Assessment Method for national threatened species listing (Chapter 2; Australian Government 2015c), through the terrestrial-focused Threatened Species Strategy (Australian Government 2015a; Runge et al. 2017). Even if coordinated efforts were implemented in marine management regimes that follow the approaches outlined in the Australian Government's Threatened Species Strategy (2015), marine migratory species that are not listed as threatened in Australia (e.g. dugongs and non-threatened migratory shorebirds protected under the *Wildlife Conservation Plan for Migratory Shorebirds 2015*) will not benefit from the proposed approach. Additionally, while some of the reviewed management plans addressed species-specific threats (e.g. the *Recovery Plan for Marine Turtles in*

Australia 2017; Conservation Advice *Megaptera novaeangliae*), few policies and management plans addressed key threatening processes defined by either the *EPBC Act 1999* or relevant state legislation. These gaps in marine governance require coordination between states and between states and the Commonwealth Government to ensure the effective management of threats to marine migratory species in a polycentric governance system (explored further in Chapters 5 – 7).

In this chapter, I showed that a coordinated approach to managing marine migratory species in eastern Australia has not yet been achieved, as demonstrated by the low level of connectivity between different levels of governance. Because the *EPBC Act 1999* serves as a bridging legislation for NSW and Qld, better integration of the *EPBC Act 1999* into Tasmanian and Victorian legislation might promote more effective environmental legislation over the marine environment and connectivity between states. Additionally, it is interesting that the reviewed policies from Victoria were not interconnected or connected to the policies of other jurisdictions; threatened species listing in Victoria is also the listing process most different from that used by other states or the Commonwealth Government. Harmonisation between national legislation, particularly the *EPBC Act 1999*, and state legislation is key to ensuring that environmental management outcomes are reached (Hawke 2009).

The relationship between policies and management plans was more defined than the relationship between policies; most management plans connect to one or more of the reviewed environmental policies. Management plans are created under designating legislation, so a strong relationship is to be expected. However, reviewed plans directly connected only to Commonwealth or same-state policies. Further, the jointly-created *Recovery Plan for Marine Turtles in Australia 2017,* while it is connected to Commonwealth and multi-state policies, it did not identify a clear relationship between Commonwealth, NSW, and Qld legislation (discussed further in Chapter 7). The reviewed plans also only directly connected to plans within the same state. Weak integration of environmental policy and management plans is common in Australia (Ross and Dovers 2008) and is problematic for marine migratory species, as it could indicate that groups implementing and working under legislative instruments and management plans designed to protect marine migratory species are operating independently of one another (discussed further in Chapters 5 – 7). A lack of coherence could also identify a communication gap between governance levels and weakens the overall implementation of conservation tools for protecting marine migratory

species in Australia (Runge et al. 2017; Smith et al. 1999), making it difficult to identify "ownership" of marine migratory species in a complex governance system (see Chapters 5 – 7).

Disconnect between policies and management plans can be problematic for managing species as many types of plans are not statutory. Management plans are often drafted as a form of threat mitigation rather than conservation, and non-statutory plans will have less of an impact on conservation than explicit environmental policy. Only recovery, protected area management, conservation advices, conservation plans, and threat abatement plans are statutory under the *EPBC Act 1999* (see Table G2 in Appendix G for descriptions). In addition, several recovery plans have expired under the *EPBC Act 1999* and are being replaced with conservation advices in order to address the backlog of recovery plans. The disadvantage of this is that conservation advices hold less weight than recovery plans when the Minster is making a decision regarding approving anthropogenic activities (discussed further in Chapters 6 and 7).

4.5 Conclusions

This chapter shows that not all species listed as Matters of National Environmental Significance are treated equally under eastern Australian environmental policies and management plans, despite the international obligation to protect these species (Hawke 2009). The larger charismatic megafauna, such as marine turtles, dugongs, and humpback whales, received more attention in statutory policy, whereas non-threatened migratory shorebirds were more likely to feature in environmental management plans. The tendency to protect some species (e.g. migratory shorebirds) through management plans rather than statutory tools is a limitation in protecting marine migratory species, as many of these plans are non-binding. However, the major weakness identified through this study is a lack of connection between the Commonwealth and state governments, between states, and within the state of Victoria.

The *EPBC Act 1999* is the central link between states, emphasising both its role in environmental governance in Australia and the horizontal and vertical communication gaps between governance levels, particularly in and within the states. Any changes to the *EPBC Act 1999* will have a cascading effect on national and state legislation and management plans.

Greater integration of the *EPBC Act 1999* into state and national legislation and management plans may help to improve coordination between state-government policy and planning. Increased cohesiveness between eastern Australian environmental policy and the translation into management plans will improve protection for marine turtles, dugongs, humpback whales, and non-threatened migratory shorebirds against anthropogenic threats throughout their ranges.

One means to achieve this cohesiveness would be through the introduction of a uniform treatment method for migratory species in eastern Australia, similar to the common assessment method introduced for threatened species (discussed in Chapters 5 – 8). In order to achieve this, states would need to amend their listing processes to include migratory species (as states do not currently have a mechanism for listing migratory species) and sign an intergovernmental Memorandum of Understanding that could then be integrated in to the *EPBC Act 1999* (pers. comm. Department of the Environment and Energy). Australia is larger than most other countries and a common method to protect and conserve migratory species would not only harmonise the management of these species but could also have a broader global application for protecting marine migratory species and promoting sustainable activities in the marine environment.

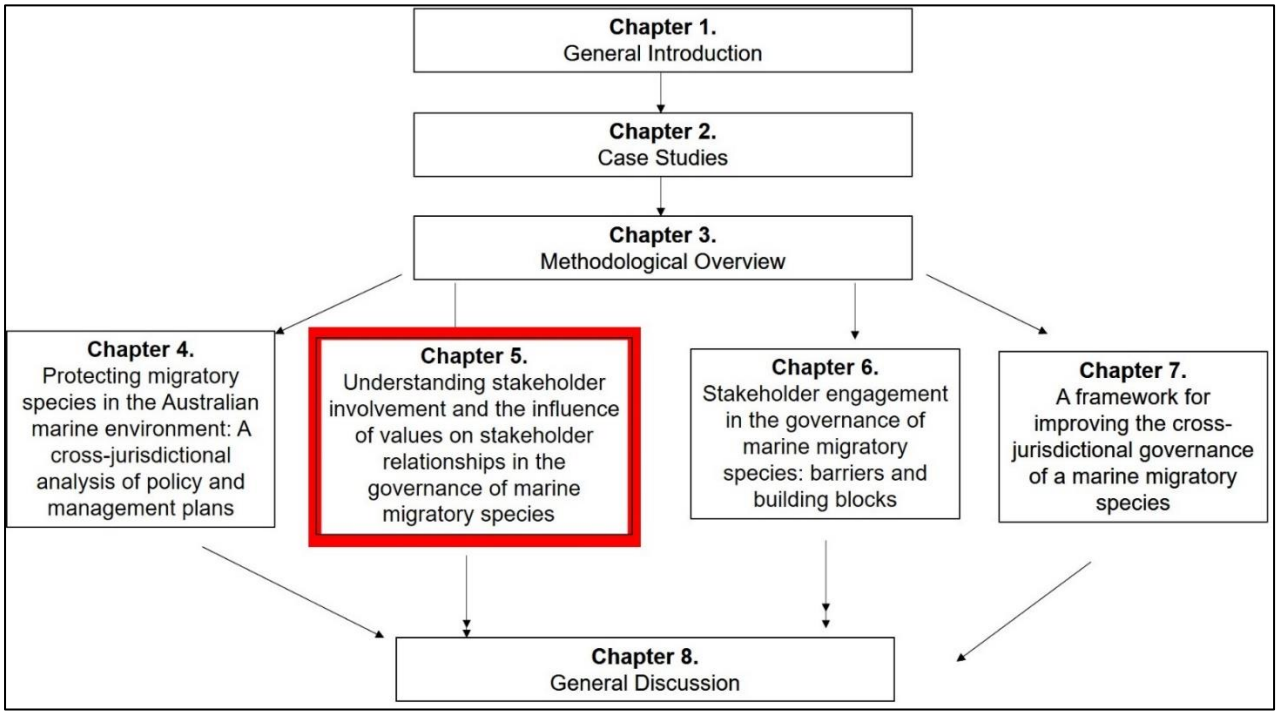
4.6 Summary

- In this chapter, I conducted a document and thematic analysis of 138 policy and management instruments relevant to the protection of marine turtles, dugongs, humpback whales, and migratory shorebirds in eastern Australia.
- My data indicate that there is a lack of cohesion between policy instruments of different governance levels and the *EBPC Act 1999* is the central link between policies and management plans of different governance levels. Thus, any changes to the *EPBC Act 1999* will have effects on all other environmental legislation in eastern Australia.
- Improving coordination and cohesion between policy instruments of different governance levels will harmonise and increase the effectiveness of managing marine migratory species as they move between different jurisdictions.
- This chapter contributes to a better understanding of the formal structures of the governance system mitigating threats to marine migratory species in eastern Australia. Further, this chapter provides a framework for analysing policy coherence in environmental governance more broadly.
- In the next chapter, I expand on these results to identify the stakeholder agencies involved in the governance of threats marine migratory species, understand the values of these stakeholder agencies, and explore the relationships between different stakeholder agencies within and between governance levels.

Chapter 5

Understanding stakeholder involvement and the influence of values on stakeholder relationships in the governance of marine migratory species

In this chapter, I identify network actors and differing value types, and qualitatively explore how these values influence relationships between the actors involved in the governance of marine migratory species in eastern Australia. This chapter builds on the results of the document analysis I conducted in Chapter 4. I used those results, plus responses from semi-structured qualitative interviews and a focus group to identify the network of diverse actors and values involved in the governance of threats to marine migratory species. I also use those results to describe the existing stakeholder network protecting marine migratory species in eastern Australia. I conclude this chapter by suggesting ways to increase cross-scale collaboration and create a more cohesive governance system for mitigating threats to marine migratory species in eastern Australia.



5. Understanding stakeholder involvement and the influence of values on stakeholder relationships in the governance of marine migratory species

5.1 Introduction

Biodiversity conservation is now a part of social debate and a broad range of stakeholders are increasingly identified as important to effectively implementing conservation initiatives in complex socio-ecological systems (e.g. Leenhardt et al. 2015; Mace 2014; Possingham et al. 2002). Further, stakeholders (e.g. those who influence or are affected by an environmental issues; Chapter 1, Section 1.6) are realising their ability to shift attention towards conservation issues by highlighting a broad range of ecological, social, and economic issues. Stakeholders can include government and non-government actors within a network (Chapter 1, Section 1.6). In this thesis, I focus on the role of both government (e.g. Commonwealth/state/local government agencies) and non-government (e.g. industry; research; non-government organisations) actors in the governance of marine migratory species, with the Commonwealth Department of the Environment and Energy (DotEE) being the central decision-making body.

Early and continuous involvement of stakeholders is particularly beneficial within collaborative governance systems because it can enable a proactive approach to setting conservation-based targets (and thus, develop biologically and socially appropriate targets) and set a platform for building on shared values to subsequently address more complex issues (see Chapter 1, Section 1.2; Chapters 6 and 7; Barrios-Garrido et al. 2019). Including multiple stakeholder agencies in a collaborative governance regime: 1) allows a governance regime to adapt, 2) creates new knowledge and skills for governing within the regime, and 3) can address power imbalances and potentially mitigate conflict between diverse stakeholder agencies (Mostert et al. 2007; Oh and Bush 2016). Further, including diverse stakeholders in decision-making within a polycentric governance system can create a shared space to build trust-based relationships that can then be expanded on to address complex issues.

Social networks have been suggested to play a large role in stakeholder involvement in natural resource governance (Chapter 3, Section 3.4.2; Bodin and Crona 2009; Crona and Hubacek 2010). This occurs because networks often form when the actors involved (e.g. different stakeholder agencies) share a joint interest in solving an environmental problem,

even if their core interests are not identical (Newig et al. 2010). In an analytical sense, social networks can be constructed using quantitative or qualitative data on interactions and the flow of knowledge and information between stakeholders (e.g. Ahrens 2018; Bodin and Crona 2009; Freeman 1979).

The ties that connect actors within the network can also describe the flow of knowledge and information between stakeholders. Bonding ties promote trust and cohesion between actors with similar viewpoints (e.g. same governance level), thus, forming tight-knit subgroups within the network (e.g. Bodin and Crona 2009; Weiss 2011). Bonding ties can also assist with knowledge exchange within the subgroup due to frequent interactions between network actors (Bodin and Crona 2009). Bridging ties connect different subgroups within the network (e.g. across governance scales), which can encourage adaptation and innovation within the network and better facilitate cross-scale collaborations and knowledge exchange (e.g. Bodin and Crona 2009; Weiss 2011). Understanding network dynamics, including the links that bind different actors, allows for researchers and managers to identify who is involved in the governance regime and how they interact. They also better capture the nature of an environmental problem, reducing bias in decision-making and producing biologically appropriate and socially equitable decisions (Chapter 3, Section 3.4.2; Hjortso et al. 2005; Newig et al. 2010).

Relationships between stakeholders can be described through examination of different network measurements (described in Chapter 3, Section 3.4.2; Table 5.1). In this chapter, I use the term 'actor' to describe all stakeholders involved in the governance of marine migratory species, including decision-making bodies (e.g. a government agency) and other actors that participate in and/or influence decision-making (e.g. non-government organisations; industry bodies; Bodin and Crona 2009). Different network measures derived in the analysis of the social network can identify important actors within the governance regime, such as betweenness centrality, overall network density, and in-degree and out-degree relationships (Chapter 3, Section 3.4.2; Table 5.1; Bodin and Crona 2009; Freeman 1979). For instance, an actor that connects several other actors displays a high-betweenness value and can serve as a bridging tie between previously unconnected actors (Chapter 3, Section 3.4.2; Bodin and Crona 2009). Networks with high-density values usually have a greater overlap of links between actors (Weiss 2012). For example, Weiss (2011) found a high network density of 76% for knowledge exchange in the governance of marine turtles

and dugongs in Northern Australia, meaning that there are likely high levels of cross-scale communication and collaboration between network actors. Further, networks with high density may support greater capacity for collaborative governance than networks with lower density because there are often a greater number of 'bridging' ties and therefore, greater interaction between actors across scales (Bodin and Crona 2009; Crona and Hubacek 2010). In-degree and out-degree measure the direction of relationships between network actors and can highlight key players, and centralisation, within the network (Weiss 2011). A highly centralised network can lead to unequal power distribution and may appear as though there are few actors who influence the overall governance network (Bodin and Crona 2009; Weiss 2011).

Social network analysis can also help identify which processes support or hinder the collaborative governance of natural resources, helping to understand where barriers may exist or conflicts might arise and how to address these conflicts based on the values of the actors involved (Bodin and Crona 2009; Oh and Bush 2016). A fundamental component of social networks in environmental governance is the value actors place on an environmental entity. There has often been emphasis on economic valuation of an environmental asset, yet various other value types may drive the participation of actors in environmental decision-making (e.g. Kenter et al. 2015; Trainor 2006). Other environmental values can include cultural, ecological, or utilitarian values (Bengston et al. 1999; Bengston and Xu 1995; Lynam et al. 2007; Trainor 2006). Values can influence a network actor's environmental concern, which may then influence environmental behaviours (e.g. Dietz et al. 2005). Similarly, values of stakeholder groups, especially non-government groups, can be influenced by their core or collective beliefs (Trainor 2006).

Values can exist across many realms and be held both individually and collectively (Irvine et al. 2016; Trainor 2006). Collective values are shared by a wider group and form through shared experiences and social processes (Irvine et al. 2016; Trainor 2006). It is important to note that although network actors are individuals (and thus, hold their own values), actors may be constrained by the values and mandates of the stakeholder agency for which they work (e.g. an individual public servant's values may differ from those of the government agency they work for; Newig et al. 2010; Weiss 2011). Relationships between network actors can be influenced by frequent and repeated interactions with other actors, especially with actors who share the same values; these interactions can build trust and cohesion between

groups who hold similar values (e.g. industry bodies with other industry bodies; Weiss 2011). Actors within a governance network who share common goals and values may be more likely to work together and view one another as allies (Ahrens 2018; Weiss 2011). However, the likelihood of actors communicating and collaborating with other network actors who share similar values and viewpoints can also limit collaborative action and adaptation within the governance regime as a whole because there is likely to be minimal cross-scale interaction between groups of actors who do not share the same values (Bodin and Crona 2009; Weiss 2011). This can limit the transmission of ideas, innovation, and the development of relationship across different parts of the network.

A lack of cross-scale communication and collaboration within a governance network can lead to conflict if multiple values differ, or if differences between actors are not considered (e.g. Barrios-Garrido et al. 2019; explored in this chapter). For example, Barrios-Garrido et al. (2019) identified value-driven differences between stakeholders impeding conservation of marine turtles in the Caribbean, some of which were multi-scale conflicts resulting from differing values or viewpoints about the conservation of marine turtles (e.g. legal consumption of marine turtles clashes with the viewpoints of some conservation groups that marine turtles should not be harvested). Understanding values, and the degree to which they vary, both within and between different groups or actors in a governance network can reduce conflict between actors, and identify and design mutual goals and outcomes for effective governance of environmental issues (Kenter et al. 2015). Studies investigating the values of the stakeholders involved in marine governance have often focused on coastal environments and 'sense of place' (e.g. Johnson et al. 2019; Marshall et al. 2018; van Riper et al. 2012). There is limited research on the values associated with species conservation, such as marine migratory species, with the exception of the cultural value of such species to particular groups and the intrinsic value of maintaining stable populations (e.g. Butler et al. 2012; Kulmala et al. 2013).

5.1.1 Purpose of this chapter

Due to the large ranges of marine migratory species in eastern Australia, it is likely that there will be diverse actors involved in the social network associated with the governance of threats to these species, which may lead to conflict within the system. Additionally, marine migratory species in eastern Australia are valuable to stakeholders for various reasons. In this

chapter, I explore the social network associated with the governance of threats to marine turtles, dugongs, humpback whales, and non-threatened migratory shorebirds on the east coast of Australia, including examining how the socio-ecological values held by different network actors (stakeholder agencies) influence the formation of relationships within the system. With few exceptions, there has been no exploration of the governance networks mitigating threats to marine migratory species in eastern Australia, including understanding what values motivate stakeholder participation (e.g. Weiss 2011; Weiss et al. 2012). Identifying and incorporating values into environmental policy and management can help promote effective cross-scale collaboration in the governance of threats to marine migratory species in eastern Australia (e.g. by-catch; Kenter 2016; Riskas et al. 2016). Additionally, because there are gaps in the legislation protecting these species in Australia (Chapter 4), understanding if these gaps are reflected within the network and identifying why network actors value marine migratory species/what values they share may help better promote cross-scale collaboration in the governance of threats to marine migratory species in eastern Australia. Better cross-scale collaboration within the governance network may promote harmonised governance of threats to these species and improve the coherence of the overall governance system.

5.2 Methods

Building on the document analysis of policy instruments that I conducted in Chapter 4 (Appendix H, Tables H1 and H2), I used a mixed-methods approach (Chapter 3) to identify the values held by the actors and understand how network actors connect with each other and what influence values may have on relationships between actors in the governance of threats to marine migratory species in eastern Australia.

5.2.1 Stakeholder identification

I used stakeholder mapping to systematically identify and classify potential stakeholders based on the results of my document analysis of 138 policy instruments used to protect marine migratory species in Australia (See Table 3.2 in Chapter 3; Chapter 4; e.g. Colvin et al. 2016; Reed and Curzon 2015).

Using a combination of ex-ante and ad-hoc approaches, I identified network actors before conducting interviews (through the document analysis conducted in Chapter 4) and through

snowball sampling by asking respondents to identify other actors who may have expertise in the governance of marine migratory species (e.g. Patton 1990; Reed and Curzon 2015; Teddlie and Yu 2007).

5.2.2 Interviews and focus group

As detailed in Chapter 3 (Section 3.3.4), I conducted 36 semi-structured interviews (with 38 respondents from both government and non-government agencies) and a focus group (n=5 with a Commonwealth Government agency) with diverse actors involved with the governance of marine migratory species in eastern Australia (e.g. Rose 1994; Kitzinger 1994; Patton 1990; Whiting 2008; Table 3.2 in Chapter 3; Chapter 3, Sections 3.3.4 and 3.3.5). I transcribed all interview and focus group audio, then iteratively coded each transcript into themes. For a detailed overview of my data collection and analyses protocols, please see Chapter 3 (Sections 3.3.4 – 3.3.5).

5.2.3 Value identification

I combined the results of my document analysis (Chapter 3, Section 3.3.1) with the responses from the semi-structured interviews and focus group (Chapter 3, Sections 3.3.4 and 3.3.5) to identify the values incorporated into policy instruments and held by different network actors involved in protecting marine migratory species in eastern Australia (see Tables H2 and H3 in Appendix H for the list of policy instruments). As in Chapter 4, I defined a policy as statutory legislation or regulations that describe how the government will protect the environment and a management plan as a document that outlines the implementation of a policy or policies, while still protecting the environment. Collectively, I refer to policies and management plans as policy instruments (Chapter 4). For the policy instruments, natural values include ecological values and social values include all other value types that are not ecological. For Figure 5.1, I was unable to provide a breakdown of specific value types (as I did for Figure 5.2), because the language of the policy instruments made it difficult to identify specific value types other than high-level “natural” or “social” values.

To identify the values held by the actors within the governance networks, I asked respondents (in interviews and in the focus group):

> Why do you think is it important to conserve marine migratory taxa, such as marine turtles, dugongs, humpback whales, and migratory shorebirds?

I chose to use the word 'important' to measure values in this chapter because 'important' encompasses why network actors believe marine migratory species are desirable, useful, and necessary (Lynam et al. 2007).

After transcribing the interviews and the focus group, I identified and iteratively coded values in NVivo (Version 12 for Windows) using a combination of existing frameworks for categorising values in natural resource governance (Tables 5.1 and 5.4; Chapter 3, Sections 3.4.3 and 3.4.4; e.g. Bengston and Xu 1995; Marshall et al. 2018; Trainor 2006). I also examined how values influence relationship formation between different network actors (Figure 5.3).

Table 5.1 A non-exhaustive list of environmental values (adapted from Bengston and Xu 1995; Marshall et al. 2018; Trainor 2006).

Environmental Value	Description
Aesthetic	Species or environment is important because it is beautiful
Cultural	Species or environment important to the practices (e.g. rituals) and preservation of a particular group, community, or culture
Economic	Species or environment has potential to generate revenue for a group/groups
Ecological	Species or environment is important (e.g. biologically) to the surrounding ecosystem
Intrinsic	Species or environment is important to protect because it is important in its own right (e.g. the statement 'important shorebird breeding grounds should be preserved')
Preservative	Species or environment should be protected for future generations

5.2.4 Social network analysis

I qualitatively identified stakeholder relationships and identified conflict within the network by asking respondents the following questions:

1) What groups and organisations do you work with (Who is involved in your different networks?)
2) Are there any groups or organisations that you feel you cannot work with for a particular reason?

I separated actors into two categories: 1) non-government and 2) government agencies. I colour-coded these agencies based on the governance level that actor operates at: 1)

Commonwealth, 2) state, 3) local, 4) general (e.g. can operate at any level or the level was not specified), and 5) international (see Table I1 in Appendix I). Any agency without a corresponding numeral associated with its identification represents a generic actor (e.g. S_NGO represents a generic state non-government organisation; see Table I1 in Appendix I). For analytical purposes, I categorised actors based on their current, primary area of expertise because several respondents had experience working for other stakeholder agencies (e.g. an independent researcher may have worked for a government agency; Table 3.2 in Chapter 3). I did not separate respondents into case-study specific networks because there were very few actors that focused on governing threats towards a single case-study species. Additionally, some of my case studies are frequently managed together, such as green turtles and dugongs, because they often share the same sea-grass-based habitats (e.g. Gredzens et al. 2014; Marsh et al. 2011).

I used NetDraw to: 1) identify how values influenced relationships between network actors (Figure 5.3) and 2) identify the key actors in the governance system using the Principal Component analysis tool in NetDraw (Figure 5.4). For Figure 5.3, I removed Indigenous and local government respondents due to their low sample size (n=2 and n=1, respectively). For Figure 5.4, I also calculated network descriptors for betweenness centrality, and the number of in-degree and out-degree relationships of key actors (Table 5.2; see Chapter 3, Section 3.4.2 for a description of social network analysis).

Table 5.2. An identification and description of the measurements used in this chapter to describe the structure and relationship strengths of the network surrounding marine migratory species (see also Chapter 3, Section 3.4.2).

Descriptor	Definition
Centrality	Describes how close a network actor is to other actors within its immediate vicinity (Scot 1988; Weiss 2011)
Betweenness	The number of relationships that pass through a specific actor to connect another two disconnected actors (Bodin and Crona 2009; Prell et al. 2009)
In-degree	Number of ties directed *towards* an actor (Weiss 2011)
Out-degree	Number of ties directed *away* from an actor (Weiss 2011)

5.2.5 Limitations

One limitation of this chapter is that I do not have network data for every respondent. This is because I did not ask every respondent the network questions (often due to time constraints

during the interview), or stakeholders did not identify specific agencies or give examples of the type of agencies they worked with. Another limitation to this chapter is the small sample size of local government (n=1) and Aboriginal Australians and Torres Strait Islander respondents (n=2). Local government/councils from eastern Australia often have jurisdiction over important nesting beaches for marine turtles and migratory shorebirds. Aboriginal Australians and Torres Strait Islanders are important in managing marine turtles and dugongs in Northern Australia and humpback whales in central Queensland (Chapter 2, Section 2.2.2.1; Chapters 6 and 7; GBRMPA 2018). Therefore, future research should focus on increasing the sample size of these stakeholder agencies.

Additionally, because I qualitatively measured relationships in the network, I was limited in my ability to explore network characteristics in-depth. As such, I could not identify relationship strength or the power/influence of individual actors. It is likely that to publish the results of this chapter, I would need to conduct quantitative social network analysis to be able to more accurately understand the network dynamics involved in the governance of threats to marine migratory species in eastern Australia. I was also unable to identify specific conflict resolution mechanisms within this same social network because numerous actors did not identify actors that they felt they could not work with. However, identifying how conflict is mediated and resolved in the governance of marine migratory species is important to facilitating cross-scale collaborations and promoting equitable conservation interventions (see Chapter 7; Bodin and Crona 2009) and would be a valuable area of future research.

5.3 Results

I identified several diverse actors, operating across multiple governance levels, involved in the governance of threats to marine migratory species in east Australia (Table 3.2 in Chapter 3). These actors held multiple values (Section 5.3.1) and had relationships with other actors within the network (Section 5.3.2).

5.3.1 Identifying the values involved in the governance of marine migratory species in eastern Australia

From the document analysis, I found that 17 out of 35 policies (48.6%) and 59 out of 123 management plans (50.4%) incorporated values into management actions (Figure 5.1). In the

policies, the values I identified were primarily natural values (12; e.g. ecological values), where there was nearly an even split between natural (34) and social values (30; e.g. cultural, economic, intrinsic values) in the management plans I reviewed (Figure 5.1; Tables H2 and H3 in Appendix H).

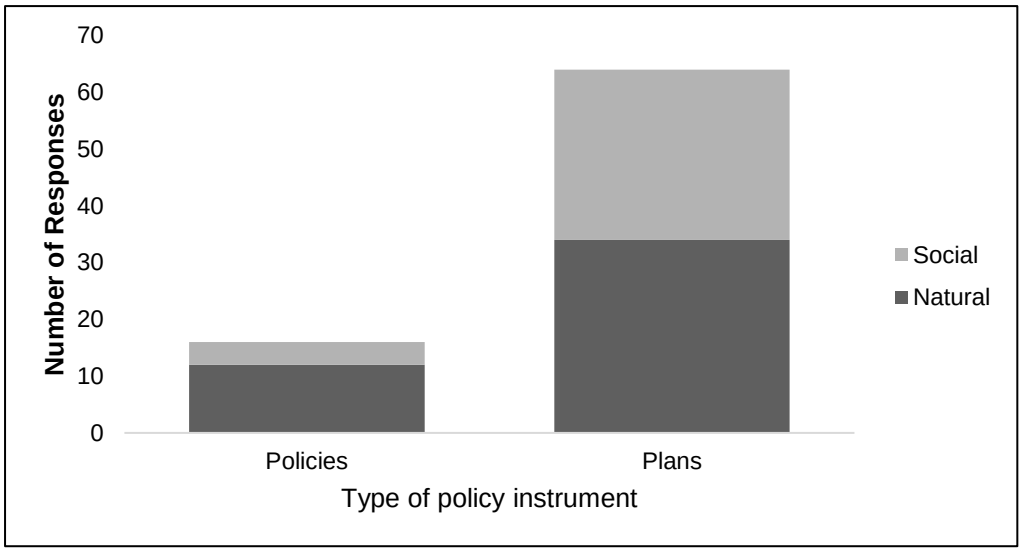


Figure 5.1. A breakdown of the values identified within the policies and management plans I reviewed. Less than half of the reviewed policies identified values; those policies that do identify values identified natural values more often than social values. Half of the plans identified values, with a nearly equal ratio of social to natural values. The distribution of natural and social values in the management plans does not equal 59 because some plans identified both types of values.

