Evaluating the Media’s Role in Public and Political Responses to Human-Shark Interactions in NSW, Australia

Sam Fraser-Baxter

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Centre for Science Communication, University of Otago, Dunedin, New Zealand

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Abstract

Of all animals that pose danger to humans in this world, few are more feared than sharks. Human-shark interactions are traumatic, emotional and difficult to rationalize. While rare, human-shark interactions generate a disproportionate amount of media coverage and public debate. The mass media is widely attributed with the continuation of negative discourses of sharks through sensationalized, emotive and graphic documentation of human-shark interactions.

During 2015, New South Wales, Australia experienced an unprecedented spike in human-shark interactions, which saw the escalation of public anxieties surrounding water safety and the development of the state’s Shark Management Strategy, announced in late 2015. Of the state’s 14 human-shark interactions that took place, 8 were recorded on the state’s North Coast. An unusual concentrated distribution of sharks in near shore waters was widely reported by surfers, fisherman and pilots. The interactions ignited considerable public debate, which sought to explain the spike in interactions and how to manage the risk of human-shark interaction. The public and political responses to the interactions were documented thoroughly by the media.

Previous literature has established an understanding of the way the media communicates human-shark interactions, public perceptions of sharks and the relationships between the media, publics and governments in the development of shark management policy. McCagh et. al (2015) have explored the role of media discourse in the development of shark management policy. The methods used in this study are largely built upon methods carried out by McCagh et. al (2015) and seeks to develop them in terms of scope and depth.

The objective of the study was to evaluate the role of the media in the development of shark management policy in NSW. Discourse analysis was used to investigate two newspaper’s reports of human-shark interactions on the North Coast to provide insights into the media’s communication of human-shark interactions, patterns of public and political response to human-shark interactions and the development of shark management policy.

The findings of this study show that the discourse used by the media examined is not fear-laden, sensationalized or emotive which previous studies have emphasized. Instead there is an evident tension between anthropocentric and eco-centric values in both the media and the gov-
ernment’s communication of human-shark interactions. Discourse surrounding management solutions offered by the media echoed that of the NSW state government; that management should be non-lethal, trialed and scientifically validated. Analysis of responses to human-shark interactions paints a picture of the intricate political and social processes at play following clusters of human-shark interactions.

This study highlights the need for a paradigm shift in shark management that sees the responsibility of water-safety and the onus and responsibility of risk moving away from governments and further towards the public. Based on the efficacy of management solutions offered by the government and the timing of their announcement after human-shark interactions during heightened public anxieties, this study concludes that shark management in NSW was not meaningfully focused on reducing the risk of human and sharks interacting, but instead at placating and calming public fears surrounding water safety.
Dedicated to Neil & Shelagh Baxter
I am forever grateful for all of your support
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“It was the Law of the Sea, they said. Civilization ends at the waterline. Beyond that, we all enter the food chain, and not always right at the top”.

-Hunter S. Thompson
1. Introduction

The world’s oceans are vast, unpredictable and wild. Our civilization ends at the waterline. Beyond that we are literally and metaphorically, out of our depth. Humans are not adapted to survive in the world’s oceans and when we enter them, we are vulnerable. Encountering sharks in the ocean reminds us. At the jaws of a shark, we cannot reason, we cannot hide, we cannot out-smart or outwit. We are more or less defenseless.

It is this vulnerability that makes encountering sharks, for humans, so fascinating. We have grown to both fear and revere sharks. Perhaps no animal on this earth is simultaneously revered and dreaded like the shark is. Over time, both fictional and non-fictional depictions of sharks have taught us to fear sharks. Sensationalized portrayals of sharks in news stories and films have portrayed sharks as blood thirsty, indiscriminate man-eating savages. These depictions are, for the most part, unjust and inaccurate. Science has taught us that human-shark interactions are an extremely rare phenomenon. We have learnt that oceans need sharks. We have learnt that sharks are critically endangered. We have learnt that sharks need our help.