The values that emerged from the semi-structured interviews and focus group responses ranged from cultural to statutory values, with ecological values being the predominate value type held by network actors (Table 5.3; Figures 5.2 and 5.3). For consistency with Figure 5.1, I categorised values as "social" or "natural" values (Table 5.3).

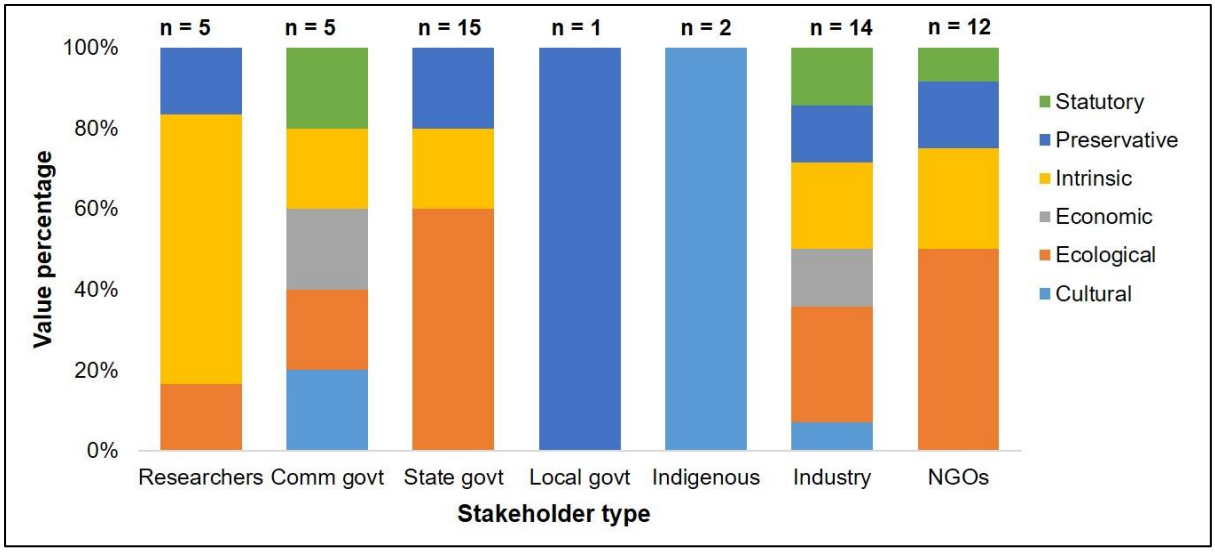
Table 5.3. The different value types held by network actors involved in the governance of marine turtles, dugongs, humpback whales, and migratory shorebirds in Australia. I have included a definition of each value type (adapted from Bengston and Xu 1995; Marshall et al. 2018; Trainor 2006) and associated example(s) of each value type, as illustrated by quotes from respondents. This table is non-exhaustive and represents the primary values identified by respondents.

Value Type	Example(s)

Cultural (social value)	
Encompasses the spiritual and cultural significance of a marine migratory species to a specific group of people(s)	*These species are actually a reflection of a colonising relationship as well. That as they go from factors that are outside of our influence, it reminds us of that trauma that we (have) gone through to be colonised. It's another hurt when they're not cared for* (Aboriginal Australian) *They also have cultural significance to the Torres Strait Islanders and Aboriginal people. They're one of my totems from my father, a Torres Strait Islander* (Torres Strait Islander)
Ecological (natural value)	
Encompasses the viewpoint that a marine migratory species plays a role in 1) maintaining biodiversity, 2) maintaining the health of the ecosystem and/or 3) is generally ecologically important	*The turtle and the dugong are part of the ecosystem. They (are) indicators in that system of how the health is going when you see big fauna like them swimming around* (Torres Strait Islander) *I just think environmentally, every creature has a place and if you move one out, then you shift the whole dynamics* (industry respondent)
Economic (social value)	
Encompasses the role that a marine migratory species plays in generating income for a particular industry	*If we do (not) protect iconic species (…) we (will) see a collapse of regional Australia's economy or regional Queensland's economy* (industry respondent)
Intrinsic (social value)	
Encompasses the viewpoint that a marine migratory species is valuable because it exists, encompasses protection of other species, and/or because its conservation is morally correct	*There (is) also (…) an intrinsic value, a social value, particularly of those charismatic marine megafauna that people have a real association* [with] *and love of (…) whales, turtles and dugongs* (state government respondent) *I think also that they (are) a really good flagship species. They catch a lot of the culture. The conservation of turtles encapsulates a lot of people and using them as your figurehead species* [can encompass] *broader marine conservation* (NGO respondent)
Preservative (social value)	
Encompasses the viewpoint that it is the responsibility of the global population to preserve a marine migratory species for future generations	*I want to see these species around for my kids when they (are) grown up and for the next generations leading in the future* (NGO respondent) *Community and people and families would like to protect this taxa, so that future generations can experience the joy of a turtle nesting* (local government respondent)

Statutory (social value) Encompasses the regulatory (e.g. legal) requirement of a government agencies(s) to protect a marine migratory species	*They* [case studies] *all make up a Matter of National Environmental Significance under section 209, so there (is) an obligation to enforce the Act* (Commonwealth Government respondent) *From a bureaucratic point of view, it (is) because we have international obligations and legislation that says it* [protecting these species] *is important* (Commonwealth Government respondent)

Some respondents expressed a variety of reasons why protecting marine migratory species is important to them (e.g. NGO organisations and state government agencies), while others identified fewer values associated with marine migratory species (e.g. Indigenous respondents; Figure 5.2). Responses from Commonwealth Government respondents were distributed equally across all value types, except for preservative values[4]. State government respondents, industry respondents, and non-government organisations identified ecological values as their dominant value type, while independent researchers emphasised the intrinsic value of marine turtles, dugongs, humpback whales, and non-threatened migratory shorebirds in eastern Australia (Figure 5.2). Local government and Indigenous respondents identified a single value type (preservative and cultural values, respectively)[5].



[4] The diversity of value types identified by Commonwealth Government respondents may be due to using a focus group with some of these respondents. It is possible that had I conducted more individual interviews with Commonwealth Government respondents, the diversity of value types may be different than those identified through the focus group.

[5] Increasing the sample size of Indigenous and local government respondents may provide more insight into the different value types held by these actors, as well as how these values link these actors with other actors within the governance network.

Figure 5.2. The different value types held by each of the network actors that I interviewed for this thesis. The Commonwealth Government category represents responses from both qualitative interview responses and the focus group. Percentages are calculated based on the total responses from each actor type and are not necessarily equal to the sample size for each network actor as some actors identified more than one value type.

Many network actors share similar values and as a result, some cross-scale collaboration occurs within the governance system mitigating threats to marine turtles, dugongs, humpback whales, and non-threatened migratory shorebirds in east Australia (Figure 5.3). An industry representative emphasised the importance of maintaining continuous relationships with actors who share a similar goals (and thus, similar values), saying:

> *If you (are) constantly working towards a common goal, you and the people you (are) working with will be able to recognise that there may well be some things* [where] *you have to agree to disagree. But, if you (are) always working on the common goals, then there (is) always something you have in common and you can always find a way through* [to solving a problem].

This was reflected in the network in that the ecological value of marine migratory species was the dominant (common) value linking the different actors involved in the governance of threats to these species in eastern Australia, including across governance scales (Figure 5.3). However, Commonwealth Government Agencies 1 and 2 and independent researchers identified either no singular value type or the intrinsic value of marine migratory species as their dominant value type, respectively (Figures 5.2 and 5.3).

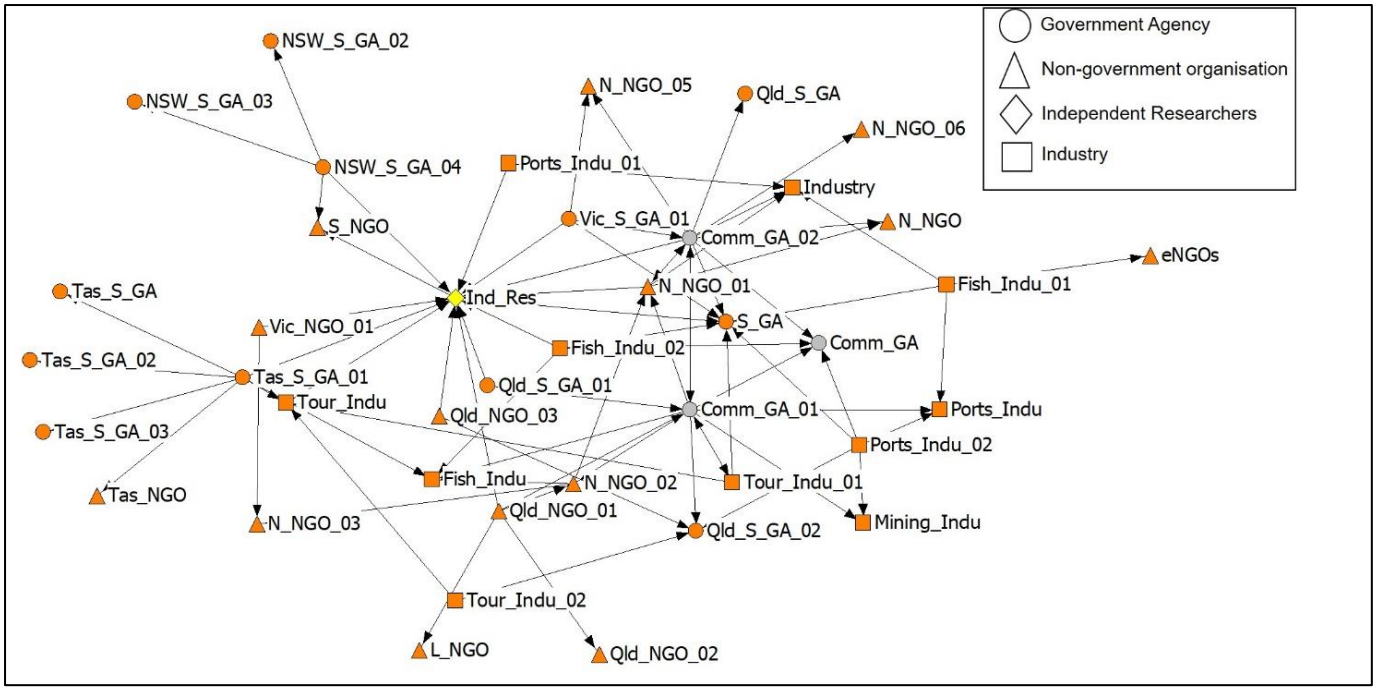


Figure 5.3. The dominant value types as held by four categories of network actors. Local government and Indigenous respondents are not included in this diagram given their small sample size. Orange shapes represent ecological value as the dominant value type, yellow shapes represent intrinsic value, and grey shapes indicate that an actor had no dominant value type.

5.3.2 Analysing the relationships between actors involved in the governance of marine migratory species in eastern Australia

Within the network protecting marine turtles, dugongs, humpback whales, and non-threatened migratory shorebirds in eastern Australia, respondents identified Commonwealth Government agencies, specifically Agencies 1 and 2 (the Great Barrier Reef Marine Park Authority (GBRMPA) and the Department of the Environment and Energy (DotEE), respectively) and independent researchers as important actors within the system (Figure 5.4). Commonwealth Government Agencies 1 (GBRMPA) and 2 (DotEE) are influential actors in the governance network protecting marine migratory species in eastern Australia as demonstrated by the two highest numbers of out-degree relationships (12 and 11, respectively) and the two highest betweenness values (114 and 73, respectively; Figure 5.4). Independent researchers are prominent actors in the governance network, as demonstrated by the highest number of in-degree relationships (14) and the third highest betweenness value (47; Figure 5.4)[6].

[6] The betweenness and in-degree/out-degree values that I calculated may be higher or lower than those calculated through quantitative social network analysis. Future research could use quantitative social network analysis and compare to my qualitative results.

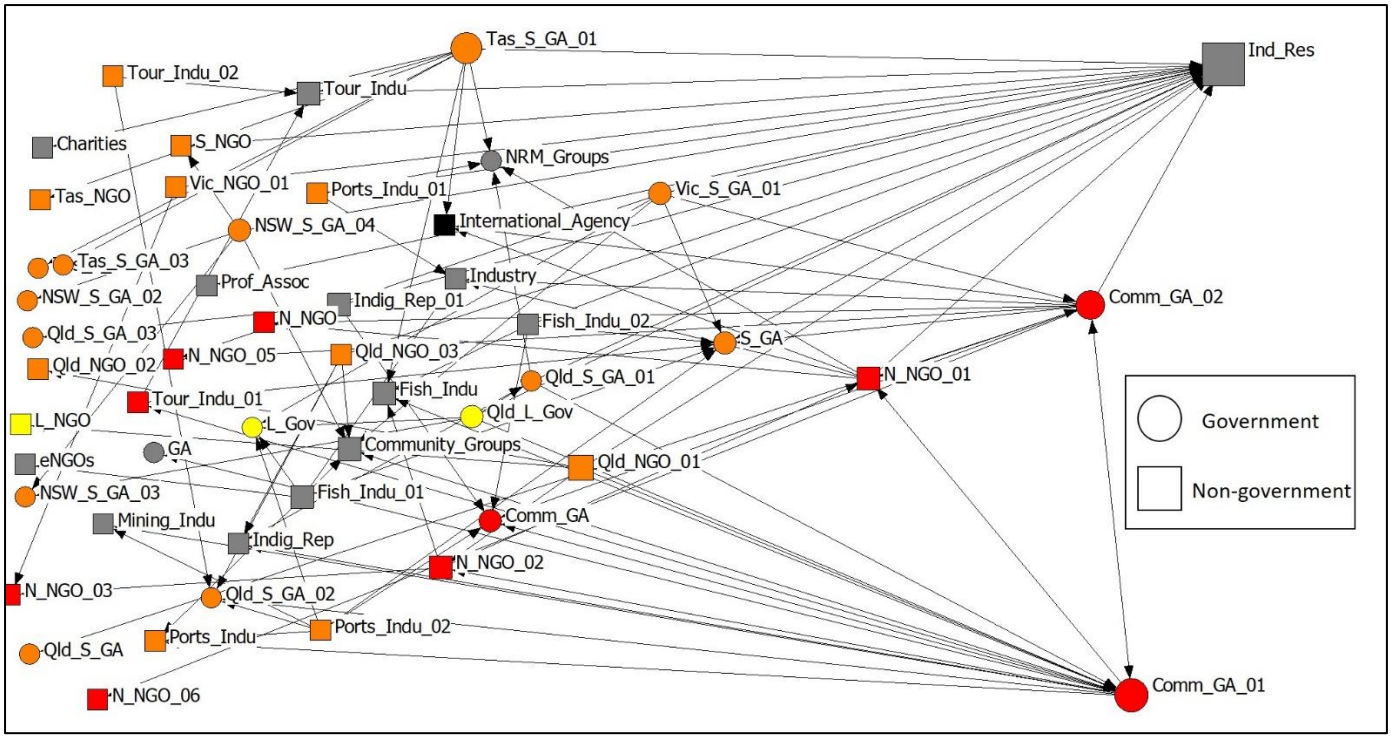


Figure 5.4. The relationships between actors involved in the governance of marine migratory species as identified by qualitative interview and focus group responses, displayed using NetDraw's Principal Component Layout. NetDraw's Principal Component tool draws key network actors out from the rest of the network. Nodes on the right hand side of the graph represent key actors. Node size is set by betweenness – larger nodes indicate that more relationships pass through that node than any other node. Node shape is dictated by the type of actors, while node colour is represented by jurisdiction. Red nodes operate at the Commonwealth level, orange nodes operate at state level, yellow nodes operate at the local level, grey nodes represent actors that can operate at any level, and black nodes represent international actors.

Some respondents suggested that collaboration between governance levels primarily occurs when addressing a specific incident or threat to a migratory species (e.g. working together to free an entangled whale as it migrates between states). Additionally, the majority of respondents replied that there were no actors with whom they could not work or collaborate. A respondent from a state government agency suggested that they could not work with some conservation and/or environmental activist groups (e.g. Sea Shepherd) because the differing ideologies and values of the state government agency and the conservation or activist groups may lead to conflict. Additionally, a Torres Strait Islander suggested that there was an individual with whom they could not work, due to the individual's public opposition of traditional harvesting of marine turtles and dugongs in Northern Australia.

5.4 Discussion

In this chapter, I found that there are multiple actors, representing both government and non-government stakeholder agencies, involved in the governance of threats to marine migratory species on the east coast of Australia. This broad range of stakeholders reflects the

polycentricity of the governance system (Chapter 1, Section 1.3; Chapters 4, 6 – 8). However, the governance system is also highly centralised around three key actors. Additionally, though each actor holds a unique set of values, the ecological value of marine migratory species is the dominant value that links actors within the network (except for the three key actors within the system; Figures 5.2 and 5.3). The combination of a highly centralised network, diverse stakeholder values, and weak policy coherence (Chapter 4) within the governance regime is likely to affect the governance of threats to marine turtles, dugongs, humpback whales, and non-threatened migratory shorebirds on the east coast of Australia, as discussed below.

5.4.1 Exploring the value of marine migratory species in eastern Australia

Though there are diverse values held by each actor involved in the governance of threats to marine migratory species in eastern Australia (Figure 5.2), the ecological value of these species was the predominant value linking actors within the network (Figure 5.3), including for industry actors. For the tourism industry, humpback whales are a particularly important economic asset (Chapter 2, Section 2.3.3) and one would assume it might be in the best economic interest of that industry to participate in the governance of threats to humpback whales along the east coast of Australia and thus, that economic values would be the dominant value of this group. Some studies have shown that industries can experience economic gain after implementing environmentally – and ecologically – friendly practices (e.g. King and Lenox 2001; Schaltegger and Synnestvedt 2002). Further, pressure from consumers can influence an industry to implement "green" practices (e.g. responsible whale watching; Wearing et al. 2014), which may then have greater economic benefits for the industry in question (e.g. Betts et al. 2015; Peloza and Shang 2011). Therefore, by protecting the ecological value of marine migratory species, industry actors may benefit financially from the continued existence of these species.

Identifying the ecological value of marine turtles, dugongs, humpback whales, and non-threatened migratory shorebirds as the dominant value type among network actors (Figure 5.3) may explain why ecological and natural value of these species is the dominant value type reflected in policies and management plans (Figure 5.1). Emphasising the natural value of marine migratory species may be a strength of eastern Australia's environmental policies and management plans because other socioecological values are often prioritised over the

environment (e.g. economic; Chapters 6 and 7; Tear et al. 2005). However, protecting natural values (e.g. ecological) more often than social values in policy instruments can appear as though legislation and management favours conservation over the socioeconomic needs of stakeholders (Farrier et al. 2007). This could be problematic where consideration of livelihoods of people are strongly linked to the environmental features (e.g. fisheries). Further, the values incorporated into policies and management plans may be reflective of the values held by the departmental Ministers and/or the policy developers, such as recovery team members (see Chapter 7; Trainor 2006; Vilkins and Grant 2017). Additionally, it is important to note, however, that there may be some overlap between social and ecological values within in the governance regime.

The governance network protecting marine turtles, dugongs, humpback whales, and non-threatened migratory shorebirds in eastern Australia has three key actors (Figure 5.4; Section 5.4.2; Garmestani and Benson 2013; Weiss 2011). These three actors did not identify the ecological value of marine migratory species as their dominant value type, despite their role in connecting actors across governance scales (Figures 5.2 and 5.3; Section 5.4.2). The Commonwealth Government agencies identified a nearly equal distribution across all value types (excepting preservative values; Figures 5.2 and 5.3), which could reflect the need for the Commonwealth Government to work with a diverse range of network actors (pers. comm. respondents from the Department of the Environment and Energy (DotEE) and from the Great Barrier Reef Marine Park Authority; Chapter 6). Additionally, a criterion for the World Heritage listing of the Great Barrier Reef is that the Commonwealth Government preserves important cultural and social values in addition to the ecological values within the World Heritage Area (GBRMPA 2011). Commonwealth Government agencies likely need to prioritise social values as well as the ecological value of marine migratory species in order to fulfil their obligations under national environmental legislation and international agreements, hence the equal distribution across value types (Figure 5.2).

Independent researchers identified the intrinsic value of marine migratory species as their dominant value type, which is potentially another form of neutrality within the governance system. Intrinsic values differ from most other value types identified by respondents in that the intrinsic value of marine migratory species is not inherently linked to any other human-focused value type (e.g. the economic value of marine migratory species; Diaz et al. 2019). However, recognising the intrinsic value of marine migratory species does not mean that

independent researchers do not recognise the other socioecological values generated by these species (Chan et al. 2016). Maintaining a relatively neutral dominant value (the intrinsic value of marine migratory species) may allow researchers to form relationships with other actors in the network based on their dominant value type because independent researchers can recognise the benefits derived from protecting marine migratory species in eastern Australia (e.g. ecological benefits; other social values such as economic benefits; Chan et al. 2016). Therefore, independent researchers are well positioned to link a diverse range of actors within the network, including those who do not hold ecological value of marine migratory species as their dominant value type (Section 5.4.2; Chapter 6).

Though Indigenous respondents and the local government respondent did not identify the ecological value of marine migratory species as their dominant value type, cultural and preservative values of marine migratory species may be closely related to ecological values and may be an avenue to promote cross-scale collaboration of these actors with other actors in the system. Indigenous respondents identified the cultural value of protecting marine migratory species, emphasising the protection of cultural keystone species such as green turtles and dugongs. Traditional hunting of dugongs and marine turtles is important in transmitting traditional ecological knowledge across generations and reflects the important ancestral relationships between Aboriginal Australians and Torres Strait Islander peoples with these species (e.g. Watkin Lui et al. 2016). Humpback whales are also totemic species (though not hunted) for the *Woppaburra* peoples in central Queensland (Chapter 2, Section 2.3.3; GBRMPA 2018). Therefore, losing these cultural keystone species means that the Traditional Owners of these species risk losing their identity (Bennett 2018; Marshall et al. 2018). However, despite the incredible cultural value of marine migratory species, particularly marine turtles, dugongs, and humpback whales, conservation policy instruments tend to undervalue the cultural value of these species because it is difficult to quantify (e.g. Delisle et al. 2018; Small et al. 2017).

The local government respondent identified the preservative value of marine migratory species as their dominant value, which is also closely related to the ecological value of these species (e.g. marine turtles in the Bundaberg region – Wilson and Tisdell 2003). The emphasis on preservation values likely arises from the ways in which local government in Australia interact with environmental change. A key component of local government's environmental management relates to legislation aimed at both planning and managing

developments along and adjacent to the coastline. Hence, preserving and protecting coastal habitats for marine migratory species for future generations would directly benefit the ecosystem in which these species live, thus, maintaining the ecological value of these species. Because marine migratory species play important ecological roles in habitat connectivity (e.g. marine turtles transport nutrients and energy from the marine environment to terrestrial environments through nesting; Bouchard and Bjorndal 2000; Unsworth et al. 2015; Tol et al. 2017; Vander Zanden et al. 2012), protecting these species may have cascading benefits to other value types (e.g. cultural; economic). Thus, considering the broad socioecological values held by other network actors when making decisions may lead to greater compliance, more equitable policy and management instruments, and reduce conflict within the network (Beierle and Konisky 2000; Bennett 2018; Hobday and McDonald 2014; Oh and Bush 2016).

Although the dominant value connecting actors within the network is the ecological value of marine turtles, dugongs, humpback whales, and non-threatened migratory shorebirds, given the diversity of network actors and the values that drive their participation, there is likely to be conflict between actors who perceive other network actors to hold different values or between actors who consider different ecological scales. Conflict may arise within the governance regime given that the social values I identified are more diverse than the ecological value of marine migratory species. Some network actors involved in protecting marine migratory species on the east coast of Australia may believe that they have conflicting values with other actors (e.g. NGOs may favour conservation and preservation values while industry may favour economic values). Additionally, because there has been a push to monetarily value ecosystems and environmental resources, conflict can arise when actors (who do not view the environment solely as an economic asset) perceive that decision-makers are emphasising the economic value of a resource over any other social value (Chan et al. 2012; Small et al. 2017). However, as briefly described above, natural resources, including marine migratory species, have some socioecological values that cannot be easily quantified (e.g. cultural and intrinsic values; Small et al. 2017). Therefore, in order to address the perceived value differences between actors and mitigate potential conflicts within the system, all actors should be included in decision-making to foster future collaborative governance efforts and develop policy instruments that are biologically appropriate and socially equitable (e.g. Barrios-Garrido et al. 2019; Redpath et al. 2013).

5.4.2 Understanding the relationships between actors in the governance system protecting marine migratory species in eastern Australia

The influential role of the Commonwealth Government agencies (particularly the GBRMPA and the DotEE), as suggested by Figure 5.4, fits within Australia's existing, centralised governance regime, as the Commonwealth Department of the Environment and Energy and Commonwealth Minister for the Environment hold the power to make the final decisions pertaining to MNES. The high betweenness and out-degree values displayed by the GBRMPA (Commonwealth Government Agency 1) and the DotEE (Commonwealth Government Agency 2; Figure 5.4) demonstrate that these actors may have greater capacity to connect network actors and influence the overall governance regime than any other actor within the network. High out-degree values also indicate that Commonwealth Government agencies may be able to efficiently disseminate information or initiate exchanges between other actors relatively easily (e.g. Chapters 6 and 7). My findings support previous findings. Weiss (2011) also found that the dugong and turtle networks in Northern Australia were highly centralised, despite a variety of actors involved across multiple scales within the governance network.

The roles of the Great Barrier Reef Marine Park Authority and the Commonwealth Department of the Environment and Energy as important actors within the governance regime protecting marine turtles, dugongs, humpback whales, and non-threatened migratory shorebirds in Australian waters is relatively well-known (Chapter 2; e.g. GBRMPA 2018; Weiss 2011). Northern areas of the Great Barrier Reef Marine Park are home to biologically important populations of marine turtles, dugongs, and some species of migratory shorebirds, while southern areas of the Marine Park are important breeding grounds for humpback whales (Chapter 2; GBRMPA 2014). Additionally, the presence of dugongs, marine turtles, and breeding humpback whales as 'Outstanding Universal Values' within the Marine Park contributed to listing of the Marine Park as a World Heritage Area in 1981 (Chapter 4; GBRMPA 2011). The Great Barrier Reef Marine Park Authority also has several Traditional Use of Marine Resource Agreements for co-managing the sea country and traditional fisheries associated with some of my case studies (Chapter 2, Section 2.2.2.1; e.g. Great Barrier Reef Marine Park Authority: Traditional Use of Marine Resource Agreements).

The Commonwealth Department of the Environment and Energy (DotEE) is charged with the development and implementation of recovery plans, conservation advices, wildlife

conservation plans, and other tools for mitigating threats to marine turtles, dugongs, humpback whales, and migratory shorebirds in Australia (Chapter 2, Section 2.1). The DotEE also often leads the consultation processes associated with developing and/or revising these same policy instruments. Therefore, in leading the consultation processes associated with developing or revising these instruments, the DotEE has a degree of control over who is involved (or not) in the decision-making process and/or how that information is integrated (or not) into policy and management documents (Chapter 6).

Categorising independent researchers as prominent in the governance regime protecting marine turtles, dugongs, humpback whales, and non-threatened migratory shorebirds in eastern Australia identifies researchers as potentially important actors serving as a bridge and linking other actors within the network (e.g. Cvitanovic et al. 2016; Weiss 2011). Having a high in-degree value indicates that other actors within the governance network are seeking out relationships with independent researchers, potentially for information to use in decision-making (Weiss 2011). Leveraging that role as a bridging actor may increase the success of the governance of threats to marine migratory species in eastern Australia, as it may connect and promote collaboration between actors who were not previously connected (Crona and Hubacek 2010).

Bridging actors can also facilitate two-way knowledge sharing by translating scientific knowledge for non-scientists (including government officials) and disseminating information across knowledge boundaries (Chapter 6; Roux et al. 2017). There has been much research into the role of independent researchers as bridging actors at the science-policy interface to assist with incorporating science into environmental policy (e.g. Cvitanovic et al. 2015; Koetz et al. 2012). However, environmental policy often emphasises the natural and biological sciences, rather than social science (Marshall et al. 2017). Because there are several actors involved in the governance of threats to marine migratory species on the east coast of Australia who may hold differing values or viewpoints, social scientists must also work to position themselves as a bridging actor within the governance regime (Marshall et al. 2017). Active engagement of stakeholders at the interface between academia and policy development/implementation can help provide equal voices to all agencies involved and help stakeholders to find ‘common ground’ for facing environmental governance issues based on shared values and viewpoints (Cvitanovic et al. 2016; Roux et al. 2017).

5.5 Conclusions

The governance of marine migratory species in Australia is polycentric (see also Chapters 4, 6 – 8), as illustrated by the diverse range of actors and cross-scale relationships identified in this chapter. Yet, the overall network is highly centralised, with two Commonwealth Government agencies and independent researchers identified as the key actors within the system. Most actors within the network (with the exception of Commonwealth Government Agencies 1 and 2 and independent researchers) identified the ecological value of marine migratory species as the dominant value to protect. Building relationships and encouraging cross-scale collaborations based on the shared values between network actors (the ecological value of marine migratory species) could lead to decision-making that is both biologically appropriate and socially equitable. Further, increased collaborations can improve coherence within the system and harmonise decision-making throughout the range of marine migratory species, promoting better collaborative governance of threats to these species in eastern Australia (Chapters 4, 6 – 7).

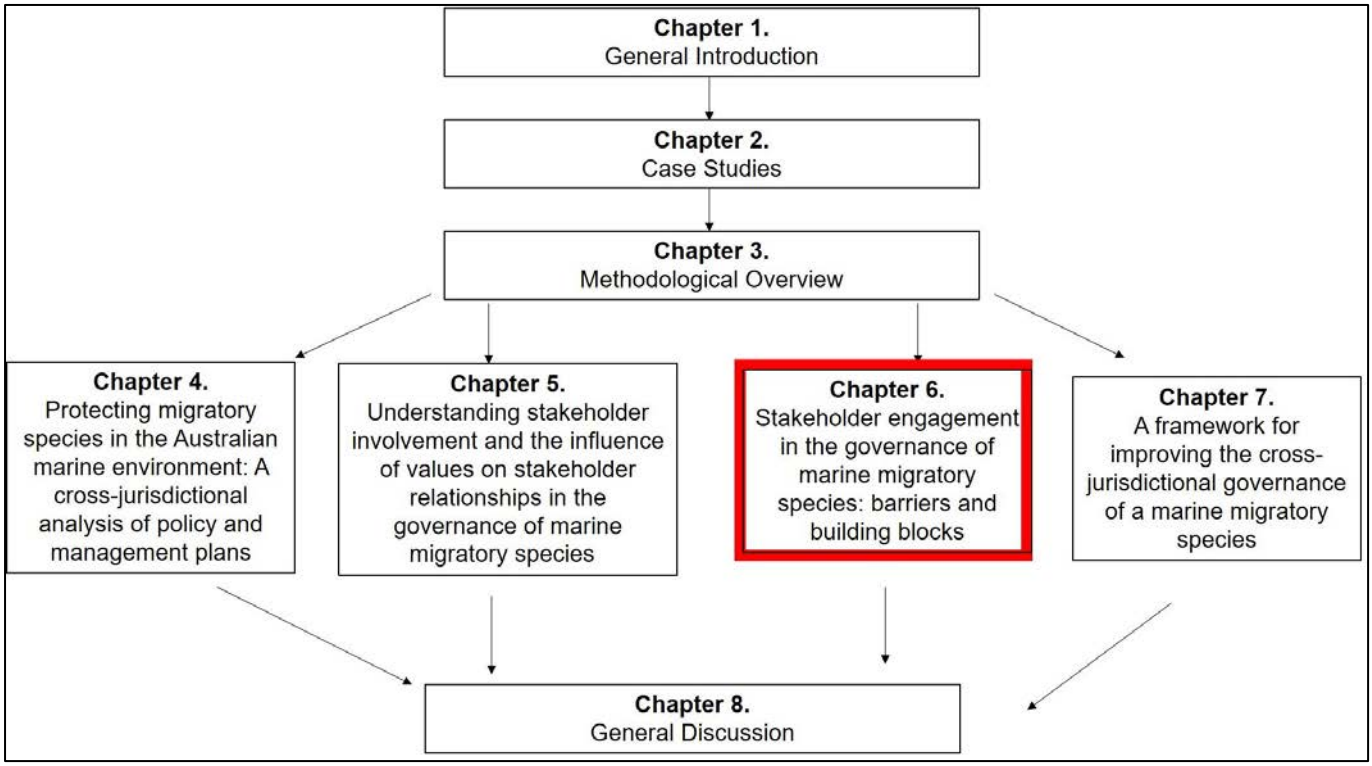
5.6 Summary

- In this chapter, I used the results of a document analysis, plus qualitative, semi-structured interviews and a focus group, to: 1) identify the actors involved in the governance system, 2) identify the values held by these different actors, and 3) explore how these values influence relationships between actors involved in the governance regime protecting marine migratory species in eastern Australia.
- My data indicate that the governance of marine migratory species is highly centralised, and features three key actors (the Great Barrier Reef Marine Park Authority, the Department of the Environment and Energy, and independent researchers).
- The ecological value of marine migratory species was the dominant value of actors within the network, highlighting a shared value that can promote cross-scale collaboration within the system and harmonise decision-making.
- This chapter contributes to a better understanding of the stakeholders involved in the governance of threats to marine migratory species in Australia, including the role that values play in promoting cross-scale collaborations. This chapter also provides a new means of examining relationships within a governance network by exploring how values can link different actors.
- In the following chapter, I identify some of the barriers to, and opportunities for, engaging stakeholders in governing threats to marine migratory species, which may further assist in harmonising decision-making throughout the range of these species.

Chapter 6

Stakeholder engagement in the governance of marine migratory species: barriers and building blocks

In this chapter, I explore the barriers to, and opportunities for, stakeholder involvement in the governance of threats to marine migratory species in eastern Australia, using semi-structured, qualitative interviews and a focus group (described in Chapter 3). I compared the results from my interviews and the focus group against the principles of good environmental governance. I conclude Chapter 6 by discussing how changes to the governance system protecting marine migratory species in eastern Australia may help harmonise the process of managing these species and lead to a more effective and efficient governance system.



Manuscript associated with this chapter:
Miller, R.L., Marsh, H., Benham, C., & Hamann, M. (Under review) Stakeholder engagement in the governance of marine migratory species: barriers and building blocks. *Endangered Species Research*

6. Stakeholder engagement in the governance of marine migratory species: barriers and building blocks

6.1 Introduction

Anthropogenic pressures are negatively impacting ecosystems worldwide, highlighting the importance of involving stakeholders to address complex, socio-ecological problems and achieve robust and effective environmental governance (Chapter 1, Section 1.6; Leenhardt et al. 2015; Mace 2014). One component of effective environmental governance involves identifying stakeholders who are affected by decision-making, and involving them in the decision-making process (e.g. Chapter 1, Section 1.6; Graham et al. 2003; Reed et al. 2009). Identifying and engaging stakeholders with diverse interests from across governance levels (e.g. from local, state, national jurisdictions) may help natural resource managers to: 1) better identify all stakeholders affected by a specific governance issue, 2) reduce bias in decision-making, and 3) capture diverse values and management concerns to develop appropriate governance interventions (Chapter 5; Benham 2017; Dietz et al. 2003; Folke et al. 2005; Luyet et al. 2012). Because all stakeholders do not hold the same set of values and viewpoints (Chapter 5), engaging stakeholders to capture their different perspectives, and understand their values, can assist decision-makers to make socially equitable and biologically appropriate decisions to appropriately address threats to a natural resource (Chapter 5; Charnley et al. 2017; Gould et al. 2017; Graham et al. 2003).

Effective environmental governance is often underpinned by a polycentric governance system (Chapter 1, Section 1.3; Graham et al. 2003; Lockwood et al. 2010). Such systems are considered superior to monocentric governance systems in addressing large-scale environmental management issues because a single government agency is unlikely to have the knowledge or capacity to address large-scale, complex environmental problems (Chapter 1, Section 1.3; Biggs et al. 2012; Lockwood et al. 2010; Morrison 2017). Because polycentric systems involve multiple governance bodies, these systems also involve networks of diverse stakeholder agencies that can serve as vertical (between governance levels) and horizontal (same level of governance) links across jurisdictions (Chapter 5; Olsson et al. 2007; Carlsson and Sandstrom 2008; Termeer et al. 2010). Cross-scale links across governance levels can promote collaboration within the governance system, particularly where formal connections (e.g. legislation) between jurisdictions are weak (Chapter 4).

In this chapter, I emphasise collaborations because collaborations are a means of active stakeholder participation and can be effective at addressing policy issues (Arnstein 1969; Chapter 1, Section 1.6). Collaborations can take place between various combinations of jurisdictions and stakeholder agencies at different levels (e.g. Chapter 1, Section 1.6; Margerum 2008; Ostrom 1986). At the policy level, collaborative efforts are often high-level and focused on legislation (e.g. local, state, or federal), policies, and rules that eventually influence the lower-level actions that are implemented (Margerum 2008). At lower governance levels, such as in local government areas with small human populations, collaboration is often focused on implementing action and conservation initiatives (Margerum 2008; Ostrom 1986). Effective governance relies on collaboration between multiple stakeholders from across governance levels to address power imbalances and achieve the desired outcomes (e.g. Graham et al. 2003; Lockwood et al. 2010). Cross-scale collaborations also foster innovation and the adaptation of management strategies in collaborative and adaptive governance regimes, consequently improving the effectiveness of governance interventions (e.g. Chapter 1, Section 1.2; Barrios-Garrido et al. 2019; Graham et al. 2003). Cross-scale collaborations enable meaningful engagement of multiple stakeholder agencies and have the potential to harmonise the management of marine migratory species (e.g. Lascelles et al. 2014; Nevins et al. 2009; Riskas et al. 2016), particularly in very large marine jurisdictions, such as in Australia.

Australia's marine jurisdiction is managed by eight state/territory governments (up to 3 nautical miles offshore), plus the federal governments (from 3 nautical miles to the edge of Australia's Exclusive Economic Zone; see Chapter 2, Section 2.2 in this thesis; Geoscience Australia: Maritime Boundary Definitions; Geoscience Australia: The Law of the Sea). Cross-jurisdictional collaboration (within Australia) is required to manage threats to marine migratory species that migrate across jurisdictional boundaries and are affected by cumulative anthropogenic threats in different jurisdictions (e.g. Chapters 4 and 5; Gallo-Cajiao et al. 2019; Lascelles et al. 2014; Meek et al. 2011). Good participatory collaboration involves numerous challenges (e.g. Healy et al. 2012; Mostert et al. 2007; Schuett et al. 2001), some of which I explore in this chapter.

6.1.1 Purpose of this chapter

There are several frameworks that discuss the principles of inclusive, robust, and effective environmental governance (Table 6.1; e.g. Bennett and Satterfield 2018; Graham et al. 2003; Lockwood et al. 2010). To date, there has been minimal exploration of the governance system protecting marine migratory species in Australia (e.g. Weiss 2011; Weiss et al. 2012). In this chapter, I aim to identify the barriers to, and opportunities for, involving different stakeholder agencies, particularly non-government stakeholder agencies (e.g. industry representatives, independent researchers), in the governance of threats to marine migratory species in eastern Australia. Because stakeholder involvement is a key component of effective, adaptive, and collaborative governance (see Chapter 1, Section 1.2; Hockings et al. 2006; Jones 2005, 2009), identifying and understanding these barriers and opportunities has the potential to improve the overall governance of threats to these species.

6.2 Methods

As explained in Chapter 3, I conducted semi-structured, qualitative interviews (e.g. Rose 1994; Whiting 2008) and a focus group (e.g. Kitzinger 1994; Patton 1990) with stakeholders involved in the governance of marine migratory species on the east coast of Australia (Table 3.2 in Chapter 3). I asked interview respondents and focus group participants the following questions to identify the barriers and opportunities that stakeholders experienced when participating in the governance of threats to marine migratory species:

> 1) What are some of the barriers to involving different levels of stakeholders (particularly non-government groups) in the policy and management of marine migratory taxa?
> 2) What are some of the opportunities or potential solutions to the barriers you mentioned (more specific during the focus group) that would lead to more involvement of different types of stakeholders in the policy and management of marine migratory taxa

Please see Chapter 3, Sections 3.3 and 3.4 for more details on how I conducted and analysed the interviews and the focus group.

In this chapter, I coded all data into categories and grouped these different categories into themes related to different barriers and opportunities. I also assessed the concepts and themes that emerged from my data against the principles of effective natural resource governance (Table 6.1; e.g. Bennett and Satterfield 2018; Graham et al. 2003; Lockwood et al. 2010). I completed this assessment by assessing different examples from my data against the definitions of the principles of good governance.

Table 6.1. The principles of good environmental governance (adapted from Bennett and Satterfield 2018; Graham et al. 2003; Lockwood et al. 2010).

Principle of good governance
Legitimacy – 1) the validity of an institution's authority for governing; 2) devolving the governance system to the lowest level (that is still effective); and 3) the integrity of an authority's means of governing
Transparency – 1) the clarity of decision-making processes to all other stakeholder agencies; and 2) the accessibility and availability of the information behind how and why a decision was made
Accountability – 1) the delegation of and responsibility for decisions and the results of those decisions; and 2) transparency regarding if and how responsibilities have been met
Inclusiveness – clearly outlined opportunities for all stakeholders to participate in decision-making processes and the implementation of governance interventions
Fairness – 1) the attention given to diverse stakeholder views; 2) decisions are equitable; and 3) bias in decision-making is limited or eliminated
Integration – 1) decisions are coordinated within, between, and across governance levels (e.g. at the same governance level; between governance levels); and 2) harmonisation of priorities, plans, and governance interventions across governance scales
Capability – the ability of stakeholder agencies to deliver their responsibilities (e.g. adequate timelines, funding, and staff levels)
Adaptability – 1) the incorporation of new information and knowledge into governance interventions; 2) the ability to anticipate and be responsive to emerging threats and opportunities; and 3) the ability to evaluate and adjust the performance of all stakeholder agencies within the governance system

6.2.1 Case Studies

I focused on Australian stakeholder agencies (national and from the east coast of Australia) involved in the governance of marine turtles, dugongs, humpback whales, and 27 species of non-threatened migratory shorebirds protected under the *Wildlife Conservation Plan for Migratory Shorebirds 2015* (described in Chapter 2). I chose these species as case studies because they are all Matters of National Environmental Significance (MNES; Table 6.2), move across multiple jurisdictions, and are charismatic, increasing the likelihood that a diverse range of stakeholders will be concerned about their conservation (Chapter 2).

Table 6.2 The criteria that each case study meets to be listed as a Matter of National Environmental Significance (MNES) under the *EPBC Act 1999*. In total, there are nine MNES categories under the *EPBC Act 1999* (see Chapter 2 for all nine criteria).

Case Study	**MNES listing under *EPBC Act 1999***
Marine turtles	Marine, migratory, threatened (category is species dependent)[1]
Dugongs	Marine, migratory
Humpback whales	Migratory, cetacean, vulnerable[1]
Non-threatened migratory shorebirds	Marine (some species), migratory

[1]A threatened species may be listed as 'critically endangered', 'endangered', or 'vulnerable' under the *EPBC Act 1999*.

6.2.2 Limitations

I did not receive responses from some stakeholder agencies that may be involved in governing threats to marine migratory species. These stakeholder agencies included some government agencies (e.g. fisheries departments), some industry groups (e.g. commercial fishers), state-wide NGOs, and some Traditional Owner groups. Effective stakeholder engagement often requires good rapport and long-term relationships with stakeholders, factors which I could not achieve with some stakeholder agencies in the timeframe of my PhD. Additionally, the Indigenous representatives I interviewed had vast experience across natural resource policy and management and spoke to me as individuals rather than as Traditional Owners representing their people, an organisation, and/or sea country. Future research should focus on better capturing the viewpoints of these stakeholder agencies where possible.

6.3 Results

I identified several barriers to, and opportunities for, improving the governance of marine turtles, dugongs, humpback whales, and non-threatened migratory shorebirds in eastern Australia (Table 6.3; Figure 6.1). These barriers and opportunities fell under four main themes, discussed below: 1) decision-making processes, 2) information sharing processes, 3) institutional structures, and 4) participatory processes (Table 6.3; Figure 6.1).

Table 6.3. The barriers to stakeholder involvement in the good governance of threats to marine turtles, dugongs, humpback whales, and migratory shorebirds on the east coast of Australia. These barriers are non-exhaustive, but are representative of multiple responses from participants of the qualitative, semi-structured interviews and the focus group. Shaded boxes indicate how a particular barrier influences a principle of good environmental governance. The opportunities discussed in this chapter arise from reforms to reduce these barriers.

Principle of good governance	**Barrier**			
	Decision-making processes	Information sharing processes	Institutional Structures	Participatory processes
Legitimacy				
Transparency				
Accountability				
Inclusiveness				
Fairness				
Integration				
Capability				
Adaptability				

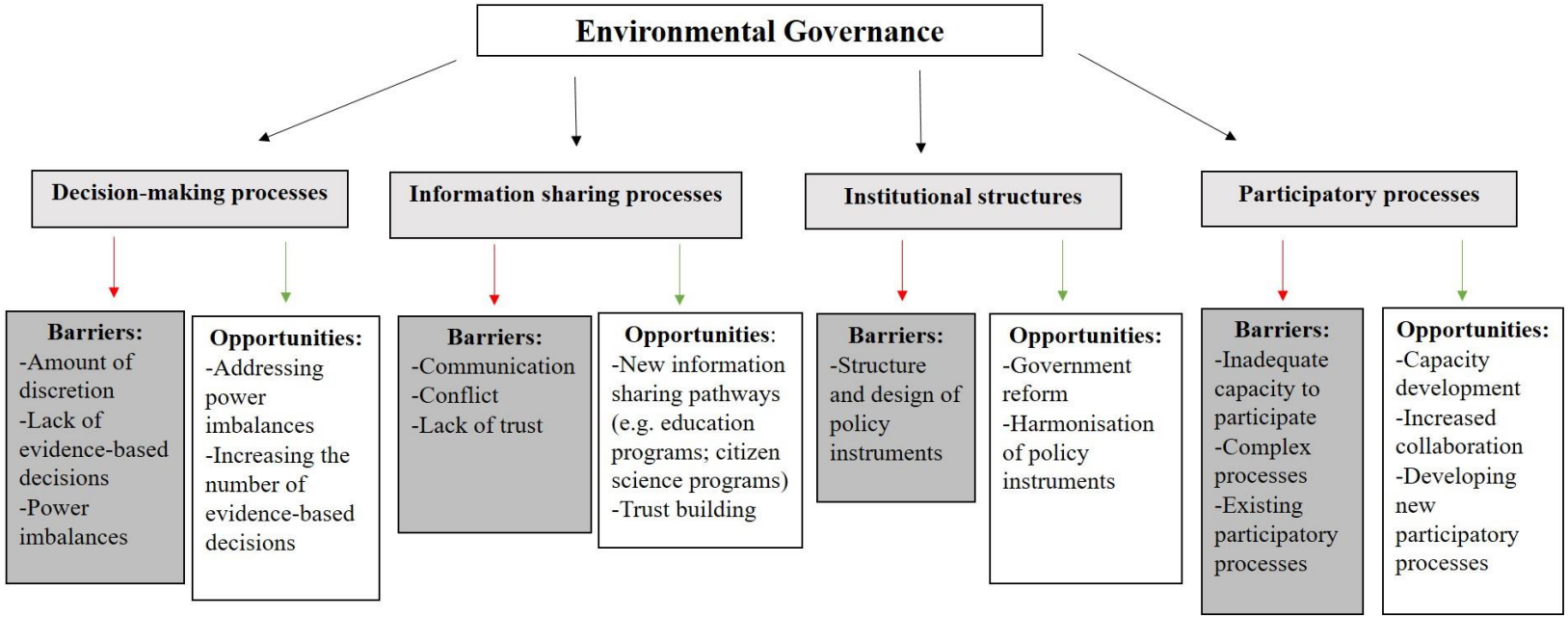


Figure 6.1. The key themes that emerged from the responses of participants in the semi-structured interviews and the focus group. Dark grey boxes represent barriers to the corresponding theme, while white boxes represent opportunities for improving stakeholder involvement in the governance of threats towards marine migratory species. All barriers and opportunities represent responses from multiple participants.

6.3.1. Decision-making processes

Respondents identified several barriers to, and opportunities for improving, the decision-making processes that affect and influence stakeholder involvement in the governance of threats to marine migratory species in eastern Australia. This theme encompasses characteristics that describe decision-making within the governance regime, including power distribution and the ability to make evidence-based decisions within the system. Respondents identified the amount of discretion available to decision-makers, a lack of evidence-based decisions, and power imbalances as key barriers to the legitimacy and accountability of this governance system.

A Commonwealth Government respondent suggested that the highly centralised nature of decision-making was a barrier to the legitimacy and accountability of the governance system, saying:

> *The barriers might be something as simple as political interests* [in that] *the government (...) might want to go in a particular direction with regard to the management of a particular species (...) that might be different from a group (...) that has a particular view. One of the things that people have to fundamentally understand about working with a government organisation is that you are there to do the business of the government of the day*

This response indicates that decision-making is likely to be directed by the agenda of the government in power (e.g. a conservative government is likely to have different approaches to environmental management than a progressive government).

An extension of the centralised approach to decision-making and another barrier to the legitimacy of the governance system protecting marine migratory species in eastern Australia is the amount of discretion available to decision-makers. A respondent from an environmental non-government organisation suggested that decision-makers have a high amount of discretion when making decisions, stating "(…) [decision-making is] so subject to the vagaries of who is currently in power that (…) [though] the intent of the legislation is great, the interpretation of the legislation is entirely flexible." A respondent from a state government agency expanded on this discretion in the context of evidence-based decisions

(or the lack thereof) and the effect these decisions have on the legitimacy and accountability of the governance system, as well as the differing values within the governance system (e.g. Chapter 5 in this thesis):

> *We have a stretch of coast where horse trainers like to train their horses. That really angered local conservations and there (is) a massive conflict there* [between horse trainers and conservationists]. *(…) The draft plan came out with a recommendation to continue to allow that* [horse training]*, which, (…) all the evidence suggests that it (is) not good for* [nesting shorebirds]. *(…) That (is) a really good example of where we (…) despite the evidence, don't make the right decisions*.

Some respondents (n=8) suggested that the following changes could increase accountability and the legitimacy of decision-making: 1) reduce the discretion of decision-makers, 2) involve decision-makers in the research process, and 3) include lower-level governance bodies in decision-making (Section 6.3.4).

6.3.2. Information sharing processes

Several respondents (n=14) cited information sharing processes as a barrier to the transparency, accountability, and adaptability of the governance system mitigating threats towards marine migratory species (Table 6.3). Information sharing processes include existing pathways of information sharing and communication between stakeholder agencies within the governance regime (e.g. the communication of research; communication of decisions; trust). Some respondents (n=3) suggested that different timelines and cultures hinder information sharing between researchers and decision-makers, saying, "decision makers, when they need evidence, they need it [now] and scientists might not be willing to share it until it (…) [has] gone through peer review" (independent researcher). Another respondent stated that information flow can limit a decision-maker's ability to make appropriate decisions, stating, "(…) often the right people do [not] have the information they need to have to apply the rules (…) to a particular decision" (independent researcher).

A respondent from the focus group expanded on this barrier to information flow between scientists and decision-makers, saying "there [can be] an attitude amongst academics that once they (have) published, it (is) (…) the policy officer's responsibility to know about it."

Further, "[policy officers and scientists] do [not] speak the same language. Scientists [often] can [not] speak to policy officers and policy officers can [not] speak to a scientist" (focus group participant). Another respondent suggested that language barriers can limit the integration of information into policy documents, saying "a lot of the policy people [do not] necessarily have a fantastic understanding of some of the science in this area and so they [are] trying to translate what they hear, see, and read through a fairly limited [scientific] understanding into policy documents" (NGO respondent).

This barrier is not limited to information sharing between researchers and government officials. A state government respondent stated, "if you do [not] work for government, you [can] view government with disdain and suspicion," indicating that a lack of communication can lead to misunderstandings and mistrust between government and non-government stakeholder agencies (see also Chapter 5).

In order to address some of the information sharing barriers and to improve the transparency, accountability, and adaptability of the governance system, a respondent suggested that better engagement with researchers and other lower-level governance bodies could be a solution. An independent researcher discussed having a relationship with decision-makers, saying:

> *Our model is to try and work with people who are making decisions and making policies around migratory species management. So, what we try to do and what we have done over the years is form good relationships with people charged with managing these species to try and understand the kinds of questions that they (are) struggling with and want answers to and to understand what pieces of scientific information they would find most helpful*

A Commonwealth Government respondent suggested developing a model for marine migratory species that is similar to the Cooperative Research Centres (CRCs) that existed for the Great Barrier Reef would be beneficial, saying:

> *The model I saw that worked best was when there were the CRCs for the Reef. You actually had end-user task associates linked up with the scientists. And so, you actually had the two-way information flow. The scientists understood what*

management did and managers understood the limitations of trying to get that information

A respondent from an NGO suggested that "(…) the government needs to work harder and invest much more in engaging communities at the more local level" to improve communication between the government and lower-level, non-government stakeholder agencies. Another respondent suggested that communicating the results of decisions and how feedback is used in decision-making can help build trust and transparency, saying, "feedback [from decision-makers], having that circular approach where stakeholders [who have been] engaged and giving their opinions, to know where those efforts have been actioned [to make a decision]" (local government respondent). Another respondent suggested that using information to identify how protecting a migratory species will directly affect a stakeholder's "enjoyment of a place or space, or [how] it (is) going to affect their economic prosperity or their aesthetic enjoyment" (NGO respondent) is also an important way to build trust and share information between decision-makers and non-government stakeholder agencies.

Better use of technology can also improve information sharing. A state government respondent suggested that "very simple things like a Facebook page would be great" to coordinate information sharing, while an industry respondent discussed collating information in a central location, such as a central data repository, could bring together the work of "(…) multiple people working on research [of a particular species or issue]."

6.3.3. Institutional structures

Institutional structures (e.g. legislation and other policy documents (e.g. management plans)/ policy processes that support governance and decision-making within the governance regime) within the governance regime were viewed by various stakeholder agencies as an impediment to stakeholder involvement in the governance of marine migratory species (Table 6.3). Several of the respondents (n=8) cited the *Environment Protection and Biodiversity Conservation Act 1999* and other environmental legislation protecting marine migratory species as a barrier to the legitimacy, fairness, integration of decisions across multiple governance levels, and the adaptability of the governance regime mitigating threats to these species in eastern Australia. A state government official argued that existing legislation and policy instruments are not designed to adapt with a changing environment, saying:

> *(…) I (am) constantly arguing that 'no, we can (not) look at where that species been, we need to predict where it (is) going to be' and create pathways for* [those changes]. *It fields up with climate change and population recovery that habitat that we (…) have never considered to be useful for that species is changing before our eyes. And we (are) just not being flexible enough to allow that to happen*

Other respondents expressed concern about the limited ability to integrate decisions across a large scale, primarily in regards to the inability to assess cumulative impacts. One respondent said:

> *A shortcoming of the legislation as I see it is we protect big sites but not little sites. (…) If* [there are] *hundreds of farms and pastoral leases around Australia and damage to every wetland in every property is happening, it can have very substantial effects on shorebirds* (NGO respondent)

Additionally, several respondents (n=10) expressed concern that legislation between jurisdictions is not harmonised to protect marine migratory species across their range (see also Chapter 4). A respondent from a state government agency compared this situation to the Common Assessment Method (CAM), which is used to harmonise threatened species listing at state and Commonwealth levels:

> *(…) The CAM (has) been quite interesting because it (has) forced us in a way to consider that. But, (…) the legislation is only one element. In terms of policymaking, there has (not) been (…) a very strong driver to bring states together to come up with some kind of consistent approach to the conservation of migratory species*.

An independent researcher expanded on the lack of harmonisation between jurisdictions, saying, "we (…) have these multiple layers of government [that] drive both inefficiencies, but also inconsistencies in policies, which will forever cause issues."

Other respondents described an unofficial hierarchy of species prioritisation under the *EPBC Act 1999.* A state government respondent described the hierarchy in terms of approvals for actions that may have a significant impact on a Matter of National Environmental Significance, saying "there are lots of [listed] migratory species (…) and that [listing as a

migratory species] has less weight [than threatened species listing], generally, whether it (is) formally or informally in decisions." This point was further illustrated by a respondent from the focus group, who stated:

> *A particular project can have multiple triggers. There could be a critically endangered bird and a migratory dolphin could trigger. They (are) not any less important, but that said, usually the critically endangered species will attract more attention during the assessment*.

Several respondents (n=5) also cited the mandatory consultation period under the *EPBC Act 1999* as a barrier to involving non-government stakeholders in the governance of threats to marine migratory species. One respondent said, "public consultation is used (…) as a 'tick the box' exercise in 99% of cases [because consultation is mandatory]. (…) So, generally, (…) [bureaucracy] treats it (consultation) as a procedural exercise" (NGO respondent).

Several respondents (n=9) suggested reforms to the governance system to improve the legitimacy, fairness, integration, and adaptability of the governance regime mitigating threats to marine migratory species in eastern Australia. Some reforms included complete government overhauls, with respondents from non-government organisations stating, "we need a reset on environment policy and a new political will, much more resources going to the environment, and we need new laws."

A state government respondent also discussed a government overhaul that would harmonise legislation across jurisdictions, saying "I think [a solution] would be pulling away state legislation, [and] making them [the states] come into line with Commonwealth legislation." Another respondent expressed the need for flexibility to govern threats to marine migratory species, saying, "(…) [have] a continuous improvement process (…) [to] get new information to refine the [decision-making] process" (industry respondent). Further, some respondents (n=8) suggested revising the *EPBC Act 1999* and other environmental legislation to "(…) have (…) joint state-interstate policy, that would [address] cumulative impacts and collaborative governance up and down the states", harmonising legislation and addressing the threats that marine migratory species may face across their range.

6.3.4. Participatory Processes

Several respondents (n=26) cited participatory processes within the governance regime as a barrier to the legitimacy, transparency, inclusiveness, fairness, integration, and capability of the governance regime mitigating threats to marine migratory species (Table 4). This theme describes the existing means for which government and non-government stakeholders can participate in developing and implementing governance interventions (e.g. the capacity and the complexity of allowing stakeholder agencies to participate in governance). For example, respondents identified capacity (e.g. appropriate timelines; adequate resources) as a barrier to stakeholder involvement in the governance of marine migratory species in Australia (Figure 1), with one respondent saying:

> (…) *There are capacity inequities. The capacity of Traditional Owners, for example, to be genuinely co-managing turtle/dugongs with societal government is actually extremely poor. That (is) an example where you would say they are connected and participants in that governance system, and resource users, but their capacity to be in a genuine co-management framing is quite low* (independent researcher)

An independent researcher stated "(…) I think that the Commonwealth departments actually do try very hard to do [consultation with stakeholders], but I (am) not sure the resources provided are sufficient to allow that to happen properly." Respondents from the focus group explained "our ability to actually talk to everyone is completely hamstrung by our resourcing to do so. We by no means came even close to talking to everyone who was relevant in an effective way." Insufficient resources may be particularly limiting when engaging Indigenous stakeholders who live in remote areas across Australia.

A respondent from an environmental non-government organisation further emphasised the capacity barrier for non-government groups, particularly for the general public, saying:

> *We* [are] *a professional conservation organisation, so it (is) our job to engage with these processes, but we are very small and there (are) only so many submissions that we can do in a year. (…) If we* [are] *struggling as a professional conservation organisation, the general public and people who are local to developments (…) you can imagine that their capacity would be really difficult to try and do their full-time job with a couple of kids and fight the development down the road at the same time.*

Several respondents (n=8) identified the complexity (e.g. technical language) of participatory processes as another barrier, primarily to the involvement of non-government stakeholders in the governance of marine migratory species (Figure 1). Stakeholder agencies who may not be professionally involved in the governance of marine migratory species may struggle, because these groups "(…) [often] do [not] understand the subtleties of different elements to engage in outside the policy process that still influences the policy process" (independent researcher). A state government respondent also said:

> *I think that we (are) increasingly moving into a space where it (is) difficult for those groups with less capability and capacity to have an informed view on policy development. (...) Every document you read gets bigger and more complicated and it (is) just getting harder.*

To assist stakeholders with overcoming the barriers of effectively participating in the governance of threats to marine migratory species, several respondents emphasised the importance of education. One respondent said:

> *It* [is] *about giving them* [non-government stakeholders] *the education and training to understand where the actual influence points are. (...) Finding a local policy officer at a lower level, they (are) the ones running the briefs going up the line, so influencing them is going to have far more impact* (independent researcher)

An industry respondent suggested that access to material in Australia to be able to make informed responses is limited and could be a means to improve the participatory processes of the governance regime, saying "(…) I think creating material in an accessible way is a barrier. [Currently] it is very scientific, it (is) very dense with information, [and] people do [not] understand it."

Some respondents (n=2) suggested increasing the use of technology could improve cross-jurisdictional collaboration and reduce the resources needed to collect and integrate diverse viewpoints. One example of using technology to connect stakeholder agencies could be through using online-based video communications (e.g. Skype or Zoom).

6.4 Discussion

In this chapter, I identified several barriers to, and opportunities for improving, the effective governance of threats to marine migratory species in eastern Australia, many of which affect stakeholder participation in the governance system (Table 6.3; Figure 6.1). Respondents emphasised the need for reforming decision-making processes, improving information sharing, reforming institutional structures, and developing more transparent and simpler participatory pathways as a means of improving the overall governance of marine turtles, dugongs, humpback whales, and non-threatened migratory shorebirds in eastern Australia. Because several of these barriers and opportunities are interrelated, addressing them has the potential to increase the efficiency of managing threats to marine migratory species more generally in Australia. Additionally, some of these barriers and opportunities apply to environmental governance more broadly (e.g. capacity; integration; participatory barriers).

6.4.1 Decision-making processes

Like many other multi-level, polycentric governance systems, Australia has a primarily centralised government and the Commonwealth Department of the Environment and Energy is ultimately the final decision maker for environmental issues affecting Matters of National Environmental Significance (Garmestani and Benson 2013; Margerum 2008). The current Australian Government believes in a 'lean government' and minimal interference of the government in private affairs (The Liberal Party of Australia: Our Beliefs). This philosophy influences the decisions of the current Commonwealth Minister for the Environment. In addition, other interests in public policy (e.g. business and economic interests) tend to outcompete environmental interests (Tear et al. 2005). The imperative to manage migratory species that are not threatened results from Australia being a signatory to relevant international agreements (Chapter 1, Section 1.4; Chapter 2, Section 2.1; Hawke 2009). Thus, individual states and territories within Australia do not have the legislative power to list non-threatened migratory species, limiting the Commonwealth's ability to devolve decision-making and potentially inhibiting co-management of marine migratory species in eastern Australia.

Co-management of natural resources is defined as a partnership between governing bodies and local resource users, and is a type of decentralised governance that can be used to address

the shortcomings associated with top-down natural resource management (e.g. Berkes 2009; Nursey-Bray and Rist 2009; Marin and Berkes 2010). For marine migratory species, the most advanced example of decentralised governance primarily occurs through the development of co-management agreements, called Traditional Use of Marine Resources Agreements (TUMRAs), between the Great Barrier Reef Marine Park Authority (GBRMPA) and Traditional Owner groups throughout Northern Australia (see Chapter 2; Section 2.2.2.1). Such co-management has developed because of the Native Title rights of Traditional Owners (e.g. *Native Title Act 1993*). However, though the development of TUMRAs show that a government agency may be willing to address power imbalances in decision-making, the government may still maintain the final power to choose the knowledge that is incorporated into decisions (Zurba 2009).

Policymakers must make decisions that reflect the best interest of their organisation (e.g. the government of the day in Australia) and that are based on appropriate evidence (Vilkins and Grant 2017). Much of the evidence incorporated into decisions is based on 'internal information' that comes from colleagues within the department or from other state and Commonwealth Government agencies (Head et al. 2014). However, solely relying on intra- and interdepartmental information to make a decision undermines the legitimacy of the governance regime, as there may be limited means of determining the validity of a decision and there are power imbalances in this approach (Head et al. 2014). Therefore, as discussed by some respondents, scientific research is also important to decision-makers for making evidence-based decisions, potentially improving the legitimacy and accountability of the decision-making processes within the governance regime (see Section 6.3.2; Head et al. 2014; Vilkins and Grant 2017).

Western scientific knowledge is often viewed as being more credible than any other source of knowledge, including traditional ecological knowledge (Young 2006; Pohl 2008; Koetz et al. 2012). An example of this bias towards western scientific evidence may be reflected in some of the TUMRAs that involve a complete moratorium on dugong and/or turtle hunting (Zurba 2009). This moratorium is often based on western scientific knowledge that identified declining population numbers of those species prior to the initial development of the TUMRA (some of which may have begun to recover), potentially indicating that the need to protect declining populations of species (and thus, scientific knowledge) outweighs the traditional knowledge and local needs of Traditional Owners to hunt and share their culture

between generations (e.g. *Girrigun* TUMRA; Zurba 2009). The Great Barrier Reef Marine Park Authority (GBRMPA) is charged with protecting marine turtles, dugongs, humpback whales, and migratory shorebirds that visit the Great Barrier Reef, particularly because the presence of these species constitutes 'Outstanding Universal Values' under the World Heritage Listing of the Great Barrier Reef Marine Park (Chapters 2 and 4; GBRMPA 2011). Thus, it is likely that the Great Barrier Reef Marine Park Authority will base decisions on evidence that may help promote the recovery of a species in decline and meet the Authority's requirements to protect the World Heritage values. However, in order for policymakers to make biologically and socially appropriate decisions, information and differing worldviews must be easily accessible to policymakers and there should be clear, two-way communication between all stakeholder agencies within the governance system protecting marine migratory species in eastern Australia when developing future policies and management plans.

6.4.2. Information sharing processes

Collaborations involving multiple stakeholder agencies are a key component of effective, adaptive, and collaborative governance because no single governance body is likely to have sufficient knowledge and information to manage marine migratory species (Emerson et al. 2012; Hockings et al. 2006; Jones 2005, 2009; Weiss 2011). Stakeholder agencies involved in natural resource governance in Australia have previously asked for better access to environmental data and information to encourage the Commonwealth environment department to be more transparent (Hawke 2009). My results indicate that developing and implementing clear communication pathways can promote the development of future collaborations between different stakeholder agencies, potentially reduce conflict, and increase the transparency, accountability, and adaptability of the overall governance regime (Chapters 5 and 7; Weiss 2011).

Improving the information sharing system could be one solution for achieving transparency within the governance system. Any information sharing system should have a two-way flow of information (e.g. government sharing information with other stakeholder agencies and vice versa; Arnstein 1969). The Cooperative Research Centre for the Great Barrier Reef (CRC Reef) was an example of an effective information sharing system that promoted collaboration between stakeholders across governance levels and produced policy-relevant research (Woodley et al. 2006). The Species Profile and Threats Database (SPRAT) is a tool provided

by the Commonwealth Department of the Environment and Energy that outlines species' life histories, threats to species, and species conservation status. However, these profiles do not provide insight into specific actions or activities being undertaken by stakeholder agencies throughout the range of the species (e.g. "who is doing what"; Chapter 7). Further, the Commonwealth Government compiles the information available in SPRAT profiles and there is no link for other stakeholder agencies to upload information.

Introducing an information-sharing database, where industry, government agencies, and academics can upload datasets, research outputs, and summaries would be beneficial to the governance of marine migratory species in a large marine jurisdiction. Having a data and information repository that is easily accessible for all stakeholder agencies involved in the governance of marine migratory species could also address the 'silo effect' and the fragmentation occurring within the governance regime surrounding marine migratory species in eastern Australia (Hawke 2009). Opening up avenues to improve future information sharing and communication could: 1) promote collaboration between jurisdictions, 2) produce decisions that are biologically and socially appropriate, and 3) aid in educating non-government stakeholder agencies in policy and protocol to help them better navigate complex governance processes (Chapters 5 – 7; Hays et al. 2019; Pietri et al. 2015).

6.4.3 Institutional structures

Australia has been viewed internationally as being a key player in environmental governance (Bührs and Christoff 2006). However, several of my respondents cited Australia's current government system (nationally) as a barrier to the appropriate governance of marine migratory species. Some respondents suggested that the Australian Government's Department of the Environment and Energy prioritises environmental issues under a hierarchy based on threatened species listing rather than any other MNES (Table 2.1 in Chapter 2). Threatened species listing drives the development of management tools (e.g. recovery plans and conservation advices) for natural resource governance in Australia (Chapter 2, Section 2.1; Hawke 2009; McDonald et al. 2015; Walsh et al. 2012). Therefore, a threatened species with a small range may receive more government conservation support than a threatened or non-threatened migratory species because management of the latter is much more complicated and requires more resources. Additionally, there may be other species or situations with more urgent need for conservation interventions (e.g. the

2018/2019 fish kills in the Murray Darling River basin; Murray-Darling Basin Authority 2019) than migratory species. Australia already underfunds biodiversity conservation compared with other developed countries (Waldron et al. 2013; Waldron et al. 2017; Threatened Species Scientific Committee 2018) and it is unlikely that environmental decision making will be prioritised over other areas of public policy in the foreseeable future (Tear et al. 2005).

This lack of funding is not unique to managing the marine migratory species in eastern Australia considered in this thesis. It applies across biodiversity issues in the nation, and affects the types of tools developed to protect these species (e.g. Chapter 7; Waldron et al. 2013). Species listed as nationally threatened under the *EPBC Act 1999* are entitled to protection under a recovery plan. Recovery plans take priority over Wildlife Conservation Plans (developed for non-threatened species) under the hierarchy described by several of my respondents. However, many recovery plans developed after the enactment of the *EPBC Act 1999* are due to expire in the next few years and the resources to remake this plans are not currently available. Most plans are being replaced with Conservation Advices (e.g. Conservation Advice: *Megaptera novaeangliae*; *EPBC Act 1999*; Threatened Species Scientific Committee 2018). Conservation Advices are less resource-intensive to develop (and involve much less consultation). They are also less binding on the Minister than recovery plans (Chapter 4; *EPBC Act 1999;* Threatened Species Scientific Committee 2018). Further, once a recovery plan (or a Conservation Advice) is developed, there is no obligation for any government body (e.g. Commonwealth or state) to fund their implementation (Chapter 7; *EPBC Act 1999*). Thus, most recovery plans are not appropriately implemented due to insufficient resources (Humane Society International 2018). To address these shortcomings, several respondents suggested that Australia's current system of government needs to be reformed to improve the effective governance of threats to MNES.

Suggestions of governmental reform are not new and have been gaining momentum in recent years. In 2018, the Parliament of Australia requested submissions to the Senate's Environment and Communications References Committee Inquiry into Australia's Faunal Extinction Crisis (see https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/Faunalextinction/Submissions). The submissions of several stakeholder

agencies, including state agencies, Commonwealth committees, and non-government organisations, emphasised the need for reforming Australia's environmental policy (e.g. Humane Society International 2018; Queensland Conservation Council 2018; Threatened Species Scientific Committee 2018). Some stakeholder agencies have also conducted campaigns advocating stronger environmental laws e.g. BirdLife Australia's "Act for Birds" and the Places You Love Alliance. While not all of my case study species are listed as nationally threatened in Australia (e.g. dugongs and migratory shorebirds protected under the *Wildlife Conservation Plan for Migratory Shorebirds 2015*), each of these taxa would benefit from reformed environmental legislation, in view of the weaknesses in their protection resulting from the lack of policy coherence and highly centralised decision-making within the governance system (Chapters 4 and 5).

The *EPBC Act 1999* is required to undergo a statutory review in 2019 (Section 522A of the *EPBC Act 1999*). Resultant reform of the *EPBC Act 1999* provides an opportunity to improve the fairness, integration, and coherence of legislation protecting marine migratory species and other Matters of National Environmental Significance in Australia. My results suggest that one means of improving the fairness of the governance system and integrating diverse viewpoints from across jurisdictions could be through the revised *EPBC Act 1999* requiring the establishment of representative steering groups to advise on the development and implementation of each management plan (described in-depth in Chapter 7). Such groups could also help to harmonise future decision-making throughout the range of a migratory species and address fragmentation within the governance regime (Chapters 4, 5, and 7).

Another change to the *EPBC Act 1999* and environmental legislation in eastern Australia more broadly could be through 'outcomes-based' legislation rather than prescriptive legislation as at present. Outcomes-based legislation is thought to provide flexibility to decision-makers and practitioners on how they develop and implement decisions while emphasising the need for the decisions to lead to the statutory outcomes (Macintosh 2010). Several of my respondents viewed the discretion available to the Minister and other decision-makers as a barrier to good environmental governance. Thus, using flexible strategies to achieve specific environmental outcomes (agreed upon by the members of the steering groups described above; e.g. limiting the disturbance of critical habitats for nesting shorebirds) could be one means to address the discretion barrier and still achieve the desired environmental outcomes.

Some of my respondents suggested that a lack of harmonisation and integration of viewpoints (and stakeholder values) in environmental legislation also reflected a 'silo effect' between different jurisdictions charged with the governance of marine migratory species throughout their range. This 'silo effect' and lack of integration across governance scales is not limited to the governance of threats to marine migratory species, and occurs in ecosystem based management regimes (e.g. Evans and Klinger 2008; Alexander and Haward 2019) and occurs across governance scales (e.g. Chapter 5; Dale et al. 2013; Mostert et al. 2007). The 'silo effect' can reinforce fragmentation within a governance regime, limiting the types of knowledge used (and available) for decision-making (see Sections 6.4.1 and 6.4.2) and affect the overall integration of the governance system (Chapters 4 and 5; Dale et al. 2013; de Loë et al. 2009; Potts et al. 2016). Changes to legislation are likely to be incremental, as governmental reform is politically fraught (Garmestani and Benson 2013), so it is important to introduce ways to improve coherence within the governance system protecting marine migratory species in eastern Australia. My results identified better integration of lower level, non-government stakeholder agencies into governance processes and improved participatory pathways as one means to improve coherence (described in more detail in Section 6.4.4).

6.4.4 Participatory processes

The effective governance of threats to marine migratory species is collaborative and adaptive and benefits from the involvement of diverse stakeholder agencies (e.g. Chapter 1, Section 1.2; Dietz et al. 2003; Failing et al. 2013). However, several respondents identified the existing participation pathways within the governance system protecting marine migratory species in eastern Australia as a barrier to the participation of non-government stakeholders, indicating that the governance of threats towards these species may not be collaborative or effective. My findings support findings from studies on other large-scale environmental governance regimes, such as ecosystem based management (e.g. Evans and Klinger 2008; Alexander and Haward 2019).

My respondents indicated that resources are a limiting factor to stakeholder participation, which supports previous literature highlighting barriers to stakeholder engagement in environmental governance (e.g. Barrios-Garrido et al. 2019; Evans and Klinger 2008; Folke et al. 2005). One of the primary factors affecting the capacity of the Commonwealth

Department of the Environment and Energy is the cap on average staffing levels (ASLs) for Commonwealth agencies. In the 2015-2016 Budget, the Commonwealth Government capped the number of jobs available for Commonwealth Government employees (Australian public servants), under the ASL Cap, regardless of the actual staffing needs of specific Commonwealth agencies (Community & Public Sector Union 2018; Hamilton 2017). Thus, the Australian Government's Department of the Environment and Energy must focus on the core business of their department as dictated by the government in power (discussed in Section 6.4.1; Fraser et al. 2017) using the resources and personnel they already have.

A potential way to increase the resources available for mitigating threats to marine migratory species in eastern Australia, and thus, improve the future capacity and capability of the governance system, could be through increased use of bridging organisations (e.g. Chapter 5). Given the ASL Cap on internal appointments to departments of Commonwealth agencies, a bridging organisation could increase the available staff to work on an issue if grants or funding are channelled to these bridging organisations involved in mitigating threats towards marine migratory species (e.g. as the Great Barrier Reef Foundation does for the Great Barrier Reef Marine Park Authority). Evans and Klinger (2008) found that effective stakeholder engagement at a large scale (e.g. ecosystem based), must focus on addressing local threats (e.g. at the local government level) while also taking action to address scales at a larger level (e.g. regionally). For marine migratory species, using bridging organisations could then help lower-level governance bodies, who may not have the resources to effectively participate in the governance of marine migratory species, participate in future decision-making and management interventions, such as monitoring (e.g. Australian Research Council Linkage Grants; Gallo-Cajiao et al. 2019; Howes 2008).

Due to Australia's large size and small human population, a more coordinated monitoring approach may help with understanding the threats to and conditions of distinct populations of marine migratory species throughout their range (e.g. nesting turtles on beaches in Queensland; migratory shorebird populations in coastal wetlands in Victoria; Hansen et al. 2018; Hays et al. 2019; Wintle 2018) and link those sightings across jurisdictions. This is particularly important when managing marine migratory species, as some species, such as turtles nesting on local beaches, cross local, state, and Commonwealth boundaries with their movements (Weiss 2011). A coordinated monitoring system is being developed through the Reef 2050 Integrated Monitoring and Reporting Program (RIMREP) to monitor Matters of

National Environmental Significance found within the Great Barrier Reef World Heritage Area (GBRWHA; Hedge et al. 2013). For marine migratory species, it would be beneficial to develop and implement a coordinated monitoring system that extends beyond the GBRWHA and into other natural resource management regions throughout the range of these species (Humane Society International 2018).

My results indicate that a coordinated monitoring system could be facilitated through better engagement with research organisations. Independent researchers, such as scientists affiliated with universities, have a unique place in socio-ecological systems in that they may be well-positioned to serve as a 'bridge' between stakeholder agencies (see also Chapter 5; e.g. Cvitanovic et al. 2017; Weiss et al. 2011). There may be no other governance body equipped to facilitate linkages between governance scales, as many other groups, such as NGOs, have limited capacity to conduct research of their own and contract independent researchers to conduct research (Chapter 5; Liverman 2004). As indicated by some of my respondents, increasing the capacity of researchers, such as through improved funding, may assist with the training of other non-government stakeholders, such as community groups, who wish to participate in governance of marine migratory species through citizen science programs (e.g. monitoring programs). The Cooperative Research Centre for the Great Barrier Reef served as a bridging organisation between policymakers and researchers; this program is no longer operating. Actively involving bridging organisations and increasing the capacity of these organisations (or stakeholder agencies), and thus, lower-level governance bodies overall, could increase overall capacity of the network and link different stakeholder agencies throughout Australia (Weiss 2011).

My respondents suggested that using technology, such as online video-conferencing links, could promote future cross-scale collaborations. This approach is becoming more feasible as reliable internet access is increasingly becoming available in remote areas of Australia, especially in areas with local or state government offices or schools. Video-conferencing technology has also improved greatly in recent years, making it a reliable and effective means of linking in multiple groups of people into a single conference. Using technology could also reduce or eliminate the need for Traditional Owners to travel for meetings (as well as other stakeholder agencies), who may be unable to participate effectively in the governance of marine migratory species due to capacity inequities. Many Traditional Owners not only have an intimate relationship with and extensive knowledge of marine migratory species, they also

have co-ownership of much of their habitat[7,8] (Chapter 2, Section 2.2.2.1; Chapter 7, Section 7.4). Further, the Commonwealth Government has an obligation to protect the cultural rights of Traditional Owners under international treaties and agreements (Chapter 4, Section 4.4.3). Thus, it is important that Traditional Owner groups receive the support required to participate effectively in governance processes (Dale et al. 2016; Jackson et al. 2012).

Several of my respondents identified complex processes (e.g. the complexity of policy instruments) as a barrier to stakeholder participation in environmental governance. To date, the technical capacity of stakeholders to understand, interpret, and implement governance interventions is a barrier that has been underexplored in the environmental governance literature (e.g. Evans and Klinger 2008). Some respondents indicated that the complex consultation process required by the *EPBC Act 1999* hinders the ability of non-government stakeholders to participate effectively in the governance of threats to marine migratory species. Much of this process relies on written submissions that address the document under review, requiring stakeholders to be literate, well informed, and familiar with that document (Antonson 2014). Creating policy instruments that allow a diverse range of stakeholders to become well informed about the document may be difficult, as the Commonwealth Department of the Environment and Energy needs to consider multiple values (Chapter 5) and use specific language within legislation and management documents (pers. comm. Department of the Environment and Energy). Further, using written submissions as the primary form of consultation limits the ability of disadvantaged stakeholders to engage (e.g. low literacy), especially stakeholders whose knowledge does not readily translate to fit the western concept of governance (e.g. Indigenous groups; Benham 2017; Casimirri 2003). Additionally, a document is usually not released for consultation until it is near completion. Thus, any resultant changes from consultation are usually technical rather than conceptual. Some comments provided by stakeholders are also not incorporated into the final version of the document because they are deemed 'out of scope'.

Some of my respondents considered that there is no transparent feedback mechanism that helps non-government stakeholder agencies understand where their feedback has been

[7] Australia did not recognise the rights of Aboriginal Australians and Torres Strait Islanders to their land (as defined by cultural customs and laws) until 1992 after the landmark Native Title case *Mabo V Qld (No.2)*.
[8] Traditional Owner groups have exclusive rights to the intertidal area of 80% of the Northern Territory coastline (see Chapter 7, Section 7.4; *Gawarrin Gumana & Ors vs Northern Territory 2007*)

implemented (or not) into policy instruments. It is important to note that comments on some *EPBC* policy instruments and documents are posted publicly on the Department of the Environment and Energy's website (e.g. Engage Early - Guidance for proponents on best practice Indigenous engagement for environmental assessments under the *EPBC Act*; https://www.environment.gov.au/epbc/consultation/engage-early-indigenous-engagement), while most are not. Due to this lack of transparency and consistency, the *EPBC*-consultation process is perceived as tokenistic. The upcoming revision of the *EPBC Act 1999* or any other overhaul to Australia's environmental legislation (discussed in Section 6.4.3; Chapter 8) should consider more inclusive approaches to stakeholder engagement and reduce the complexity for non-government stakeholders to participate effectively in the governance of marine migratory species in eastern Australia (e.g. Hawke 2009; Mostert et al. 2007).

Some potential solutions for helping non-government stakeholders navigate complex governance processes included education and information sharing (discussed in Section 6.4.2). Bridging organisations could also play a role here, particularly if the bridging organisation is familiar with the policymaking processes (e.g. an academic or a non-government organisation; Oliver and Cairney 2018). These bridging roles could also be fulfilled by public servants, but given the previously-discussed capacity barrier on public servants, using appropriately trained individuals or organisations familiar with the policy processes may be beneficial (as described by Craik 2018 for Australia's agricultural sector). Bridging organisations that are familiar with the policymaking processes can help other non-stakeholder agencies understand the difference between policy and management and identify areas where stakeholders may have the most influence in future decision-making (Evans and Cvitanovic 2018; Oliver and Cairney 2018). Additionally, developing educational opportunities targeted at helping non-government stakeholder agencies effectively participate in the governance of marine migratory species would be beneficial.

The ability to communicate among stakeholders is essential in developing collaborative and adaptive governance. Creating informal (e.g. pamphlets or brochures), non-formal (e.g. structured workshops or educational presentations), and/or formal (e.g. courses; tertiary education programs) education interventions may help provide non-government stakeholder agencies with the information they need to effectively participate in environmental governance (Eshach 2007; Maarschalk 1988; Tamir 1991). An example of such an educational program is New Zealand's Department of Conservation's implementation of the

Environmental Education for Sustainability Strategy (2017 – 2027). This program aims to educate and support government agencies in developing pathways to encourage the participation of non-government stakeholder agencies in addressing environmental issues, including how to engage with and inform environmental governance. Australia does not yet have these explicit guidelines for government or non-government agencies for protecting marine migratory species. However, developing and implementing programs (either formal or non-formal) or educational materials (informal) that can help non-government stakeholder agencies effectively participate in the governance of marine migratory species is important and may require fewer changes in institutional structures than other reforms (Section 6.4.3; Chapter 8).

6.5 Conclusions

The governance of marine migratory species in eastern Australia would benefit from the introduction of new information pathways, reformed institutional structures (including changes to environmental legislation), and improved participatory pathways for non-government stakeholders. My results highlighted some well-studied barriers to stakeholder engagement and identified 'complexity', particularly the technical knowledge needed by non-government stakeholders to interpret legislation and other management instruments, as a new, underexplored barrier in environmental governance. Stakeholder involvement in the governance of marine migratory species would be increased by collaboration throughout natural resource management regions, across which these species move within eastern Australian jurisdictions. Increased collaboration should address the complexity of the issues faced by non-government stakeholders and harmonise the governance of threats to these species.

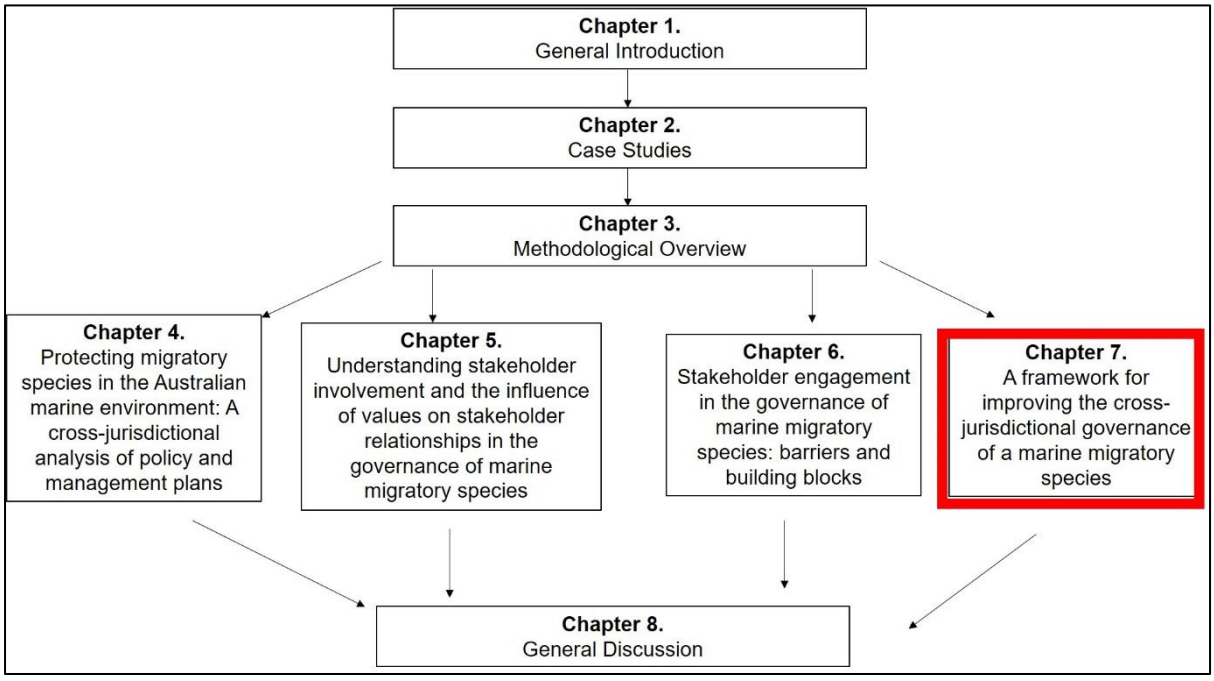
6.6 Summary

- In this chapter, I conducted qualitative semi-structured interviews and a focus group to identify the barriers to, and opportunities for, increasing stakeholder involvement in the governance of marine migratory species.
- My data indicate that the barriers to and opportunities for effective governance of threats towards marine migratory species can be categorised under four themes: 1) decision-making processes, 2) information sharing processes, 3) institutional structures, and 4) participatory processes
- I suggest that the governance system is complex and would benefit from increased collaboration across governance scales, better information sharing pathways, and less complex participatory pathways for non-government stakeholders to engage in the system.
- This chapter provided insight into the barriers hindering the participation of non-government stakeholder agencies in the governance of threats to marine migratory species in eastern Australia, including 'complexity' as a previously underexplored barrier in environmental governance. Additionally, this chapter identified opportunities to address these barriers that may be applicable to environmental governance more broadly.
- In the next chapter, I evaluate the extent to which collaborative governance occurs when managing threats to marine turtles in Australia and how to improve the governance system to harmonise the governance of threats to these species and marine migratory species in Australia more broadly.

Chapter 7

A framework for improving the cross-jurisdictional governance of a marine migratory species

The previous chapters have examined the strengths and weaknesses of the governance system protecting marine turtles, dugongs, humpback whales, and non-threatened migratory shorebirds in eastern Australia. For this chapter, I focused primarily on marine turtles in Australia and analysed the Recovery Plan for Marine Turtles in Australia 2017 (the Plan) and three of its subsidiary plans for evidence of collaborative governance using a two-part gap analysis and qualitative, semi-structured interviews. I applied existing adaptive and collaborative governance frameworks, which focused mainly on the social components of collaborative governance, and identified a need for a new, interdisciplinary framework for the collaborative governance of marine turtles in Australia. In this chapter, I develop and present a framework that may be beneficial to improving the governance of marine migratory species within a large marine jurisdiction. My framework is directly relevant to harmonising the management of marine turtles across jurisdictions in Australia, but it could also be applied to managing threats towards other migratory species that inhabit large marine jurisdictions.



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7. A framework for improving the cross-jurisdictional governance of a marine migratory species

7.1 Introduction

Effective natural resource governance typically requires collaboration across jurisdictions (within and between countries), adaptability, and the ability to incorporate the latest scientific information for developing and improving indicators for the evaluation and adjustment of management strategies (e.g. Chapter 1, Section 1.6; Chapters 4 – 6; Failing et al. 2013; Olsson et al. 2004; Scarlett 2013), while also responding to the societal drivers of resource decline. Collaborative governance (described in Chapter 1, Section 1.2) is critical to effectively managing natural resources with large geographical ranges, such as marine fisheries or migratory species, as large-scale application of adaptive management (described in Chapter 1, Section 1.2; Figure 7.1) often cannot be achieved by a single regime (e.g. Berkes 2009; Meek et al. 2011; Olsson et al. 2004, 2006; Morrison 2017).

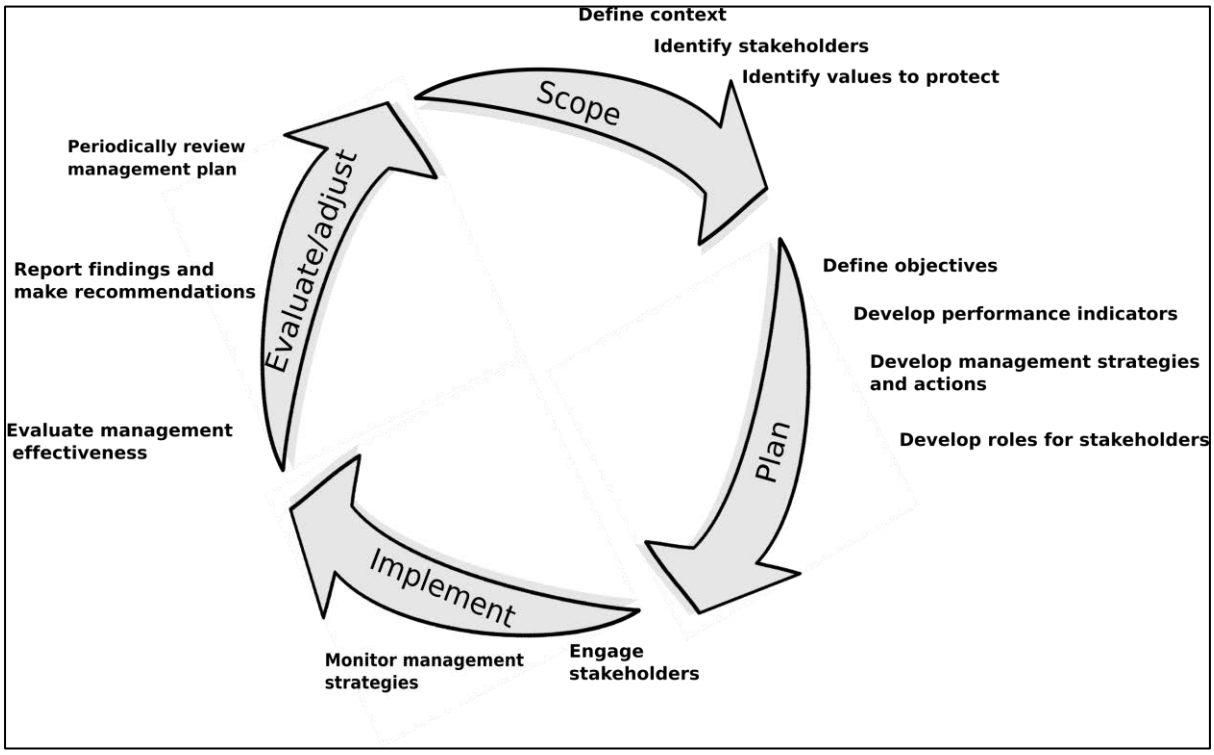


Figure 7.1. The adaptive management cycle used in natural resource management (Adapted from Jones 2005, 2009; Hockings et al. 2006; Williams 2011). This figure is a re-print of Figure 1.2 in Chapter 1.

7.1.1 Polycentric governance and collaborative governance in threatened species management

Natural resource governance systems are frequently polycentric, and the governance system mitigating threats to marine migratory species is no exception (Chapter 1, Section 1.3; Chapters 4 – 8). At an international level, management of some threatened marine migratory species protected under the Convention on the Conservation of Migratory Species (CMS) facilitates collaboration between range states, thus inevitably encompassing a broader range of stakeholders than single-state management regimes. The Memorandums of Understanding for marine turtles and dugongs are evidence of such polycentrism (e.g. IOSEA Marine Turtles MoU; Memorandum of Understanding on the Conservation and Management of Dugongs (*Dugong dugon*) and their Habitats throughout their Range).

7.1.2 Stakeholders in marine governance within Australia

Throughout my thesis thus far, I have described why stakeholders are important to environmental governance, particularly within large marine governance systems, like the one protecting marine migratory species in eastern Australia (See Chapter 1, Sections 1.5 and 1.6; Chapters 5 and 6). In Australia, many environmental governance decisions, including the governance of threats towards marine migratory species, are large-scale due to the sheer size of Australia's land (approx. 7.7 million square kilometres; 6th largest country) and marine jurisdictions (approx. 10 million square kilometres; 3rd largest marine jurisdiction; Chapters 2, Chapters 4 – 6; Geoscience Australia: Australia's Size Compared). Because marine migratory species move across multiple boundaries, meaningful, cross-scale stakeholder engagement would benefit the overall environmental governance system protecting marine migratory species in eastern Australia (Chapters 5 and 6).

Cross-scale stakeholder engagement requires a structured approach to decision-making, incorporating both science and values into the management framework (Chapters 5 and 6; Failing et al. 2013; Gregory et al. 2012), while maintaining the ability to reorganise the system in a dynamic environment (de Loë et al. 2009; Plummer et al. 2013). Structured decision-making promotes collaborative governance by involving multiple actors, including external stakeholder groups, in decision-making (Ansell and Gash 2008; Benham and Hussey 2018; Dietz et al. 2003; Rijke et al. 2012).

7.1.3 Purpose of this chapter

Managing threats towards marine migratory species should involve harmonised, multi-jurisdictional collaborative decision-making processes that incorporate both biological and social values for mitigating threats to species across their range, because these species often face myriad threats throughout their long migrations(Chapters 4 – 6; Meek et al. 2011). Several management frameworks exist for collaboratively addressing cross-scale environmental management issues in socio-ecological systems (e.g. Folke et al. 2005; Garmestani and Benson 2013; Jones 2005; Jones 2009; Williams 2011). I considered several of these existing frameworks and found that they emphasised the social components over the biological components of natural resource governance. Additionally, existing frameworks were not designed for cross-scale collaboration at the scale needed to collaboratively and adaptively manage threats towards marine turtles across their range.

In this chapter, I draw on an analysis of interagency relationships, including state and non-state stakeholder agencies, to develop and apply an interdisciplinary framework that can be used for the cross-jurisdictional management of threats to a marine migratory species. I assessed existing management arrangements against key indicators of collaborative governance (Table 7.1) and in doing so, identified a need for a more comprehensive framework for assessing threat management plans and harmonising threat management for marine migratory species across multiple jurisdictions. Because marine turtles move across jurisdictional boundaries (e.g. local, state, national, international) and face varying threats across their range, I developed a framework that encompasses critical components of adaptive management (as illustrated in Figure 7.1), collaborative governance (Table 7.1), and important ecological considerations (illustrated in Figure 7.2; Table K1 in Appendix K). My framework builds on existing frameworks by integrating social and ecological influences at the scale needed to manage marine migratory species and provides a model for the interdisciplinary analysis of conservation plans and to improve conservation of large-scale natural resources.

7.2 Methods

I collected and analysed data using an adaptive theory approach (Layder 1998), through document analysis (described in Chapter 3, Section 3.3.1) and used three stocks of marine turtles as my case studies (described below). I used adaptive theory in this chapter by

adapting existing theory in collaborative and adaptive governance in environmental management to address my research questions. The results of my data build on existing theories in collaborative and adaptive governance, rather than generate new theory.

Marine turtles make an ideal case study of collaborative natural resource governance because their threatened status, iconic nature, migratory life cycle, and large area of occupancy increase the likelihood that a diverse number of stakeholder agencies from their range states will be concerned about their management. I focused on three genetically distinct stocks (synonymous with populations) of marine turtles, all of which are protected in Australia: the south-west Pacific stock of loggerhead turtles (*Caretta caretta*), the Northern Great Barrier Reef (GBR) stock of green turtles (*Chelonia mydas*), and the North Queensland (Qld) stock of hawksbill turtles (*Eretmochelys imbricata*). I chose these stocks of marine turtles because they are data-rich, have ranges that span multiple jurisdictions (e.g. state, national, and international), and are populations of conservation concern (see Section 1 of Appendix K for detailed descriptions of the plans). Distribution, threats, and management actions for each stock are detailed in the *Recovery Plan for Marine Turtles in Australia 2017* (henceforward, the Plan). I have chosen to use the Plan in the application of my interdisciplinary framework because it is comprehensive, includes biological components of marine turtle management, as well as components of collaborative and adaptive governance from the social sciences.

7.2.1 Assumption and gap-analysis

I used a document analysis to conduct a two-part gap analysis seeking evidence for existing adaptive and collaborative governance frameworks in the Plan and its components. I assumed that collaborating stakeholder agencies shared the goal of minimising anthropogenic threats to the six species of marine turtles found in Australia, while supporting the recovery of these species to maximise their long-term survival (*EPBC Act 1999; Recovery Plan for Marine Turtles in Australia 2017*). This assumption is based on the definition of a recovery plan under the *EPBC Act 1999* and on the long-term objective detailed in the Plan. I analysed the Plan and three individual genetic stock plans contained within it (collectively referred to as the Plans) for the presence or absence of the key components of collaborative governance using an adaptation of existing frameworks (Table 7.1). It is important to note that these stock plans are components of the overall Plan and are not recovery plans *per se*.

Table 7.1. The key components of collaborative governance (adapted from Donahue 2004; Bouwen and Taillieu 2004; Emerson et al. 2012) used to analyse the Recovery Plan for Marine Turtles in Australia 2017.

Key Components of Collaborative Governance	
Component	**Description**
Describe the focus and scope of the collaboration	Describe and identify the focus (including shared motivation), objectives, management strategies and performance indicators of the collaboration
Presence of steering group(s)	Identify a group that will lead the collaboration and connect stakeholders at different governance levels
Describe the system's 'architecture'	Outline the legal and economic frameworks under which the collaboration operates; identify any potential conflicts or issues that may arise and solutions for those issues; structure the system's information flow; describe resourcing
Stakeholder analysis and engagement	identify values of participating stakeholder agencies; Deliberately engage (e.g. face-to-face or public meetings) stakeholder agencies (incl. at minimum one public and one private agency) and assign specific roles or tasks to each stakeholder group
Assess and adjust the collaboration	Periodically evaluate the collaboration's outputs (what was created) and outcomes (what was achieved); discuss evaluation with collaborating stakeholder agencies; adjust focus and scope, structure, and/or stakeholder roles as necessary

I then applied my new framework (Figure 7.2; Table K1 in Appendix K) to the Plans. I first analysed each Plan for explicit (plainly written and identifiable) statements (similarly to Chapter 4; Ortega-Argueta et al. 2011) describing collaborative governance. I then expanded my analysis to include implicit components based on interview responses from respondents who helped with the development of the Plan. I considered collaborative governance components to be implicit if their presence could be implied by the context of the Plan.

7.2.2 Development and application of the new interdisciplinary, cross-jurisdictional collaborative governance framework

I supplemented data from the document analysis with the qualitative interviews I conducted with the Plan developers (n=5; individuals from the Australian Government Department of the Environment and Energy, the Great Barrier Reef Marine Park Authority, state and territory governments, and independent sea turtle biologists). To complement and expand on my analyses for application to other marine migratory species, I also conducted interviews (n=36) with stakeholders (n=38) involved in the policy and management of marine migratory

species in Australia (see Chapter 3, Section 3.3.4 for interview protocol; see Appendix B for interview questions). These stakeholders included representatives from Commonwealth (3) and state/territory government agencies (10), industry representatives (6), non-government organisations (NGOs; 13), and independent researchers (e.g. scientists; 6) who study migratory species or environmental governance. I used the data provided by these respondents to inform and develop a robust, interdisciplinary framework to improve cross-jurisdictional collaboration when managing threats to a marine migratory species.

7.3 Results

I identified several characteristics of effective collaborative governance in the existing governance structures for marine turtles, and other migratory species, in eastern Australia. For conciseness, I present the key findings from my analysis using the key components of interdisciplinary, collaborative governance of a marine migratory species from my new framework (Figure 7.2; Table 7.2; see Table K2 in Appendix K for complete analysis).

Table 7.2. The key results from my analysis of The Recovery Plan for Marine Turtles in Australia 2017 (the Plan) and its embedded stock plans for south-west Pacific loggerheads (SWP Loggerheads), Northern GBR green turtles (NGBR greens), and North Queensland hawksbill turtles (NQ Hawksbills). For a detailed analysis, see Table S2 in Supplementary Material. Darkly shaded boxes indicate the explicit inclusion of a framework component, lightly shaded boxes indicate implicit inclusion of a component, and white boxes indicate the absence of that component.

Essential governance component	***the Plan***	**Stock:** SWP loggerheads	**Stock:** NGBR greens	**Stock:** NQ hawksbills
System architecture				
• Clearly identifies the legal framework it operates under?				
• Clearly identifies the economic framework (including resourcing)?				
Steering group identified				
Focus and scope				
• Includes a clear and detailed focus and scope?				
• Includes objectives?				
These objectives are:				
- Specific				
- Measurable				
- Achievable				
- Relevant				
- Time bound?				
Stakeholder analysis and engagement				
• Describes how stakeholder agencies are engaged in the implementation and development processes?				
• Identifies specific roles assigned to additional stakeholder agencies?				
Develop and implement management strategies				
• Collate best available science and highlight gaps in knowledge?				
• Includes detailed management strategies?				

• Management strategies are: - Supported by and inclusive of best practice science?				
Evaluation and adjustment				
• Identifies the capacity to evaluate outputs and outcomes?				
• Describes how collaborating stakeholder agencies will be involved in adjusting management strategies?				
• Identifies the capacity to adapt and improve management strategies?				
• Identifies the capacity to adjust and improve collaborations with key stakeholder agencies?				

7.3.1 System Architecture

The Plan is an overarching, Commonwealth policy document that is implemented by various jurisdictions and differing stakeholder agencies. The legal framework for managing marine turtles in Australia is explicitly included in the overall Plan and the stock plan for the south-west Pacific stock of loggerheads, including the international, national, and state legislation under which the Plan operates (Table 7.2; Table K2 in Appendix K). However, relationships to legislation from New South Wales (NSW) and Queensland (Qld), the states that were co-developers of the Plan, were not explicitly detailed other than in the table that lists the status of each species in the states (Table 4 on pg. 10 of the *Recovery Plan for Marine Turtles in Australia 2017*). Plan developers advised that the Plan was made only with Ministers from NSW and Qld because although the other key range jurisdictions within Australia, Western Australia and the Northern Territory, were "extremely supportive of the Plan, they did (not) have the legislative ability to make the Plan at a state level[9]." It was considered to be a favourable outcome to have the Qld government's agreement to co-develop the plan because there is no mandate in Qld legislation for recovery planning (Commonwealth Government respondent; *Nature Conservation Act 1992*). Some respondents suggested that for migratory species, "harmonising the states would also be beneficial" (state government respondent) and that "these legislations that are (protecting) migratory species need to come from (the) Commonwealth level" (state government respondent).

None of the plans include a budget for the implementation of management strategies. Respondents who assisted in developing the Plan expressed concern about this lack of information on the funding required for recovery. One state government respondent stated "I know what programs I should be running to address some of these issues. My issue is I have no funding to do that. (…) It's a Commonwealth priority, but turtles have never come with a lot of money[10]." Section 5.2 of the Plan states that resourcing is a component of "core government business" (at state/territory and national levels) and that it is not practical to predict actual costs of implementing the actions outlined in the Plan. A respondent suggested that "(…) the government holds that up as they (are) being effective, and they (are) delivering on expectations and the Act, but technically, they actually are for that example (the Plan), but

[9] Under the *Wildlife Conservation Act (WCA) 1950*, there was no legislative mandate for recovery planning in Western Australia (WA). As of 1 January 2019, the *Biodiversity Conservation Act 2016* replaced the *WCA 1950* and has legislative support for recovery planning in WA. The Plan was drafted before this legislation took effect.

[10] Under the *EPBC Act 1999*, there is no obligation for any government to fund recovery plans.

it (is) the funding and the support that is (not) provided to those plans" (environmental NGO respondent). This lack of financial framing was viewed as a major weakness of the recovery planning process and of threatened species protection as a whole in Australia (see https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/Faunalextinction/Submissions): "recovery plans are (…) pretty much on the shelf because they (are) never (or not often) funded or not adequately funded. (…) Not to say that the frameworks are (not) there or in place, they (are) just not used or funded. Therefore, not effective" (environmental NGO respondent). Some respondents suggested that a lack of funding for environmental governance concerns, including marine migratory species, is because "conservation in general is a lower priority (than other public policy concerns) of both states and Commonwealth governments" (environmental NGO respondent).

7.3.2 Steering Group Formation

Steering groups were identified for each of the three genetic stock plans (e.g. the Queensland government is the steering group for managing the south-west Pacific stock of loggerheads), but not the overall Plan (Table 7.2; Table K2 in Appendix K). The overall Plan lists states and territories as the responsible parties for on-ground implementation (see section 4.3 of the Plan for more information). One respondent who assisted in the development of the Plan indicated that having states and territories as the primary implementers of the Plan was a downside, stating that there is "an expectation the relative jurisdictions and the states and the territories will then have the means to implement (actions within) them (recovery plans) to drive the actions in the field." However, another stated, "(…) there are some very obvious actions and objectives identified that the Commonwealth itself can take the lead on," indicating that the Commonwealth Government is an implicit steering group in some cases. Steering groups for managing marine migratory species are not limited to the Commonwealth Government in Australia and can come from any stakeholder agency, such as "an environmental NGO that is particularly concerned about an individual species" (Commonwealth Government respondent) and has the capacity to work across jurisdictional boundaries, especially international.

7.3.3 Focus and Scope

The focus and scope of the overall *Recovery Plan for Marine Turtles in Australia 2017* (the Plan) is clearly defined. Many Commonwealth documents pertaining to environmental

governance have an umbrella role, as indicated by a respondent from a state government, who stated "(…) Commonwealth documents are (…) that umbrella which pulls it all together." The Commonwealth Government has taken a similar approach for other marine migratory species, such as whales, by developing documents like the Australian National Guidelines for Whale and Dolphin Watching 2017. Several respondents identified the umbrella approach as a strength of the Plan, with some respondents saying "it (is) ultimately just a guide for everyone to attach their programs to and to hope that we (are) all working in the same direction" and "(…) in articulating those priorities, it also gave them (states and territories) a basis to defend on-going work." However, many of the objectives in the Plan are high-level objectives. As currently worded, the objectives are difficult to quantify and progress against them is not explicitly measurable. Developers of the Plan stated that progress is implicitly measurable "if you can actually prove that you (have) (…) reduced the anthropogenic threats" and that "the measure of success for each stock provides the context of what could be achieved for the stock within the life of the Plan. These (objectives) are generally specific, measurable, achievable, relevant and time bound." Having "certain goals and objectives that we have to achieve that are measurable, or SMART" is not limited to legislative documents, but are also "(…) important for our (environmental NGO) conservational planning" across other stakeholder agencies.

7.3.4 Incorporation of Best Available Information

One of the strengths of the reviewed plans was the use of best practice science based on available peer-reviewed literature and/or expert opinion in developing detailed management strategies (outlined in 'priority actions specifically required to recover this stock'). Action Areas 4 and 8, for example, protect habitats critical to survival (as identified by marine turtle experts during a 2016 workshop) for each genetic stock. Multiple respondents involved in the Plan's development stated that there was an improvement in the incorporation of science into this Plan and praised the use of genetic stocks as its basis. One respondent from a territory government stated, "I think an important difference [from the previous recovery plan adopted in 2003] is that the more recent genetic science that we have has allowed for the structure of this report, or the recovery plan, to be based around stocks." Additionally, "not all turtles move around and share the same region, there [are] specific genetic isolation areas that we can manage" (respondent from a territory government). A respondent from a Commonwealth Government agency emphasised the importance of best practice science for all environmental

policies and management actions, stating "So, for us, we rely very strongly on the findings of research, (…) getting access to information early, taking the findings of research and putting that into policy." As stated by a Commonwealth Government respondent, "decisions and policy directions need to be based on something, whether they are just community view or whether they are based on something that is known, a fact or a belief (such as science)", indicating that science plays an important, but not the only, role in environmental governance.

7.3.5 Stakeholder Analysis and Engagement

None of the plans explicitly indicated how stakeholders were engaged during plan development, nor how stakeholders would be engaged during implementation (Table 7.2; Table K2 in Appendix K). Developers of the Plan indicated that consultation workshops were held with some Indigenous groups during the development of the Plan in addition to the 90-day public comment period required by the *EPBC Act 1999*. A respondent from a Commonwealth Government agency described the difficulties of stakeholder engagement, stating:

> *Sometimes our processes simply don't match up with everybody's idea of how you should do consultation. People feel sometimes that there is almost a view that there needs to be a program of over-consultation. And sometimes, we simply can't accommodate that. And so, depending on the situation, there's going to be a bunch of things there that influence whether or not you can effectively consult with groups.*

Some respondents involved in the Plan's development suggested that "(…) there [are] probably better ways that it could maybe be more accessible to community groups and how they might be able to see 'what can we do, there (is) a recovery plan, but what can we actually do?" A suggestion to make the plan more accessible was "if (…) there was a summary sheet (…) attached to it that could be provided to community groups or ranger groups that could help them understand (what they could do)." While there were no clear roles for stakeholders included in any of the plans, Plan developers stated that the Plan highlights current work that the states and territories are doing, and also "gives them shape and direction and (…) gives an understanding for someone coming in from an external point of view to understand what we're all trying to achieve with regards to turtles."

In 2018, Commonwealth, state, and territory management and regulatory agencies met for an Australian Marine Turtle Government Round Table to discuss what roles these agencies (tasked with marine turtle recovery activities in Australia) could take in implementing the Plan (pers. comm. Department of the Environment and Energy). This Round Table helped agencies to "look outside and to see who else needed support in their management of marine turtles and to question whether there might be some issues that require different stakeholders to be brought together." Several respondents suggested that these Round Tables would be beneficial for managing other migratory species, stating, "those (round tables) are really good think tanks" (state government respondent), and: "(…) a way to check in with each other, (…) consolidate what (is) happening in the state, and bring it together and report it to others" (state government respondent). However, there is currently not a system in place (e.g. a website or blog) to easily share documents or experiences between participating stakeholder agencies (see also Chapter 6 in this thesis).

7.3.6 Capacity for Evaluation and Adjustment

The overall Plan also encompasses the components of evaluation and adjustment of the management strategies, a key component of adaptive management (Figure 7.1; Figure 7.2; Table K2 in Appendix K). Plan developers emphasised the importance of having an adaptive recovery plan, stating "the way that data improves and science is developing at the moment (…) that (is) something important (…) that it (is) not enshrined in this document that remains static because things are quite dynamic" and "we do (not) constrain ourselves to something we know now. It could change dramatically." A respondent from a state government emphasised the need for adaptability when discussing the threat of climate change to other marine migratory species, stating:

> *Now, if we (are) only retrospectively, through our legislation and through our planning approvals, (…) applying rules, it does (not) allow migratory species, which are before our eyes adapting to climate change, if we can (not) factor that into our future planning, then that's a real problem.*

Similarly to the silence on some aspects of stakeholder engagement and analysis, none of the plans detailed the involvement of collaborators in the adjustments of management strategies

or identified ways to evaluate and improve collaborative relationships throughout the life of the Plan, such as a central website or a blog.

7.4. Discussion

Governance of marine migratory species occurs within a polycentric system because these species move across jurisdictional boundaries and their management involves multiple state and non-state actors (see also Chapters 4 – 6, Chapter 8 in this thesis). However, this does not mean that governance arrangements are necessarily harmonised. Marine turtles in Australia provide a good case study for collaborative governance because they highlight strengths and weaknesses in a relatively well-developed natural resource governance regime. Policy instruments protecting marine migratory species in Australia are rarely explicitly connected to other governance levels (Chapter 4), but harmonisation and collaboration may be achieved through the actions of a multi-jurisdictional steering group comprised of diverse stakeholder agencies (Figure 7.2, Chapters 5 and 6). While an "umbrella" plan, like the *Recovery Plan for Marine Turtles in Australia 2017*, can be beneficial, a distinct steering group (or recovery team) may improve the effectiveness and delivery of the plan (Figure 7.2; *Recovery team governance – Best practice guidelines,* Commonwealth of Australia 2017).

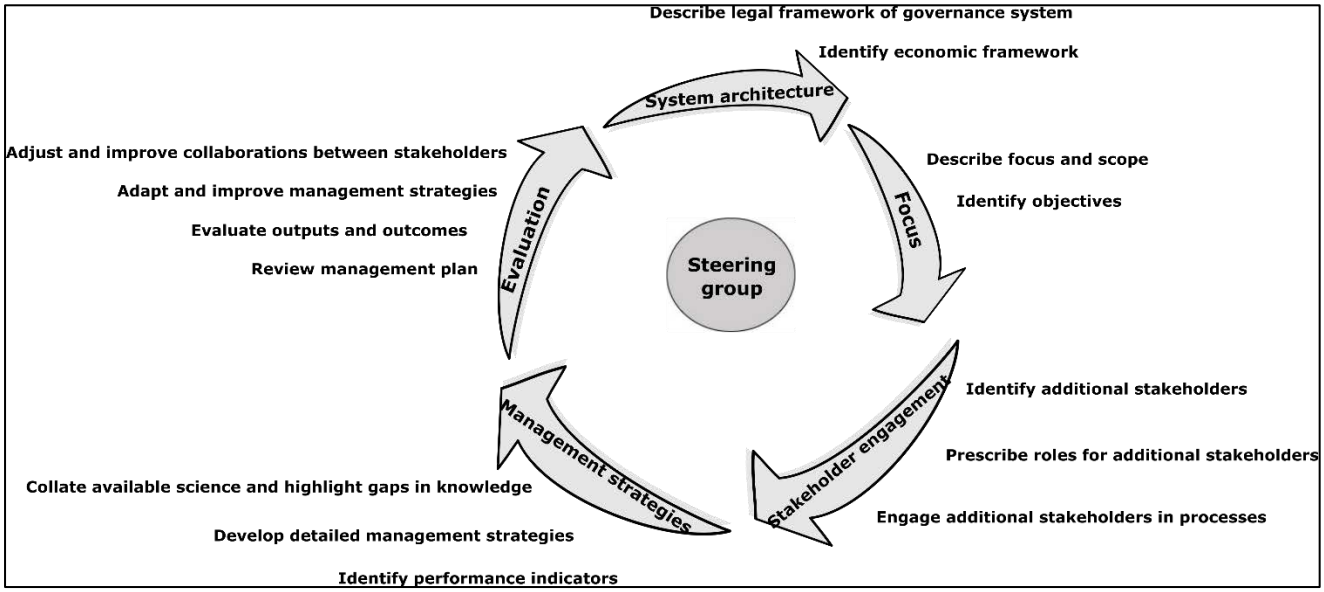


Figure 7.2. Key components of my new, interdisciplinary framework for the collaborative governance of a marine migratory species (see Table K1 in Appendix K for full framework). This framework was adapted from existing collaborative governance frameworks (Donahue 2004; Bouwen and Taillieu 2004; Emerson et al. 2012; Table 7.1) and informed by qualitative interviews with key stakeholders involved in the development of the Recovery Plan for Marine Turtles in Australia 2017 and/or involved in the policy and management of marine migratory species. Management strategies include coordinated monitoring across jurisdictions.

In collaborative governance systems (Described in Chapter 1, Section 1.2), steering groups can be a form of clear leadership and are important in connecting different governance levels and stakeholder groups (Figure 7.2; Folke et al. 2005; Garmestani and Benson 2013; Schuett et al. 2001), particularly where there are weaknesses in formal legislation (e.g. Chapter 4 in this thesis). Additionally, representative steering groups are a recognition of the polycentricity of the governance system surrounding marine migratory species. The members of the Australian Marine Turtle Government Round Tables currently implicitly serve as a steering group for activities related to the *Recovery Plan for Marine Turtles in Australia 2017*, as there is no Marine Turtle Recovery Team in Australia (pers. comm. Department of the Environment and Energy). The first Round Table brought together representatives of multiple Commonwealth, state, and territory government agencies, who discussed the implementation of the Plan and identified "Hot Topic" issues (e.g. National Light Pollution Guidelines) stemming from the Plan (pers. comm. Department of the Environment and Energy) and increasing collaboration. Such a steering group could serve as a link for some components of collaborative governance by clarifying the focus and scope of management tools and conducting further stakeholder analysis and engagement (Figure 7.2).

To be effective, a steering group should be assembled early in the planning process and should include key non-government stakeholder agencies (Bouwen and Taillieu 2004). Expanding the membership of the Round Tables to include non-government stakeholders could strengthen its role as a steering group. Non-government groups are not subjected to the same jurisdictional constraints as state and Commonwealth Governments and may have more capacity to influence policy (Carlisle and Gruby 2018; Heikkila and Weible 2018).

Non-government steering groups may be both expertise and representative-based, increasing the number of stakeholders represented in management actions (e.g. Advisory Committee and Scientific Panel of the Northwest Shelf Flatback Turtle Conservation Program). Greater representation of stakeholders, including industry and other non-government organisations early on in the planning process, would improve collaboration and coordination between groups and jurisdictions, and increase the quality of plans (see also Chapters 5 and 6; Brody 2003; Hawke 2009).

In Australia, Traditional Owners are deeply involved in managing marine turtles (particularly green turtles in Northern Australia; Chapter 2; Jackson et al. 2015; Kennett et al. 2004a;

2004b), where they are considered cultural keystone species (Butler et al. 2012). Some Traditional Owner groups have co-ownership over the land and sea as a result of successful Native Title claims. Co-ownership of sea occurs in some important marine turtle feeding areas (e.g. the Torres Strait Native Title sea claim; *Akiba on behalf of the Torres Strait Islanders of the Regional Seas Claim Group v State of Queensland 2010; Akiba on behalf of the Torres Strait Regional Seas Claim Group v Commonwealth of Australia;* Kennett et al. 2010). Further, Traditional Owners have sole ownership over some important marine turtle nesting habitats (e.g. Traditional Owners have sole ownership of the intertidal zone of Blue Mud Bay in the Northern Territory; *Gawarrin Gumana & Ors vs Northern Territory 2007*). As a result, engagement processes should explicitly include Traditional Owners as a key stakeholder group. Traditional Owners may be limited by their capacity to attend meetings and discussions (pers. comm. independent researcher (Torres Strait Islander); Chapter 6; Jackson et al. 2012), so support (e.g. financial, technical) should be provided to increase the capacity of Traditional Owners to contribute effectively to management efforts (see Chapter 6; Dale et al. 2016; Jackson et al. 2012).

Experts, both in biology and/or environmental governance from nonaligned institutions such as universities or research agencies, may take the role of a facilitator or independent chair, allowing for all invited stakeholder agencies to participate and lead towards a more decentralised form of governance (Bouwen and Taillieu 2004). Further, including scientific experts in a steering group can catalyse the adaptation and adjustment of the collaborative governance regime as more scientific information becomes available.

Evaluation and adjustment of management approaches are essential components of both adaptive (Figure 7.1; Figure 7.2) and collaborative governance (e.g. Figure 7.2; Armitage et al. 2008; Evans et al. 2011). It is important to adjust management strategies to address new problems or to improve current management actions, particularly as new science becomes available (McDonald et al. 2015). Adaptation is important when managing marine migratory species, particularly in the face of large-scale threats such as climate change. Marine migratory species will benefit from more research into how their biology and life history are affected by climate change (e.g. feminisation of marine turtles (e.g. Jensen et al. 2018); food supplies of whales feeding in Antarctic (e.g. Nicol et al. 2008), as well as how to best manage these species in new locations as their ranges expand (e.g. Pecl et al. 2017). These large-scale threats also highlight the need for cooperative, coordinated monitoring to provide the

evidence base for adapting management strategies as data become available (see also Chapters 5, 6, 8; Hawke 2009).

The adaptability of management strategies can also be constrained by the information of the evidence available to them and the standard of that evidence.The application of evidence to policy is limited by the information accessible to policy makers and its perceived management relevance (e.g. Cvitanovic et al. 2015; Cvitanovic et al. 2016; Fazey et al. 2005; Ortega-Argueta et al. 2011). If the information available for decision-making is inappropriately used in policy decisions, it can lead to inequitable and/or inappropriate decisions (Chapter 6; Charnley et al. 2017; Hockings and Myers 1994; Ryder et al. 2010). The best-available science, including social science, should be published in the peer-reviewed literature. In the case of marine turtles in Australia, expert opinion had to be used to identify the threats to several of the genetic stocks, and subsequent management actions, as required data are not yet in the peer-reviewed literature (pers. comm. Department of the Environment and Energy; *Recovery Plan for Marine Turtles in Australia 2017*). One issue for a stock-based Plan is that while biological data are often published at a stock level, data on threats are often aggregated at species level, or in the case of bycatch, species are not always identified (Riskas et al. 2016), highlighting gaps in threat mitigation for threatened species. Further, development of science-based policy and management is a process that may be overtaken by political practicalities and competing interests (Tear et al. 2005), often favouring the interests of more powerful stakeholder agencies (e.g. Chapters 5 and 6; Epstein et al. 2015; Kumar 2002).

A key concern about recovery planning and threatened species management in Australia is the limited funding for making and supporting recovery plans (Chapter 6; Hawke 2009; McDonald et al. 2015; Walsh et al. 2012; see also https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/Faunalextinction/Submissions). The Plan is meant to serve as a mechanism for directing funding to management actions by the states and territories (pers. comm. Commonwealth Government respondent; McDonald et al. 2015), but making the Plan did not guarantee the financial support required to implement it. Western Australia has established funding for their North West Shelf Flatback Turtle Conservation Program through the use of environmental offsets funded by industry (Department of Biodiversity, Conservation, and Attractions 2017), rather than relying on funding from state or Commonwealth agencies.

Resource deficits not only hinder the implementation of management strategies and recovery of threatened species (Hawke 2009; McDonald et al. 2015), but also affect how stakeholders are engaged in the recovery process (pers. comm. Commonwealth Government respondent; Chapter 6; Reed 2008).

Stakeholder engagement is a critical component of any adaptive or collaborative governance program (e.g. Figure 7.1; Figure 7.2; Chapters 5 – 8 in this thesis; Ansell and Gash 2008; de Loë et al. 2009; Reed et al. 2009). The *Recovery Plan for Marine Turtles in Australia 2017* met the legal requirements under the *EPBC Act 1999* for stakeholder consultation for a recovery plan. The introduction of the Plan states that the objectives of the previous plan for marine turtles were largely met, including communication with stakeholders, with the important exception of threat mitigation (*Recovery Plan for Marine Turtles in Australia 2017*). However, even if previous versions of the recovery plan successfully engaged stakeholders, ongoing engagement is critical. As explained above, the respondents involved in the Plan's development were primarily government officials and sea turtle biologists. All other groups were consulted rather than engaged in the planning process, meaning that the values held by these stakeholder groups may not be reflected in the Plan (Chapter 5). The Plan was written to align with the policies of state and territory government agencies (pers. comm. Commonwealth Government respondent) and thus, may reflect the values of these agencies (Chapter 5). Further the meaning of the text may be opaque to many non-government groups (Chapter 6). Interested parties external to government must familiarise themselves with the Plan in order to understand what actions need to be done (pers. comm. Commonwealth Government respondent). Some community groups or non-government stakeholder agencies do not understand the intricacies of engaging in the policy process (including the limitations of specific legislation), making it difficult for some groups to participate effectively in management actions (Chapter 6). Additionally, at large scale scales, there is often little information sharing between different stakeholder agencies and governance bodies end up operating independently of one another (Chapters 5 and 6; Dale et al. 2013; Potts et al. 2016; Weiss et al. 2012). As such, stakeholder agencies may not know what other stakeholder agencies in the governance system are doing to implement management strategies. A truly collaborative management system for marine migratory species needs to engage different stakeholder agencies throughout the management process, including representation on recovery teams (and steering groups) and implementation at later

stages of the plan (e.g. *Recovery team governance – Best practice guidelines*, Commonwealth of Australia 2017).

Clear roles for stakeholders or agencies helps to determine roles and responsibilities, clearly assign accountability for environmental decisions and consequences, and build consistency and continuity into management actions, including monitoring (de Loë et al. 2009; Garmestani and Benson 2013; Hawke 2009). Stakeholder roles could be determined in the planning stage using the steering group, allowing for organisational structures to be reworked for delegating responsibilities to different agencies between governance scales (Garmestani and Benson 2013). In the United States, some recovery plans describe some of the roles for stakeholders, identifying the agencies responsible for funding and implementing specific actions (e.g. *Recovery Plan for U.S. Pacific Populations of the Green Turtle*). In Australia, an Intergovernmental Memorandum of Understanding, much like the Common Assessment Method for harmonising the management of threatened species, would need to be introduced at the state and territories level to facilitate complementary management of marine migratory species (pers. comm. Department of the Environment and Energy; Chapters 4 – 6).

For non-government or community stakeholder agencies, coordinated monitoring programs across jurisdictions (including citizen science) can increase stakeholder participation and provide new data about these migratory species throughout their range (Chapter 6; Wintle 2018). Stakeholder agencies may also become involved through a central data (or metadata) repository (e.g. national reporting framework for recovery team progress) or by identifying a central steering group to coordinate monitoring approaches in order to improve the management of threats towards marine migratory species as they cross jurisdictions (Chapter 6). Explicitly outlining potential roles for different stakeholder groups is a robust way of helping groups become involved in accordance with their values and motivations for protecting marine migratory species (Chapter 5).

7.5 Conclusions

In this chapter, I drew on an existing, comprehensive framework to identify ways to harmonise the collaborative governance of a marine migratory species through a case study analysis of the *Recovery Plan for Marine Turtles in Australia 2017* and its embedded stock plans for the south-west Pacific stock of loggerhead turtles, the Northern GBR stock of green

turtles, and the North Qld stock of hawksbill. I used the results of my analyses to develop an overarching, interdisciplinary framework for managing a marine migratory species (or a group of species as in this case; Figure 7.2) that goes beyond biological components for managing marine turtles to include stakeholder analysis and engagement components (from the social sciences) that were largely missing from all four marine turtle plans I examined. The research was not intended to evaluate the Plan as a document. Rather, I considered it as part of the evidence I evaluated of the process defined in the *EPBC Act 1999* and used to develop the Plan. My framework should be used to guide multiple stakeholder agencies, including state and non-state agencies, in the initial planning stages (in the form of a steering group) for managing threats against a marine migratory species, setting appropriate priorities and targets (including biological and social targets), and for designating stakeholder roles for the implementation of the plan. My framework would also be appropriately used to review and adjust existing management plans for a migratory species or for providing guidance for downscaling large, "umbrella" plans to make implementation of management strategies easier to understand for non-government stakeholders.

My findings identify the need for a more comprehensive approach to stakeholder engagement for future, effective, transboundary collaborative governance of marine migratory species. Internationally, working groups under the CMS for threatened marine migratory species, such as the Sharks MOU Conservation Working Group, are comprised of a range of stakeholders, including academics, government, and non-government representatives. I recommend that: 1) key stakeholders are represented on all conservation planning committees, 2) future management plans are effectively scoped to cover threats that require collaboration (e.g. entanglement of a migrating whale in fishing gear), and 3) future plans provide more explicit guidance for different stakeholder agencies wishing to participate in the implementation of a plan, irrespective of whether the Plan is a national or international instrument (see also Chapters 5, 6, 8). One important component of managing marine migratory species, and a potential starting point for increased collaborations, is the coordinated monitoring of species throughout their range (Chapter 6; Hansen et al. 2018). Improved informal collaborations through coordinated monitoring may then lead to more formalised collaborations reflected in policy instruments. Codifying the guidelines for the biological and social components of collaboratively managing marine migratory species may be the first step towards such harmonisation and aid in the effective collaborative governance and recovery of marine migratory species.

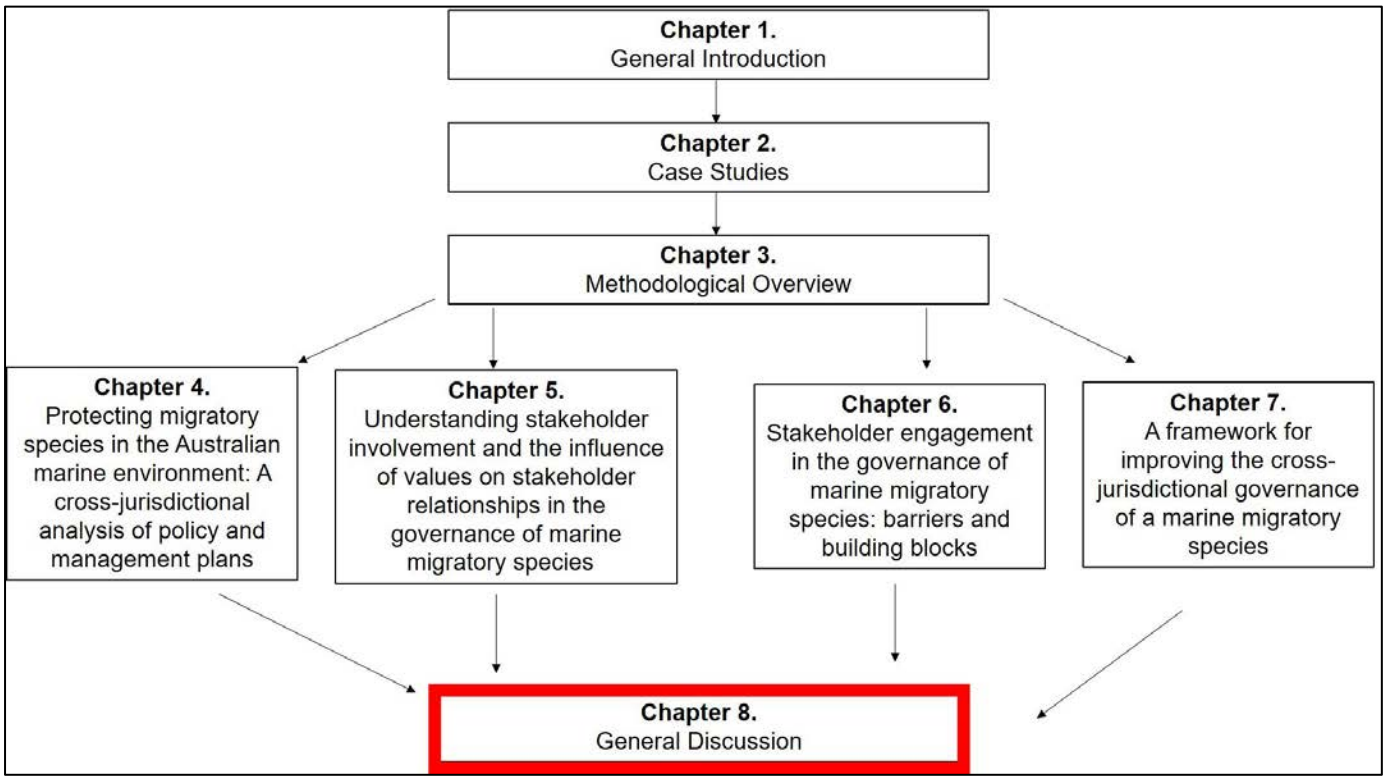
7.6 Summary

- In this chapter, I assessed the extent to which collaborative governance takes place when governing threats to a marine migratory species. Although there are several existing frameworks for assessing collaborative governance within a natural resource governance regime, I found that these frameworks emphasised the social components over the biological components of natural resource governance.
- I developed a framework that integrates the key components of collaborative governance and the key biological components of natural resource governance and identified that governance of marine turtles in Australia emphasises biological management of threats over the social components of collaborative governance.
- Clear guidelines and roles for stakeholder agencies who wish to participate in the governance of marine migratory species should be outlined within a management plan and should be developed in collaboration with a steering group.
- The chapter contributes to the governance of marine migratory species with large ranges and to large-scale environmental governance more broadly. My framework could be used to review and adjust existing management plans for a migratory species or to provide guidance for downscaling large, "umbrella" plans to make implementation of management strategies easier to understand for non-government stakeholders.
- In the next chapter, I synthesise the results of Chapters 4 – 7 and provide recommendations for improving the overall governance of marine migratory species in eastern Australia.

Chapter 8

General Discussion

In this final chapter, I synthesise the key findings of my mixed method, interdisciplinary approach into understanding the role of stakeholders in the governance of marine migratory species in eastern Australia. I discuss my findings in the context of their overall contribution to the environmental governance literature and in their contribution to potentially improving the governance of threats to marine migratory species in eastern Australia. I finalise this discussion by identifying areas of future research and providing recommendations for improving stakeholder involvement in the governance of marine migratory species in eastern Australia and other large marine jurisdictions.



8. General Discussion

8.1 Revisiting the research problem

Marine migratory species cross multiple jurisdictions throughout their migrations, subjecting these species to various anthropogenic threats over large spatial scales. Throughout this thesis, I have argued that the governance regime mitigating threats to marine migratory species in eastern Australia is complex and polycentric, and that it would benefit from harmonised legislation and coordination across jurisdictions (Chapters 4 – 7). Though international agreements are influential in managing marine migratory species (see Chapters 1 and 2), narrowing the scope of my thesis to policy instruments and stakeholder agencies from the east coast of Australia allowed me to explore the governance of threats to marine migratory species in greater depth.

Prior to this thesis, there was limited research on the governance of marine migratory species within Australia, and no research about the role of stakeholders within this system (Chapter 1, Section 1.9). My research makes a new and novel contribution to both research and practice by identifying ways to build on existing governance processes, including policy and management strategies that protect marine migratory species in eastern Australia. In this final chapter, I summarise how I met my key objectives (Sections 8.2 – 8.4) and synthesise these findings by discussing how my results contribute to improving the overall governance system of threats to marine migratory species in eastern Australia.

8.2 Identifying the gaps in managing marine migratory species in Australia (Objective 1)

Examining individual policy instruments, as I did in Chapter 4, can help to identify variation and gaps in polycentric governance systems (Heikkila and Weible 2018). I found that the way that threats to marine turtles, dugongs, humpback whales, and non-threatened migratory shorebirds are addressed in eastern Australia is not harmonised (Chapter 4). Despite these species having a shared status of Matters of National Environmental Significance (MNES), more policies and management plans from eastern Australia protect charismatic megafauna

(e.g. marine turtles, dugongs and humpback whales) than smaller species, such as migratory shorebirds.

I also found that in eastern Australian jurisdictions, environmental policies and management plans display low policy coherence and often do not connect to policies and/or management plans from other jurisdictions (Chapter 4). The Australian *Environment Protection and Biodiversity Conservation* (*EPBC*) *Act 1999* is the central link between state and Commonwealth legislation, emphasising its role in Australian environmental governance and importance in connecting legislation between states and stakeholders.

8.3 Understanding the involvement of stakeholders in the policy and management of four MNES in Australia (Objective 2)

Given that policy instruments protecting marine migratory species are not harmonised (Chapter 4), it is important to understand: 1) who is involved in the governance network mitigating threats to these species, 2) what values these network actors hold, 3) how these values influence relationships between different network actors, and 4) the barriers to, and opportunities for, stakeholder involvement in the governance system. I identified several actors (both government and non-government) across multiple scales involved in the governance network mitigating threats to marine migratory species in eastern Australia (Chapter 5). Of these different agencies, I identified three key actors (the Department of the Environment and Energy, the Great Barrier Reef Marine Park Authority, and independent researchers) within the governance system, reflecting a highly centralised governance regime (Chapter 5). Each actor also identified why they value marine migratory species; the ecological value of marine migratory species was the dominant value linking most of the actors in the governance network (Chapter 5). Initiating dialogue early and throughout the decision-making process can highlight the shared values of different network actors and promote better cross-scale collaboration, potentially decentralising decision-making in the mitigation of threats to marine turtles, dugongs, humpback whales, and non-threatened migratory shorebirds in eastern Australia.

As part of this objective, I also investigated barriers to, and opportunities for, increasing the involvement of stakeholders within the governance of threats to marine turtles, dugongs, humpback whales, and non-threatened migratory shorebirds in eastern Australia.

Respondents described barriers and opportunities that fell under four key themes: 1) decision-making processes, 2) information sharing processes, 3) institutional structures, and 4) participatory processes (Chapter 6). Many of the barriers and opportunities I identified were not unique to managing threats to marine migratory species and applied to environmental governance more broadly (e.g. capacity barriers; communication barriers). However, I also uncovered complex processes as an underexplored barrier that hinders the participation of non-government stakeholders in the governance of marine migratory species. Increased cross-scale collaboration between stakeholder agencies may be an opportunity for addressing several of the barriers identified by respondents (e.g. through information-sharing databases; better use of technology; Chapters 5 and 6). Further, introducing an intergovernmental memorandum of understanding to list migratory species may help simplify the process for mitigating threats to these species, as per the Common Assessment Method used for listing threatened species in Australia.

8.4 Develop a framework to assess and increase the collaborative governance of stakeholder agencies involved in the policy and management of marine migratory species (Objective 3)

In Chapter 7, I analysed the *Recovery Plan for Marine Turtles in Australia 2017* (the Plan) and three stock plans within it for evidence of collaborative governance. My analysis revealed that this Plan is a robust, comprehensive framework for managing marine turtles in Australia, but relies heavily on the biological components of threat management. The stakeholder engagement processes are underdeveloped. I identified the need for a more explicit approach to stakeholder engagement in the collaborative governance of threats to marine turtles in Australia (Chapter 7). I proposed that better stakeholder engagement in future versions of the Plan and other management plans protecting other marine migratory species could be achieved by including expertise from key stakeholder groups on planning committees, such as through representation on steering groups. Further, I recommended that future management plans include specific guidance about the roles available for stakeholder agencies who wish to participate more actively in the implementation of action within a management plan (Chapter 7).

8.5 Synthesis – harmonising the management of threats to marine migratory species in eastern Australia

The governance system mitigating threats to marine turtles, dugongs, humpback whales, and non-threatened migratory shorebirds in eastern Australia displays characteristics of effective environmental governance, including adaptive, collaborative, and polycentric governance (Sections 8.6.1; Chapters 4 – 7). However, the governance system is not harmonised, likely because Australia is a federation, with six semi-autonomous states and two territories. Each state and territory has the ability to create legislation and management instruments to govern the marine environment in their respective jurisdiction (up to three nautical miles offshore). However, these policy instruments can conflict with other jurisdictions, including the overarching, national *Environment Protection and Biodiversity Conservation Act 1999*. In addition to the lack of harmonisation of policy instruments across jurisdictions, because the Commonwealth marine jurisdiction is much larger than any of the marine jurisdictions at state/territory levels, governance of this regime remains highly centralised. Thus, even though the governance system has several strengths (e.g. involves multiple governance bodies in decision-making; has legislation that explicitly protects some of my case studies), my research indicates this system would benefit from some changes (Section 8.5.1; Chapters 4 – 7).

The governance regime I studied would benefit from changes to stakeholder involvement in decision-making, including by incorporating the key components of good environmental governance into the policy instruments protecting these species (Chapter 6; e.g. Bennett and Satterfield 2018). Some of the suggestions drawn from my results may be applicable to the statutory review of the *EPBC Act 1999* due to occur in 2019 (Chapters 5 and 6), while others would require a much more extensive overhaul of the governance system (described below).

One low-cost reform to the governance regime mitigating threats to marine migratory species could be through changes to the way collaborations are developed and implemented. Currently, collaborations to mitigate threats to these species in eastern Australia are issue-specific, often require travel by one or more stakeholder agencies, and can be difficult to coordinate (Chapters 5 – 7). Therefore, collaborations at the scale needed to govern threats to marine migratory species in this region can be costly. However, technology has greatly improved since the initial writing and implementation of the *EPBC Act 1999*, yet it is not adequately used in decision-making processes (Chapter 6). Thus, better use of technology may be an easier, lower-cost, and environmentally friendly way to connect stakeholders from throughout the range of a marine migratory species, reducing some of the costs affiliated with

collaboration (including environmental costs such as carbon emissions from air travel), as the need to travel could be nearly eliminated for all stakeholder agencies involved (Chapter 6). Further, increased use of technology may improve information sharing between network actors within the governance regime, particularly if an information sharing database is introduced that allows non-government stakeholder agencies to upload data and information (Chapters 6 and 7).

The governance system mitigating threats to marine migratory species in east Australia shows some evidence of information sharing, as discussed by some respondents (Chapters 5 – 7). For example, participants in the focus group provided examples of how they engage with researchers and other stakeholder agencies (e.g. engaging Indigenous groups in workshops) during the development of policy instruments, highlighting existing pathways of communication between stakeholder agencies (Chapters 6 and 7). Additionally, several respondents discussed how they maintain relationships with researchers in order to have access to scientific evidence for making biologically appropriate decisions (Chapters 6 and 7). However, it is important to note that several stakeholder agencies also highlighted communication and information sharing as a barrier to their involvement in the governance of marine migratory species (Chapter 6).

Some means to improve information sharing could be through the increased use of bridging actors (discussed in Chapters 5 and 6) or through the scaling-down of 'umbrella' documents to make information more accessible to non-government stakeholders (Chapter 7). A recent example of such 'scaling-down' of an umbrella document comes from the Great Barrier Reef Marine Park Authority (GBRMPA). Non-government stakeholder agencies (e.g. tourism operators; local divers) recently expressed concern that the permitting requirements for removing Crown of Thorns Starfish (CoTS) from the Marine Park were unclear (pers. comm. Townsville Local Marine Advisory Committee). As a response to these concerns, the GBRMPA updated their website to make it clearer to marine park users where in the Marine Park permits are needed to remove CoTS and provided links to the appropriate guidelines for removing CoTS (pers. comm. Townsville Local Marine Advisory Committee; see http://www.gbrmpa.gov.au/our-work/our-programs-and-projects/crown-of-thorns-starfish-control-program/crown-of-thorn-starfish-control-permit-requirement). Introducing a scaled-down, plain English, version of important policy documents for marine migratory species with large ranges (e.g. the *Recovery Plan for Marine Turtles in Australia 2017*; Australian

National Guidelines for Whale and Dolphin Watching), such as operational guidelines or infographics, may help make these policy instruments become more accessible to non-government stakeholder agencies. Accessibility may then increase the future engagement of stakeholder agencies from all governance levels and jurisdictions in implementing management actions (Chapter 6).

Information sharing between stakeholder agencies early in the decision-making process can help increase the transparency of governance processes and reduce the complexity of processes by involving stakeholders from the beginning, thereby allowing non-government stakeholders to better understand where they can become involved and how to influence governance (Chapters 6 and 7). Improving information sharing by having a resource (e.g. a national data repository; better use of citizen science programs) that is accessible and easy to understand for non-government stakeholders may also help increase the participation of such stakeholder agencies. Improving the flow of information between stakeholder agencies would not only improve the polycentricity of the governance system surrounding marine migratory species in Australia, but could also increase accountability and improve the adaptability of the governance regime protecting these species.

A necessary, but potentially resource-intensive, reform to the governance regime would be the introduction of clearly defined processes that are both 'top-down' and 'bottom-up' to reflect the polycentricity of the governance system protecting marine migratory species in east Australia (Chapters 6 and 7). Australia's environmental governance system is highly centralised in that the Commonwealth Minister for the Environment (and the DotEE) is charged with all decision-making pertaining to national MNES (Chapters 5 – 7). Centralised approaches to natural resource governance can potentially cause controversy, as different socioeconomic and political contexts make it difficult for the universal application of environmental solutions across local, regional, and national scales (Farrier et al. 2007; Koetz et al. 2012; Young 2006). The appointment of a representative steering group of stakeholder agencies involved in the governance of marine migratory species (including both government and non-government stakeholder agencies; Chapters 5 – 7) may be one means to capitalise on Australia's centralised governance system while also recognising and incorporating the needs of lower-level governance bodies into decision-making.

Building the legislative capacity to develop, appoint, and fund these steering groups into the revised *EPBC Act 1999* (and/or successive environmental laws) and at state/territory levels may help improve the overall capacity of the governance regime protecting all *EPBC*-listed marine migratory species in Australia (Runge et al. 2017). At a state and territory level, introducing a Memorandum of Understanding (MoU) for listing marine migratory species could help harmonise the governance of threats to these species and further support the appointment of representative, expertise-based steering groups. Having these processes outlined in statutory policy instruments may also help to coordinate the actions of the stakeholder agencies involved in mitigating threats to marine migratory species (Chapter 7) and develop clearer pathways for bottom-up governance approaches.

One component of promoting bottom-up governance approaches is that the roles of stakeholders involved in the governance of marine migratory species are explicitly outlined (Chapter 7; Ross and Dovers 2008; Bennett and Dearden 2013). East Australia's current system of governing threats to marine migratory species, particularly threats to marine turtles, lacks this component (Chapter 7). Deliberately including stakeholder agencies early in planning processes (such as on a steering group) may help to increase stakeholder engagement in policy development and increase ownership of the governance interventions put into place as a result (Chapters 5 – 7; Benham and Daniell 2016). Increased ownership over governance interventions may then lead to greater collaboration and compliance within the governance of threats to marine migratory species in eastern Australia, while also reducing conflict (Chapters 5 – 7).

Coordinated monitoring of marine migratory species is one means to improve collaboration and increase the system's ability to adapt. Collaborative monitoring can challenge the perceptions of the governance bodies by linking and building partnerships between governance bodies who hold different values and beliefs that did not previously exist (Chapters 5 and 6; Fernandez-Gimenez et al. 2008; Runge et al. 2017). Including social scientists on steering groups and making better use of bridging actors can help promote this coordination and collaborative monitoring within eastern Australia. Coordinated monitoring of Matters of National Environmental Significance within the Great Barrier Reef World Heritage area (e.g. *EPBC*-listed migratory species) is a component of the Reef Integrated Monitoring and Reporting Program (RIMREP). RIMREP aims to incorporate multiple knowledge types from a range of stakeholder agencies (e.g. Traditional Owners; research

organisations; government agencies). Additionally, RIMREP aims to monitor values (both ecological and social) associated with MNES (including marine migratory species) across multiple governance scales within the Great Barrier Reef World Heritage area (an area of 385,000 square kilometres; GBRMPA: Differences between the Marine Park and the World Heritage Area; Hedge et al. 2013). However, no such program currently exists to monitor the values associated with *EPBC*-listed marine migratory species outside of the Great Barrier Reef World Heritage Area. Many *EPBC*-listed marine migratory species have ranges that extend beyond the Great Barrier Reef World Heritage Area (including the four taxa used as case studies in this thesis). Therefore, monitoring the social values across their range, in addition to the existing biological and ecological monitoring of marine migratory species, may help promote robust and effective collaborative governance within a large-scale, polycentric system.

8.6 Suggestions for future research

I focused solely on the governance of marine migratory species at a national level within Australia and from eastern states. However, international agreements and treaties play a large role in environmental governance in Australia (see Section 1.5; Chapters 4 – 7). For marine migratory species, there is much work around the governance of migratory shorebirds that use the East Asian-Australasian Flyway (e.g. Runge et al. 2017), including the declaration of World Heritage Sites that are important to migratory shorebird species (e.g. the July 2019 addition of China's Migratory Bird Sanctuaries along the coast of the Yellow Sea-Bohai Gulf; see http://www.xinhuanet.com/english/2019-07/05/c_138202316.htm). Additionally, the presence of international MoUs for marine turtles (https://www.cms.int/en/legalinstrument/iosea-marine-turtles) and dugongs (https://www.cms.int/dugong/en) and the existence of the scientific networks through the International Whaling Commission (e.g. https://iwc.int/entanglement-response-network) highlight the importance of collaboratively managing these species outside of Australia. Further, some of my case studies migrate to and/or have populations in other areas of Australia (e.g. dugongs and marine turtles have large populations in Western Australia and the Northern Territory; there is a separate west coast population of humpback whales). Future research could focus on the international collaborative governance of marine migratory species between Australia and other range states that marine turtles, dugongs, humpback whales, non-threatened migratory shorebirds, and other *EPBC*-listed marine

migratory species (e.g. great white sharks; threatened migratory shorebirds) migrate to, as well as the governance of these species throughout their entire range within Australia.

In Chapter 6, I discussed an unofficial 'hierarchy' of prioritising Matters of National Environmental Significance in Australia. My respondents suggested that migratory species are lower on the priority list for decision-makers when approving projects and/or making decisions. More research into this unofficial hierarchy could be useful to better understand environmental decision-making and governance of Australia's Matters of National Environmental Significance.

Another area of future research would be to investigate the role of stakeholder agencies that were missing from my research. Some industry groups, like fisheries and oil and gas agencies, declined my request for interviews because, in their opinion, they could not see the immediate relevance of their work to my research and thus, were reluctant to contribute staff time. However, my case study taxa are the highest triggers of referral under the *EPBC Act 1999.* For example, loggerhead turtles (*Caretta caretta*) are the migratory species that trigger referral under the *EPBC Act 1999* most frequently (81 times since the enactment of the *EPBC Act* 1999; pers. comm. Threatened Species Scientific Committee). Marine migratory species are often caught as by-catch in fisheries, thus having the potential to halt work on fishing boats, and governance of these species would benefit from collaboration between fisheries agencies and other stakeholder agencies (e.g. Riskas et al. 2016). Further, it is still unclear the effect that exploratory seismic testing for oil and gas has on some marine migratory species, like humpback whales (e.g. Dunlop et al. 2015; GBRMPA 2017). Greater involvement from industry bodies has the potential to improve industry practices to achieve improved economic outcomes and meet the needs of industry bodies, while also meeting the biological and ecological needs of the species being protected. Additionally, as emphasised throughout this thesis, future research should aim to better capture the viewpoints of Traditional Owners, given the important roles these groups play in managing populations of green turtles and dugongs in Northern Australia. Therefore, future research would benefit from better inclusion of these stakeholder agencies and can provide more insight into the different values held by these groups and how those values influence relationships within the network.

Finally, future research could focus on quantitative network measures into specific networks within the governance regime. For example, Weiss (2011) evaluated knowledge exchange

and policy influence networks within the governance system protecting marine turtles and dugongs in Northern Australia. Future research could focus on knowledge exchange, policy influence, as well as conflict resolution within the governance regime protecting the case studies I used in this thesis. This research would contribute to identifying potential power imbalances as well as identifying important conflict resolution techniques, ultimately increasing the robustness of the overall governance system mitigating threats to marine migratory species in eastern Australia and beyond.

8.7 Key findings and original contributions to knowledge from this research

Australia has an international reputation of having strong environmental governance (Bührs and Christoff 2006). No other country with a large marine jurisdiction has a single environmental legislative instrument that protects migratory species (e.g. the United States and Canada have separate Acts from their primary environmental legislation to protect migratory birds and marine mammals). The governance system mitigating threats to marine turtles, dugongs, humpback whales, and non-threatened migratory shorebirds in eastern Australia is indeed polycentric and robust (Chapters 4 – 7). However, throughout this thesis, I have argued that the governance system would benefit from harmonisation across jurisdictions and increased involvement of non-government stakeholders in developing and implementing governance interventions (Chapters 4 – 7).

The findings from my research are not limited to the four taxa I used as case studies in this thesis. The results of my thesis may help other jurisdictions identify and anticipate issues that may arise from managing threats to large-scale natural resources, including how to navigate barriers to stakeholder engagement appropriately and systematically. Examples of such jurisdictions include those collaboratively governing threats to marine migratory species with large ranges, including species occurring within and outside of national waters (e.g. species with ranges throughout the Coral Triangle; species with ranges throughout the Caribbean; Barrios-Garrido et al. 2019). Further, some of my results apply to the environmental governance of large-scale natural resources more broadly, such as ecosystem-based management. Here, I conclude by summarising my key findings.

Key finding 1: The formal structures of the governance system (e.g. legislation and management plans) protecting marine migratory species in eastern Australia are not harmonised (Chapter 4).

Marine migratory species with large ranges would benefit from harmonised and collaborative governance throughout their range, as these species are likely to face myriad threats as they move across jurisdictions. Introducing a Memorandum of Understanding (e.g. at the local/state/territory/Commonwealth level; between different nation states) to list and mitigate threats across the range of these species would be beneficial. My results provide a framework for analysing policy coherence in environmental governance more broadly.

Key finding 2: The overall governance network protecting marine migratory species in eastern Australia is highly centralised and has several barriers to effective stakeholder involvement (Chapters 5 and 6).

Coupled with weak policy coherence (Chapter 4), the informal structures of the governance system mitigating threats to marine migratory species indicate that the governance of threats to these species is not as effective as it could be. Taking advantage of bridging actors, such as independent researchers, developing and implementing representative steering groups, and promoting coordinated monitoring of *EPBC*-listed species throughout eastern Australia could promote collaboration, harmonise governance, and address some of the barriers discussed in Chapter 6.

Key finding 3: The governance system protecting marine migratory species in eastern Australia would benefit from better integration of the key components of environmental governance (Chapters 5 – 7).

One means of achieving good environmental governance of marine migratory species could be through steering committees and coordinated monitoring of *EPBC*-listed marine migratory species. These steering groups could generate new information sharing pathways that would promote collaboration and reduce complexity by assisting non-government stakeholders with interpreting policy instruments in order to better participate in the governance of these species. For example, in Western Australia, the Western Australian Government and Chevron recently supported a joint meeting for the groups working on flatback turtle programs in the Northwest Shelf region (Chapter 7). The key aims were to obtain confirmation that the broad

conservation goals of parties were being met and to determine if there were goals or ideas missing from the planned activities.

Coordinated monitoring of ecological and social values associated with marine migratory species could further support these collaborations and reduce complexity (Chapters 5 – 7). Increasing collaboration and reducing complexity benefits environmental governance of large-scale natural resources more broadly by integrating different knowledge types, values, thereby improving compliance and developing socially and biologically appropriate governance interventions.

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Appendix A.

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Appendix B.

INFORMATION SHEET – INTERVIEWS

PROJECT TITLE: **Understanding stakeholder involvement in policy and management of migratory taxa in the Australian marine environment: A case study approach**

You are invited to take part in a research project about **the role of stakeholders in the policy and management of marine migratory taxa in Australia**: marine turtles, dugongs (*Dugong dugon*) and humpback whales (*Megaptera novaeangliae*), and migratory shorebirds. Individually, these species (all six species of marine turtles and the 35 species of migratory shorebirds listed under the *Wildlife Conservation Plan for Migratory Shorebirds* 2015) are considered to be a Matter of National Environmental Significance (MNES). The study is being conducted by **Rachel Miller** and will contribute to the completion of her thesis in the **Doctorate of Philosophy (PhD)** in **Natural and Physical Sciences** at James Cook University.

If you agree to be involved in the study, you will be invited to participate in a **semi-structured interview**. The interview will be audio-taped, with your consent, and should only take, at most, 1 hour of your time. The interview will be conducted at the venue of your choice, but can also be conducted via Skype or phone call.

The overall purpose of this research is: To identify and understand the role of stakeholders (particularly non-government stakeholders) in the development of policy and management of marine migratory animals in Australia; through the use of four case studies: marine turtles, dugongs, humpback whales, and migratory shorebirds
(as listed under the *Wildlife Conservation Plan for Migratory Shorebirds 2015*).

In order to answer these questions, the primary objectives of this interview are to identify: 1) what drives stakeholder participation in the development of policy and management for marine migratory animals; and 2) barriers to, and opportunities for stakeholder engagement in the management of MNES taxa in Australia's marine environment.

If you agree to be involved in an interview, key points for discussion would include**:**

1) The importance of marine migratory taxa and their place in the legislative and management processes. For example,

- Why you think is it important to conserve marine migratory taxa, such as marine turtles, dugongs, humpback whales, and migratory shorebirds?
- What you understand as the process of using marine migratory taxa, such as marine turtles, dugongs, humpback whales, and migratory shorebirds, to trigger the EPBC Act or state legislation?
- How do you choose which MNES (or Matter of State Environmental Significance) to use to trigger legislation?
    - Is there a hierarchy (i.e. any MNES, migratory species, specific species?)
    - How might delisting humpback whales at a national level change their use as a trigger for the EPBC Act?

2) The role and motivation of your specific group or organization (and others) in the policy and management of marine migratory taxa. For example,

- What is the role of your organization in the policy and management of marine turtles, dugongs, humpback whales, and migratory shorebirds (i.e. funding/implementation/lobbying/etc.)?
- How did your role develop?
- How has the role of your organization changed over time?
- Do you see this role changing in light of the apparent government crackdown on people getting tax deductions for funds spent on environmental lobbying?
- Why is your group/organization influential in the policy and management of marine migratory taxa?

- When is (has) your group (been) active in the political and management processes regarding marine turtles, dugongs, humpback whales, and migratory shorebirds?
- What has been your historic involvement in these processes?
- What motivates your group or organization's participation in the policy and management of marine migratory taxa, such as turtles, dugongs, humpback whales, and migratory shorebirds (Why do you do what you do)?
    - Do you have different motivations for various taxa?
- What role do Indigenous groups play in the policy and management of marine turtles, dugongs, humpback whales, and migratory shorebirds?
    - What roles do you think indigenous groups should play?
    - How can their roles be improved?
- What role does the media play in influencing the policy and management of marine migratory taxa?
- What role does social media play in influencing the policy and management of marine migratory taxa?
- What role do online advocacy groups (such as GetUp) play in influencing the policy and management of marine migratory taxa? Do you think their influence will increase?
- What types of media do your organization use to obtain knowledge on migratory species? To lobby?

3) Identifying policy influencers and understanding networks in policy and management of marine migratory taxa.

- Who influences the policy and management development process that affects marine migratory taxa in Australia?
- How do they influence policy and management (What do they do that drives policy and/or management in a specific direction?)?
- What groups and organizations do you work with (aka Who is involved in your different networks?) Short-term/Long-term?
- Do these networks change over time?
- How do these networks change with changes in government?
- Are there any groups or organizations that you feel you cannot work with for a particular reason?
- Who do you lobby? How do you do this?
- From where does your group or organization operate from (i.e. metropolis/regional/coastal etc.)?
- Whose (or what) interests are missing from the political and management processes for marine migratory taxa?
- Whose (or what) interests are favoured?

4) Barriers and opportunities to involving stakeholders (particularly non-government groups) in the policy and management of marine migratory taxa, such as marine turtles, dugongs, humpback whales, and migratory shorebirds

- What are some of the barriers to involving different levels of stakeholders (particularly non-government groups) in the policy and management of marine migratory taxa?
- What are some of the opportunities or potential solutions to the barriers you mentioned (more specific during the interview) that would lead to more involvement of different types of stakeholders in the policy and management of marine migratory taxa?

Taking part in this study is completely voluntary and you can end your participation in the study at any time without explanation or prejudice.

If you know of others who may be interested in this study, please pass on this information sheet to them so they may contact me to volunteer for the study.

Your responses and contact details will be strictly confidential. The data from the study will be used in research publications and reports, which I am happy to provide copies of when they are complete, if requested. You will not be identified in any way in these publications.

If you have any questions about the study, please contact **Rachel Miller** or **Mark Hamann.**

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If you have any concerns regarding the ethical conduct of the study, please contact:
Human Ethics, Research Office
James Cook University, Townsville, Qld, 4811
Phone: (07) 4781 5011 (ethics@jcu.edu.au)

Appendix C.

INFORMED CONSENT FORM - INTERVIEWS

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Appendix D.

INFORMATION SHEET – FOCUS GROUP

PROJECT TITLE: **Understanding stakeholder involvement in policy and management of migratory taxa in the Australian marine environment: A case study approach**

You are invited to take part in a research project about **the role of stakeholders in the policy and management of marine migratory taxa in Australia**: marine turtles, dugongs (*Dugong dugon*) and humpback whales (*Megaptera novaeangliae*), and migratory shorebirds. Individually, these species (all six species of marine turtles and the 35 species of migratory shorebirds listed under the *Wildlife Conservation Plan for Migratory Shorebirds* 2015) are considered to be a Matter of National Environmental Significance (MNES). The study is being conducted by **Rachel Miller** and will contribute to the completion of her thesis in the **Doctorate of Philosophy (PhD)** in **Natural and Physical Sciences** at James Cook University.

If you agree to be involved in the study, you will be invited to participate in a **semi-structured focus group**. The focus group will consist of other members from your same agency or department. Focus groups will be audio-taped, with the consent of all participants, and should only take, at most, 1 hour of your time. The focus group will be conducted at the venue of your choice, but can also be conducted via Skype or phone call. There may be a scribe present to help me facilitate the discussion, but this person will be trained in social research methods and have been briefed on the confidentiality of this study. Scribe details will be provided to all participants before the focus group. If respondents are uncomfortable with having a scribe present, a scribe will not be used.

The overall purpose of this research is: To identify and understand the role of stakeholders (particularly non-government stakeholders) in the development of policy and management of marine migratory animals in Australia; through the use of four case studies: marine turtles, dugongs, humpback whales, and migratory shorebirds
(as listed under the *Wildlife Conservation Plan for Migratory Shorebirds 2015*).

In order to answer these questions, the primary objectives of this focus group are to identify: 1) what drives stakeholder participation in the development of policy and management for marine migratory animals; and 2) barriers to, and opportunities for stakeholder engagement in the management of MNES taxa in Australia's marine environment.

If you agree to be involved in the focus group, key points for discussion would include**:**

3) The importance of marine migratory taxa and their place in the legislative and management processes. For example,

- Why you think is it important to conserve marine migratory taxa, such as marine turtles, dugongs, humpback whales, and migratory shorebirds?
- What you understand as the process of using marine migratory taxa, such as marine turtles, dugongs, humpback whales, and migratory shorebirds, to trigger the EPBC Act or state legislation?
- How do you choose which MNES (or Matter of State Environmental Significance) to use to trigger legislation?
    - Is there a hierarchy (i.e. any MNES, migratory species, specific species?)
    - How might delisting humpback whales at a national level change their use as a trigger for the EPBC Act?

4) The role and motivation of your specific group or organization (and others) in the policy and management of marine migratory taxa. For example,

- What is the role of your organization in the policy and management of marine turtles, dugongs, humpback whales, and migratory shorebirds (i.e. funding/implementation/lobbying/etc.)?
- How did your role develop?
- How has the role of your organization changed over time?
- Do you see this role changing in light of the apparent government crackdown on people getting tax deductions for funds spent on environmental lobbying?

- Why is your group/organization influential in the policy and management of marine migratory taxa?
- When is (has) your group (been) active in the political and management processes regarding marine turtles, dugongs, humpback whales, and migratory shorebirds?
- What has been your historic involvement in these processes?
- What motivates your group or organization's participation in the policy and management of marine migratory taxa, such as turtles, dugongs, humpback whales, and migratory shorebirds (Why do you do what you do)?
    - Do you have different motivations for various taxa?
- What role do Indigenous groups play in the policy and management of marine turtles, dugongs, humpback whales, and migratory shorebirds?
    - What roles do you think indigenous groups should play?
    - How can their roles be improved?
- What role does the media play in influencing the policy and management of marine migratory taxa?
- What role does social media play in influencing the policy and management of marine migratory taxa?
- What role do online advocacy groups (such as GetUp) play in influencing the policy and management of marine migratory taxa? Do you think their influence will increase?
- What types of media do your organization use to obtain knowledge on migratory species? To lobby?

5) Identifying policy influencers and understanding networks in policy and management of marine migratory taxa.

- Who influences the policy and management development process that affects marine migratory taxa in Australia?
- How do they influence policy and management (What do they do that drives policy and/or management in a specific direction?)?
- What groups and organizations do you work with (aka Who is involved in your different networks?) Short-term/Long-term?
- Do these networks change over time?
- How do these networks change with changes in government?
- Are there any groups or organizations that you feel you cannot work with for a particular reason?
- Who do you lobby? How do you do this?
- From where does your group or organization operate from (i.e. metropolis/regional/coastal etc.)?
- Whose (or what) interests are missing from the political and management processes for marine migratory taxa?
- Whose (or what) interests are favoured?

6) Barriers and opportunities to involving stakeholders (particularly non-government groups) in the policy and management of marine migratory taxa, such as marine turtles, dugongs, humpback whales, and migratory shorebirds

- What are some of the barriers to involving different levels of stakeholders (particularly non-government groups) in the policy and management of marine migratory taxa?

- What are some of the opportunities or potential solutions to the barriers you mentioned (more specific during the focus group) that would lead to more involvement of different types of stakeholders in the policy and management of marine migratory taxa?

Taking part in this study is completely voluntary and you can end your participation in the study at any time without explanation or prejudice.

If you know of others who may be interested in this study, please pass on this information sheet to them so they may contact me to volunteer for the study.

Your responses and contact details will be strictly confidential. The data from the study will be used in research publications and reports, which I am happy to provide copies of when they are complete, if requested. You will not be identified in any way in these publications.

If you have any questions about the study, please contact **Rachel Miller** or **Mark Hamann.**

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Appendix E.

INFORMED CONSENT FORM – FOCUS GROUP

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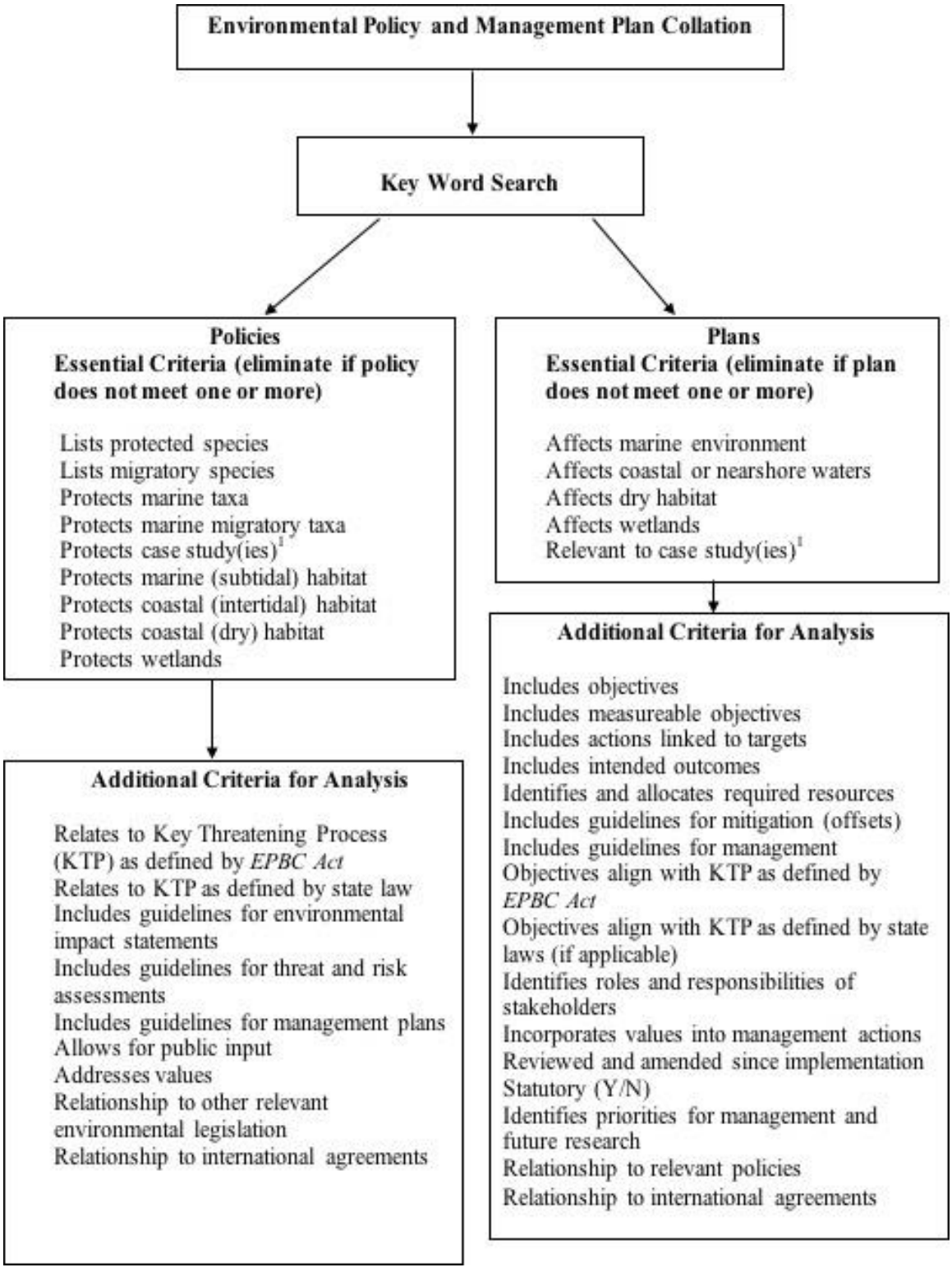
Appendix F.



[1]Marine turtles, dugongs, humpback whales, or migratory shorebirds, all of which are considered to be Matters of National Environmental Significance (MNES) in Australia.

Figure F1. Graphic depiction of the systematic review process, including essential and additional criteria used for determining inclusion or exclusion of environmental policies and management plans at the Commonwealth and state (NEW SOUTH WALES, Queensland, Tasmania, and Victoria) levels.

Appendix G.

Table G1. A non-exhaustive list of national policy instruments, excluding species-specific policy instruments, addressing threats for each of the taxa used as case studies in this study.

Species or Group	National Policy Instrument Addressing Threats
Marine Turtles	*Recovery Plan for Marine Turtles in Australia 2017* - Statutory National Strategy for Mitigating Vessel Strike of Marine Mega-fauna 2017 - guidance *Threat abatement plan for the impacts of marine debris on vertebrate marine life 2017* - Statutory *Threat abatement plan for predation by feral cats 2015* – Statutory *Threat abatement plan for predation by the European red fox 2008* - Statutory *Threat abatement plan for predation, habitat degradation, competition, and disease transmission by feral pigs (Sus scrofa) 2017* – Statutory
Dugong	National Strategy for Mitigating Vessel Strike of Marine Mega-fauna 2017 - guidance *Threat abatement plan for the impacts of marine debris on vertebrate marine life 2017* – Statutory
Humpback Whale	*National Strategy for Mitigating Vessel Strike of Marine Mega-fauna 2017* – guidance *Threat abatement plan for the impacts of marine debris on vertebrate marine life 2017* – Statutory EPBC Act Policy Statement 2.1 - Interaction between offshore seismic exploration and whales: Industry guidelines 2008 – guidelines Australian National Guidelines for Whale and Dolphin Watching 2017 – Guidelines Conservation Advice *Megaptera novaeangliae* (2015) - Statutory
Migratory Shorebirds[1]	*Wildlife Conservation Plan for Migratory Shorebirds 2015* - statutory EPBC Act Policy Statement 3.21 Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species – guidance

[1]There are 35 species listed under the *Wildlife Conservation Plan for Migratory Shorebirds 2015*; some species have since been listed as threatened, but the Plan has not yet been amended. This study considers 27 non-

threatened species that are listed as migratory and visit the east coast of Australia. The policy instruments included in this table are only for non-threatened migratory shorebirds included in the Plan.

Table G2. Descriptions of the types of environmental management plans reviewed for this study.

Plan Type	Description	Statutory Requirement
Recovery plan	Outlines the research and management actions needed to maximise the long-term survival of threatened species or communities (*EPBC Act 1999*)	Legislative instrument indicating that Commonwealth agency must not contravene a Recovery Plan (RP) and Minister must consider RP before approving decisions (Section 268 *EPBC Act 1999*)
Conservation advice	Provides guidance on broader management actions for immediate recovery and threat abatement so as to ensure the conservation of newly listed species or ecological communities (*EPBC Act 1999*)	Must be created for all listed threatened species (except extinct or Conservation Dependent) or threatened ecological communities (Section 266B of *EPBC Act 1999*)
Wildlife conservation plan (WCP)	Identifies the research and management actions needed to protect a marine, migratory, conservation dependant, or cetacean species that is not listed as endangered or vulnerable under the EPBC Act *1999*, but that would benefit from coordinated conservation efforts (*EPBC Act 1999*)	Commonwealth agency must complete all activities in accordance with created WCP (Section 286 *EPBC Act 1999*)
Threat abatement plan (TAP)	Provides guidelines on the research, management, and other actions needed to reduce effects of a key threatening process on listed species and ecological communities (*EPBC Act 1999*)	Legislative instrument indicating that Commonwealth agency must not contravene a TAP and Minister must consider TAP before approving decisions (Section 268 *EPBC Act 1999*)
Protected area management (PAM) Plan	Outlines threats, management principles, and management outcomes of an area listed as protected for its natural or cultural value (Queensland Dept. of National Parks, Sport and Racing)	Legislative instrument created under a state's primary environmental policy
Industry- generated environmental management plan (including fisheries)	Identifies how industry actions might impact the environment and outlines how those actions can be avoided, mitigated, or managed to meet legislative requirements (*EPBC Act 1999*)	Usually created alongside Environmental Impact Assessment when applying for a permit; not a legislative instrument (Section 101 *EPBC Act 1999*)
Marine bioregional plan	Identifies key conservation values, ecological features, regional priorities and pressures and provides advice to help support better informed decision-making regarding activities in the region (Dept. of Environment and Energy)	May be created for a Commonwealth bioregional area and Minister must consider plan when making decisions that affect the area protected by the bioregional plan (Section 176 *EPBC Act 1999*)

Appendix H.

Table H1. A list of the relevant legislation reviewed for this study, determined by a thematic analysis.

Policy Name	**Jurisdiction**
EPBC Act 1999	Commonwealth
Environment Protection (Sea Dumping) Act 1981	Commonwealth
Fisheries Management Act 1991	Commonwealth
Torres Strait Fisheries Agreement 1984	Commonwealth
Great Barrier Reef Marine Park Act 1975	Commonwealth
Native Title Act 1993	Joint (Commonwealth & Queensland)
GBR Intergovernmental Agreement 2015	Joint (Commonwealth & Queensland)
Coastal Protection Act 1979	New South Wales
Marine Estate Management Act 2014	New South Wales
Fisheries Management Act 1994	New South Wales
Threatened Species Conservation Act 1995 (Replaced with Biodiversity Conservation Act 2016)	New South Wales
Native Vegetation Act 2003	New South Wales
National Parks and Wildlife Act 1974	New South Wales
Marine Parks Act 2004	Queensland
Nature Conservation Act 1992	Queensland
Coastal Protection and Management Act 1995	Queensland
Fisheries Act 1994	Queensland
Threatened Species Protection Act 1995	Tasmania
State Coastal Policy 1996	Tasmania
Living Marine Resources Act 1995	Tasmania
Whale Protection Act 1988	Tasmania
Flora and Fauna Guarantee Act 1988	Victoria
Coastal Management Act 1995	Victoria

Table H2. A list of the relevant management documents reviewed for this study, determined by a theme analysis.

Management Plan Name	**Jurisdiction**
Threat abatement plan for predation by feral cats 2015	Commonwealth
National Strategy for Mitigating Vessel Strike of Marine Mega-fauna 2017	Commonwealth
North Marine Bioregional Plan	Commonwealth
Southeast Marine Bioregional PROFILE (Not plan)	Commonwealth
Temperate East Marine Bioregional Plan	Commonwealth
Threat abatement plan for the impacts of marine debris on vertebrate marine life 2017	Commonwealth
Threat abatement plan for predation by the European red fox 2008	Commonwealth
Threat abatement plan for predation, habitat degradation, competition, and disease transmission by feral pigs (Sus scrofa) 2017 – Statutory	Commonwealth
EPBC Act Policy Statement 2.1 - Interaction between offshore seismic exploration and whales: Industry guidelines 2008	Commonwealth
The National Policy on Fisheries Bycatch	Commonwealth
Recovery Plan for Marine Turtles 2017	Commonwealth
Wildlife Conservation Plan for Migratory Shorebirds 2015	Commonwealth
Conservation Advice: Megaptera novaeangliae	Commonwealth
Action Plan for Australian Birds	Commonwealth

Action Plan for Australian Mammals	Commonwealth
EPBC Act Policy Statement 3.21 Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species	Commonwealth
Australian National Guidelines for Whale and Dolphin Watching 2017	Commonwealth
National Assessment Guidelines for Dredging 2009	Commonwealth
Commonwealth Fisheries Bycatch Strategy	Commonwealth
Australian Tuna and Billfish Fisheries Bycatch and Discarding Workplan	Commonwealth
Coral Sea Fishery Bycatch and Discard Work Plan	Commonwealth
Northern Prawn Fishery Bycatch Strategy	Commonwealth
Small Pelagic Fishery Management Plan 2009	Commonwealth
Torres Strait Prawn Fishery Bycatch and Discarding Workplan	Commonwealth
National Dugong and Turtle Protection Plan 2014 – 2017	Commonwealth
Reef 2050 Plan	Joint
Sustainable Harvest of Marine Turtles and Dugongs in Australia – A National Partnership Approach 2005	Joint
Green Port Guidelines – Port Authority of NSW	New South Wales
Sydney Port Botany Terminal 3 Project – Shorebird Management Plan	New South Wales
Sydney Port Botany Terminal 3 Project Phase 2 & 3 – SICTL Main Works Construction Environmental Management Plan Phase 2 & 3	New South Wales
Bird Hazard Management Plan – Port Botany	New South Wales
Port Botany Expansion – Marine Mammal Management Plan	New South Wales
Bournda National Park and Bournda Nature Reserve Plan of Management	New South Wales
Berkeley Nature Reserve Plan of Management	New South Wales
Bongil Bongil National Park Plan of Management	New South Wales
Booti Booti State Recereation Area Plan of Management	New South Wales
Botany Bay National Park Plan of Management	New South Wales
Broadwater National Park Plan of Management	New South Wales
Clarence Estuary Nature Reserve Plan of Management	New South Wales
Cockle Bay, Rileys Island, Pelican Island and Saratoga Island Nature Reserves Plan of Management	New South Wales
Conjola National Park Plan of Management	New South Wales
Cook Island Nature Reserve Plan of Management	New South Wales
Julian Rocks Nature Reserve Plan of Management	New South Wales
Coastal Management Plan	Queensland
Hinchinbrook Plan of Management	Queensland
Shoalwater Bay (Dugong) Plan of Management	Queensland
Whitsundays Plan of Management	Queensland
Protected areas in the Agnes Water/1770 area Management Plan	Queensland
Bakers Creek Conservation Park Management Plan	Queensland
Barnard Islands National Park Management Plan	Queensland
Bowling Green National Park Management Plan	Queensland
Brook Islands National Park and Goold Islands National Park Management Plan	Queensland

Buckley's Hole Conservation Park Management Plan	Queensland
Bullock Creek Conservation Park Management Plan	Queensland
Burleigh Head National Park Management Plan	Queensland
Fitzroy Island National Park and Marine Management Area Management Plan	Queensland
Holbourne Island National Park and adjoining State Waters Management Plan	Queensland
Capricornia Cays National Park and adjoining State Waters Management Plan	Queensland
Marine Parks (Moreton Bay) Zoning Plan 2008	Queensland
Marine Parks (Great Barrier Reef Coast) Zoning Plan 2004	Queensland
The Great Barrier Reef Marine Parks Shark Control Program	Queensland
Port of Cape Flattery Environmental Management Plan 2014	Queensland
Environmental management plan (Dredging) Port of Cooktown	Queensland
Port of Cairns Long-term Management Plan	Queensland
Hey River Capital Dredge Management Plan – River Facilities	Queensland
Long Term Management and Monitoring Plan for Maintenance Dredging and Disposal – Port of Karumba Entrance Channel (2013-2022)	Queensland
Port of Mourilyan Environmental Management Plan 2009	Queensland
Port of Weipa Environmental Management Plan	Queensland
Port of Thursday Island environmental Management Plan 2014	Queensland
Western Basin Dredging and Disposal Project – Biodiversity Offset Strategyn	Queensland
Australia Business Unit East Migratory Shorebird Management Plan - Operations	Queensland
Pipeline Threatened Fauna Management Plan – Australia Pacific LNG Upstream Project	Queensland
Curtis Island Long-term Management plan	Queensland
Santos GLNG Significant Species Management Plan – GFD Project	Queensland
Port of Hay Point – Environmental Management Plan	Queensland
Port of Abbot Point Land Use Plan	Queensland
Port of Lucinda – Statement of Proposal for Land Use Plan	Queensland
Blackman Bay Marine Farming Development Plan 2000	Tasmania
Far North West Marine Farming Development Plan	Tasmania
Pipe Clay Lagoon Marine Farming Development Plan	Tasmania
Great Oyster Bay and Mercury Passage Marine Farming Plan	Tasmania
Marine Farming Development Plan	Tasmania
Port Sorell Estuary Environmental Impact Statement To Accompany Draft No. 4 To D'entrecasteaux Channel Mfdp 2002 – A Request To: Amend Zone 18b	Tasmania
Draft Amendment No.6 To D'entrecasteaux Channel Marine Farming Plan February 2002 (amendment submitted in 2015)	Tasmania

Arthur-Pieman Conservation Area Management Plan 2002	Tasmania
Small Bass Strait Islands Reserves – Draft Management Plan	Tasmania
Joint Management Plan for the Egg Islands Reserve and Egg Islands Conservation Area 2009	Tasmania
Freycinet National Park (Wye River State Reserve) Management Plan 2000	Tasmania
Kent Group National Park (Terrestrial Portion) Management Plan 2005	Tasmania
Logan Lagoon Conservation Area (Ramsar Site) Management Plan 2000	Tasmania
Maria Island and Ile Des Phoques Nature Reserve Management Plan 1998	Tasmania
Moulting Lagoon Game Reserve (Ramsar Site) Management Plan 2003	Tasmania
North East River Game Reserve Management Plan	Tasmania
Pitt Water Nature Reserve Management Plan	Tasmania
TasPorts Environmental Policy	Tasmania
Port Davey Marine Reserve (Commercial Visitor Guidelines)	Tasmania
Melaleuca -Port Davey Area Plan (in conjunction with Port Davey Visitor Guidelines)	Tasmania
Sandringham Foreshore Coastal Management Plan	Victoria
Shipwreck Coast Master Plan – Master Plan Report	Victoria
Barwon Bluff Marine Sanctuary Management Plan 2007	Victoria
Beware Reef Marine Sanctuary Management Plan 2006	Victoria
Bunurong Marine National Park (Bunurong Marine Park, Bunurong Coastal Reserve and Kilcunda-Harmers Haven Coastal Reserve) Management Plan 2006	Victoria
Cape Conran Coastal Park Management Plan 2005	Victoria
Cape Howe Marine National Park Management Plan 2006	Victoria
Cape Liptrap Coastal Park Management Plan	Victoria
Corner Inlet Marine National Park Management Plan 2005	Victoria
Croajingolong National Park Management Plan 1996	Victoria
French Island National Park Management Plan 1998	Victoria
Yaringa Marine National Park, French Island Marine National Park, Churchill Island Marine National Park Management Plan	Victoria
Gippsland Lake Ramsar Site Strategic Management Plan	Victoria
Jawbone Marine Sanctuary Management Plan 2007	Victoria
Merri Marine Sanctuary Management Plan 2007	Victoria
Mushroom Reef Sanctuary Management Plan 2007	Victoria
Port of Melbourne Operations Pty Ltd. Dredging Program 2012 – 22 Environmental Management Plan	Victoria
Western Port Ramsar Site Management Plan	Victoria
Victorian Coastal Strategy 2014	Victoria

Table H3. A list of policies and management plans that address key threatening processes defined by either the *EPBC Act 1999* or state legislation.

Policy Instrument Name	**Jurisdiction**	**Instrument Type**
EPBC Act 1999	Commonwealth	Policy
Fisheries Management Act 1991	Commonwealth	Policy

Threat abatement plan for predation by feral cats 2015	Commonwealth	Plan
North Marine Bioregional Plan	Commonwealth	Plan
Temperate East Marine Bioregional Plan	Commonwealth	Plan
Threat abatement plan for the impacts of marine debris on vertebrate marine life 2017	Commonwealth	Plan
Threat abatement plan for predation by the European red fox 2008	Commonwealth	Plan
Threat abatement plan for predation, habitat degradation, competition, and disease transmission by feral pigs (Sus scrofa) 2017	Commonwealth	Plan
Wildlife Conservation Plan for Migratory Shorebirds 2015	Commonwealth	Plan
Conservation Advice *Megaptera novaeangliae*	Commonwealth	Plan
EPBC Act Policy Statement 3.21 Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species	Commonwealth	Plan
GBR Intergovernmental Agreement 2015	Joint – Commonwealth and Queensland	Policy
Recovery Plan for Marine Turtles in Australia 2017	Joint – Commonwealth, Queensland, and New South Wales	Plan
Marine Estate Management Act 2014	New South Wales	Policy
Sydney Port Botany Terminal 3 Project Phase 2 & 3 – SICTL Main Works Construction Environmental Management Plan Phase 2 & 3	New South Wales	Plan
Bournda National Park and Bournda Nature Reserve Plan of Management	New South Wales	Plan
Berkeley Nature Reserve Plan of Management	New South Wales	Plan
Booti Booti State Recereation Area Plan of Management	New South Wales	Plan

Botany Bay National Park Plan of Management	New South Wales	Plan
Broadwater National Park Plan of Management	New South Wales	Plan
Clarence Estuary Nature Reserve Plan of Management	New South Wales	Plan
Cockle Bay, Rileys Island, Pelican Island and Saratoga Island Nature Reserves Plan of Management	New South Wales	Plan
Conjola National Park Plan of Management	New South Wales	Plan
Cook Island Nature Reserve Plan of Management	New South Wales	Plan
Julian Rocks Nature Reserve Plan of Management	New South Wales	Plan
Bowling Green National Park Management Plan	Queensland	Plan
Holbourne Island National Park and adjoining State Waters Management Plan	Queensland	Plan
Capricornia Cays National Park and adjoining State Waters Management Plan	Queensland	Plan
Marine Parks (Moreton Bay) Zoning Plan 2008	Queensland	Plan
Pipeline Threatened Fauna Management Plan – Australia Pacific LNG Upstream Project	Queensland	Plan
State Coastal Policy 1996	Tasmania	Policy
Living Marine Resources Act 1995	Tasmania	Policy
Environmental Impact Statement To Accompany Draft No. 4 To D'entrecasteaux Channel Mfdp 2002 – A Request To: Amend Zone 18b	Tasmania	Plan
Draft Amendment No.6 To D'entrecasteaux Channel Marine Farming Plan February 2002 (amendment submitted in 2015)	Tasmania	Plan

Joint Management Plan for the Egg Islands Reserve and Egg Islands Conservation Area 2009	Tasmania	Plan
Logan Lagoon Conservation Area (Ramsar Site) Management Plan 2000	Tasmania	Plan
Maria Island and Ile Des Phoques Nature Reserve Management Plan 1998	Tasmania	Plan
North East River Game Reserve Management Plan	Tasmania	Plan
Pitt Water Nature Reserve Management Plan	Tasmania	Plan
Flora and Fauna Guarantee Act 1988	Victoria	Policy
Sandringham Foreshore Coastal Management Plan	Victoria	Plan
Barwon Bluff Marine Sanctuary Management Plan 2007	Victoria	Plan
Beware Reef Marine Sanctuary Management Plan 2006	Victoria	Plan
Bunurong Marine National Park (Bunurong Marine Park, Bunurong Coastal Reserve and Kilcunda-Harmers Haven Coastal Reserve) Management Plan 2006	Victoria	Plan
Corner Inlet Marine National Park Management Plan 2005	Victoria	Plan
Croajingolong National Park Management Plan 1996	Victoria	Plan
French Island National Park Management Plan 1998	Victoria	Plan
Jawbone Marine Sanctuary Management Plan 2007	Victoria	Plan

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Appendix I.

Table I1. A list of the codes assigned to identify stakeholder relationships from qualitative semi-structured interviews. This list is an expanded list of Table 3.3 (Chapter 3) and represents all stakeholder agencies who 1) participated in an interview or in the focus group or 2) were identified as having a relationship with other stakeholder agencies within the governance network.

Stakeholder Agency	Code	Agency Type	Jurisdiction
Commonwealth Government Agency	CG	Government	Commonwealth
State Government Agency	SGA	Government	State
Generic Government Agency	GA	Government	General
New South Wales State Government Agency	NSWSGA	Government	State
Queensland State Government Agency	QSGA	Government	State
Tasmanian State Government Agency	TSGA	Government	State
Victorian State Government Agency	VSGA	Government	State
Local Government Agency	LG	Government	General
Natural Resource Management Group	NRM	Government	General
Independent Researcher	IR	Non-government	General
Indigenous Representatives	INGR	Non-government	General
Industry	IND	Non-government	General
Fisheries Industry	FISH	Non-government	General
Mining Industry	MI	Non-government	General
Ports Industry	PI	Non-government	General
Tourism Industry	TI	Non-government	General
Non-government Organisation	NGO	Non-government	General
National non-government organisation	NNGO	Non-government	Commonwealth
Local non-government organisation	LNGO	Non-government	Local
Environmental non-government organisation	ENGO	Non-government	General
State non-government organisation	SNGO	Non-government	State
Queensland non-government organisation	QNGO	Non-government	State
Victorian non-government organisation	VNGO	Non-government	State
Tasmanian non-government organisation	TNGO	Non-government	State
Professional Agency	PA	Non-government	General
Community group	COMM	Non-government	General
International Agency	INTA	Non-government	International

Appendix J.

Table J1. The affiliation and associated jurisdictions of respondents and the number of respondents from each agency. This table is a reprint of Table 5.1 (Chapter 5).

Stakeholder Agency and Jurisdiction	**Number**
Government	
Commonwealth Agencies	3
Queensland Agencies	1
Queensland Local Government Agency	1
New South Wales Agencies	3
Victorian Agencies	3
Tasmanian Agencies	2
NGO	
National	9
Queensland	3
Victoria	1
Independent Researchers	
National	4
Indigenous	
Torres Strait Islander	1
Aboriginal Australian	1
Industry Representatives	
Fisheries	2
Ports	2
Tourism	2

Appendix K.

1. The *Recovery Plan for Marine Turtles in Australia 2017*

Australia is home to six species of marine turtles that are all protected under Australian environmental legislation. This statutory Plan was officially 'made' jointly by the federal Minister for the Environment and the Ministers for the Environment from Queensland and New South Wales. Under the *EPBC Act 1999*, a recovery plan is a statutorily-binding instrument that may be created for threatened species (*EPBC Act 1999* Division 5, Section 269A, Subsection 2a) and is designed to identify the research and management actions required to stop the decline of and to aid in the recovery of declining populations of listed threatened species or ecological communities (*EPBC Act 1999* Division 5, Section 270, Subsection 1).

The first national recovery plan for marine turtles was created in 2003 and reviewed in 2013 (*Recovery Plan for Marine Turtles in Australia 2017*). After this review, the Commonwealth Government recommended that the plan be redesigned with state and territory governments, Traditional Owners, and other key stakeholders across the Australian range of marine turtles (*Recovery Plan for Marine Turtles in Australia 2017*). The 2017 Plan has a life of ten years with the long-term objective of minimising threats to marine turtles protected under the *EPBC Act 1999* so that they can be removed from the threatened species list and several short-term objectives designed to promote the recovery of marine turtles in Australia (*Recovery Plan for Marine Turtles in Australia 2017*).

The Plan also includes descriptions of the life history traits of marine turtles, priority actions for all species, including 22 individual, genetically-separated stocks in Australia, and 19 of the anthropogenic threats that marine turtles face (*Recovery Plan for Marine Turtles in Australia 2017*). In addition, the Plan lists adaptive management actions to address anthropogenic threats, indicating an intention to evaluate and adjust the Plan as one of its interim targets (Target 3.1). The Plan identifies potential collaborators for each management action, including federal and state agencies, independent research experts, industry partners, and Indigenous communities, among others (e.g. Action Area 2 in the *Recovery Plan for Marine Turtles in Australia 2017*).

1.1 South-west Pacific stock of loggerhead turtles

The south-west Pacific stock of loggerheads is protected internationally (e.g. CITES Listing Appendix I), as well as under federal law in Australia (*EPBC Act 1999*), and under state laws in Queensland (*Nature Conservation Act 1992*) and in New South Wales (*Biodiversity Conservation Act 2016*). Further, in 2014, signatory parties to the Convention on the Conservation of Migratory Species (CMS) developed the *Single Species Action Plan for Loggerhead Turtles* (*Caretta caretta*) *in the South Pacific Ocean* (CMS *Single Species Action Plan for Loggerhead Turtles* (*Caretta caretta*) *in the South Pacific Ocean*; *Recovery Plan for Marine Turtles in Australia 2017*). Australia is one of the signatory parties to the CMS and aided in the drafting of the Plan (CMS 2017).

The south-west Pacific stock of loggerheads is demonstrating early stages of decline in Australia (Limpus et al. 2013; *Recovery Plan for Marine Turtles in Australia 2017*). Threats to this stock include bycatch of oceanic-stage individuals and predation of eggs and hatchlings, among others, which could have led to the early stages of decline that are being noticed in foraging grounds in Australia (*Recovery Plan for Marine Turtles in Australia 2017*). In response to declining turtle population sizes, turtle excluder devices (TEDs) were introduced into Australian trawl fisheries in 2001, leading to a recovery in the nesting turtle abundance in Australia (*Recovery Plan for Marine Turtles in Australia 2017*; Limpus 2009). However, despite recoveries, recruitment of juveniles is low and this stock of loggerheads is classified as 'early stages of decline' under the *Recovery Plan for Marine Turtles in Australia 2017*.

In Australia, this stock of loggerheads is primarily managed by the Queensland government (*Recovery Plan for Marine Turtles in Australia 2017*) and uses beaches along the southeast coast of Queensland and in New Caledonia for nesting (*Recovery Plan for Marine Turtles in Australia 2017;* Limpus 2009), with hatchlings dispersing to oceanic foraging grounds, including off South America (*Recovery Plan for Marine Turtles in Australia 2017*; Boyle et al. 2009).

1.2 Northern GBR stock of green turtles

Green turtles are protected internationally (e.g. CITES Listing Appendix I), federally within Australia (*EPBC Act 1999*), and under Queensland legislation (*Nature Conservation Act 1992*). The Northern GBR stock of green turtles also forages in the waters off the Northern Territory (*Recovery Plan for Marine Turtles in Australia 2017*) but are not listed as threatened under any Northern Territory legislation (nt.gov.au 2017). This stock of green turtles is collaboratively managed by the Queensland Government, the Great Barrier Reef Marine Park Authority (GBRMPA), the Torres Strait Regional Authority (TSRA), and Traditional Owners across its range (*Recovery Plan for Marine Turtles in Australia 2017*). Green turtles are an important cultural fishery to Aboriginal Australians and Torres Strait Islanders (Marsh et al. 2004). The majority (about 95%) of the Northern GBR stock of green turtles nests on Raine Island and Moulter Cay, located in Far North Queensland, off the coast of the Cape York Peninsula (*Recovery Plan for Marine Turtles in Australia 2017*; Limpus et al. 2003).

Raine Island National Park (Scientific) supports the largest aggregation of nesting green turtles in the world (Limpus et al. 2003). The Park is registered under an Indigenous Land Use Agreement, granting unrestricted access to the national park for Traditional Owners and outlining the co-management arrangements of the park (Raine Island National Park (Scientific) Indigenous Land Use Agreement). Raine Island is such an important area for nesting green turtles and an important cultural heritage place for Aboriginal and Torres Strait Islanders that a five-year, multi-million dollar restoration project was launched in collaboration with BHP (industry), the Queensland Government (state), the GBRMPA (federal), Wuthati and Kemer Kemer Meriam Nation (Ugar, Mer, Erub) nations (Traditional Owners), through the Great Barrier Reef Foundation (charity) (Queensland Government 2017). The Raine Island Recovery Project is the first of its kind in the area focusing on understanding and addressing the causes of low nesting and hatching success and high adult mortality of green sea turtles (Queensland Government 2017). This recovery project aims to protect and restore important island habitat to preserve the future of important marine species, including green turtles and seabirds (Queensland Government 2017). Objectives include restoring nesting habitat through beach re-profiling, rescuing stranded nesting female turtles, monitoring island species, and undertaking research to promote the recovery and resilience of species like green turtles (Queensland Government 2017). The Raine Island Recovery Project is especially important to the Northern GBR stock of green turtles as this

stock is also believed to be in early stages of decline (Jensen et al. 2016a; Jensen et al. 2016b; *Recovery Plan for Marine Turtles in Australia 2017*).

1.3 North Qld stock of hawksbill turtles

Hawksbill turtles are protected internationally (e.g. CITES Listing Appendix I), federally within Australia (*EPBC Act 1999*), and under Queensland law (*Nature Conservation Act 1992*). Managing the North Queensland stock of hawksbill turtles is a collaborative effort between Queensland Parks and Wildlife Service (QPWS), GBRMPA, TSRA, local Indigenous communities, and non-government organisations (NGOs) (*Recovery Plan for Marine Turtles in Australia 2017*). While this stock of hawksbill turtles is considered to be the same genetic stock as those nesting in east Arnhem Land, the *Recovery Plan for Marine Turtles in Australia 2017* considers the North Qld stock of hawksbills to be separate based on their seasonally-different nesting aggregation (FitzSimmons and Limpus 2014; *Recovery Plan for Marine Turtles in Australia 2017*). Individuals from the North Qld stock of hawksbill turtles migrate to feeding grounds in Northern Australia, the Great Barrier Reef, the Coral Triangle (including Indonesia, Papua New Guinea, and the Solomon Islands), and Vanuatu (Limpus and Miller 2008; Bell et al. 2012; *Recovery Plan for Marine Turtles in Australia 2017*).

Until 1968, the harvest of hawksbills for tortoiseshell was legal in Queensland (*Recovery Plan for Marine Turtles in Australia 2017*; Limpus 2009); further, in the south-west Pacific Ocean, there is still an unquantified, harvest of hawksbills for tortoiseshell on the black market (*Recovery Plan for Marine Turtles in Australia 2017*; Limpus and Miller 2008). It is possible that these harvests have contributed to the depletion of the North Queensland stock of hawksbill turtles (*Recovery Plan for Marine Turtles in Australia 2017*; Limpus and Miller 2008; Limpus 2009). Additionally, accidental capture of juvenile hawksbill turtles in ghost nets and the predation of eggs by both natural (e.g. goannas) and introduced predators (e.g. foxes and pigs) has contributed to the decline of the North Qld stock of hawksbill turtles (*Recovery Plan for Marine Turtles in Australia 2017*; Limpus and Miller 2008; Limpus 2009). This stock of hawksbill turtles is classified as ‘declining’ under the *Recovery Plan for Marine Turtles in Australia 2017*.

Table K1. Our interdisciplinary, cross-jurisdictional framework designed for evaluating the extent to which collaborative governance is achieved in protecting marine turtles in Australia as evidenced by the *Recovery Plan for Marine Turtles in Australia 2017*.

System architecture
• Clearly identifies the legal framework it operates under? - International - National - State • Clearly identifies the economic framework (including resourcing)?
Steering group identified?
Focus and scope
• Includes a clear and detailed focus and scope? • Includes objectives? These objectives are: - Specific - Measurable - Achievable - Relevant - Time bound?
Stakeholder analysis and engagement
• Describes how additional stakeholders are identified? • Describes how stakeholders are engaged in the development and implementation processes? • Includes a list of key stakeholders? • Identifies values? These values are: - Cultural? - Economic? - Biological? - Social? • Includes a structure of information flow? • Identifies specific roles assigned to additional stakeholders?
Develop and Implement Management Strategies
• Collate available science and highlight gaps in knowledge? • Includes detailed management strategies? Management strategies are: - Supported by and inclusive of best practice science? - Protecting critical habitats for each stock? - Appropriate for the management of marine turtles? - Addressing major threats towards marine turtles in Australia? - Applicable across the entire range of Australian marine turtles (including international)? • Includes performance indicators?
Evaluation and adjustment

- Includes a timeline for review?
- Identifies the capacity to evaluate outputs and outcomes?
- Describes how collaborating stakeholder agencies will be involved in adjusting management strategies?
- Identifies the capacity to adapt and improve management strategies?
- Identifies the capacity to adjust and improve collaborations with key stakeholder agencies?

Table K2. The complete application of our interdisciplinary, cross-jurisdictional framework for collaborative governance to the overall *Recovery Plan for Marine Turtles in Australia 2017* and three stock plans of marine turtles found in eastern Australia. Darkly shaded boxes indicate the explicit inclusion of a framework component, lightly shaded boxes indicate implicit inclusion of a component, and white boxes indicate the absence of that component.

Essential governance component	***Recovery Plan for Marine Turtles in Australia 2017***	**Stock name:** South-west Pacific loggerheads	**Stock name:** Northern GBR green turtles	**Stock name:** North Queensland hawksbill turtles
System architecture				
• Clearly identifies the legal framework it operates under?				
- International				
- National				
- State				
• Clearly identifies the economic framework (including resourcing)?				
Steering group identified				
Focus and scope				
• Includes a clear and detailed focus and scope?				
• Includes objectives?				
These objectives are:				
- Specific				
- Measurable				
- Achievable				
- Relevant				
- Time bound?				
Stakeholder analysis and engagement				
• Describes how additional stakeholder				

agencies are identified?				
• Describes how stakeholder agencies are engaged in the implementation and development processes?				
• Includes a list of key stakeholder agencies?				
• Identifies values?				
Are these values:				
- Cultural?				
- Economic?				
- Biological?				
- Social?				
• Includes a structure of information flow?				
• Identifies specific roles assigned to additional stakeholder agencies?				
Develop and implement management strategies				
• Collate best available science and highlight gaps in knowledge?				
• Includes detailed management strategies?				
• Management strategies are:				
- Supported by and inclusive of best practice science?				
- Protecting critical habitats identified for each stock?				
- Appropriate for the management of marine turtles?				
- Addressing major threats towards marine turtles in Australia?				
- Applicable across the entire range of Australian marine turtles (including international)?				

• Includes performance indicators?				
Evaluation and adjustment				
• Includes a timeline for review?				
• Identifies the capacity to evaluate outputs and outcomes?				
• Describes how collaborating stakeholder agencies will be involved in adjusting management strategies?				
• Identifies the capacity to adapt and improve management strategies?				
• Identifies the capacity to adjust and improve collaborations with key stakeholder agencies?				

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