Even still, the fear persists. Mankind fears sharks even as science and conservation tirelessly communicates tells us of their importance. Fear is an intrinsic part of the human psyche. A fearless human would not have survived for long in the wild. As advanced humans, our fear of sharks presents fascinating tensions with our primal and instinctual minds.

This thesis is an exploration of these tensions. It is an exploration of the way human’s respond to human-shark interactions. By examining public and political responses to human-shark interactions, we can begin to understand the tensions and complexities that play out following human-shark interactions. We can understand the discourse and rhetoric offered by the media and important stakeholders involved in the development of shark management policy. We can understand what drives policy, whether it may be fear or science.

This study seeks to offer findings which will further our understanding of the way humans respond to human-shark interactions. It is the authors hope that this study will help inform future responses to human-shark interactions, which are rational and guided by science. Such responses will help to promote a more peaceful co-existence with sharks.
1.1 A Two-Part Thesis: Academic and Creative

This paper is written in conjunction with a collection of non-fiction stories relating to this thesis topic. While the stories range in style and scope, they have been constructed upon a pillar of ideas and knowledge that have been built by the content of this academic study. Story telling is the *modus operandi* of Science Communication at the University of Otago. As much as fear is built into the human psyche, so too is story-telling.

My creative component seeks to use story telling as a means of challenging the fear of sharks that are so deeply embedded in the minds of the public. The collection of writings that makes up the creative component employs an eclectic array of styles and narratives to communicate some of the ideas and content within the academic thesis. While my thesis offers a range of theory and examples to be addressed in my creative component, it has also offered some guidelines in writing about sharks outside of the academic realm. It has essentially taught me how *not* to write about sharks. The academic study explores societal implications associated with discourse and rhetoric. My study has taught me to be wary of the way controversial issues are presented in societies and my creative component is very much aware of this idea.

Specifically, this study builds upon and closely follows the research of McCagh *et. al*, (2015) which examines the representation of human-shark interactions in the West-Australian media during and around the time of the ‘shark-cull’ policy. Specifically, this thesis considers the representation of human-shark interactions in the northern New South Wales (NSW) media (the NSW broad Sydney Morning Herald and the northern NSW specific Northern Star) and contrasts the representation and related political discourse with the West Australian case. After reviewing the literature (chapter 2), and setting the background (chapter 3), chapter 4 presents the methods and chapter 5 the findings, which are discussed in chapter 6.

The content in the creative component is varied. It ranges from the Stewart Island Cage diving controversy, to the experiences of shark scientist and science communicator Riley Elliot, to more generalized contemporary explorations of the way sharks have been depicted in the media. While the focus and style of each story varies, the lens through which it is written remains consistent. In writing the creative component I set out to diversify the topics and style of each piece as a means to showcase how stories can be constructed around sharks without the need to sensationalize or fear monger.
2. Literature Review

The purpose of this review is to provide a comprehensive theoretical basis for the investigation into media, public and political responses concerning human-shark interactions in New South Wales, Australia. The New South Wales Shark management strategy was implemented in December 2015 following an unprecedented spike in human-shark interactions in NSW over a 12 month period. Shark management in New South Wales has been a controversial issue, which has seen a range of shark hazard management solutions explored and implemented by the NSW state government.

This review seeks to collate relevant literature in the growing and multidisciplinary field of shark studies in the context of human-shark interactions and shark management in Northern NSW in 2015. The review will do this by examining the role of the media in communicating human-shark interactions, understanding a background to the negative discourse of sharks in the media, exploring the negative discourses of sharks in the media and then finally looking into the relationship between the negative discourse of sharks, the media and shark hazard management.

Of all the interactions with species, which may pose a threat to humans, few are more feared than sharks (Crossley et al, 2014). While unprovoked attacks by sharks on human are rare, they are extremely traumatic, emotional and difficult to rationalize (Curtis et al, 2011, Neff, 2014). Given the rarity of such events, they produce a disproportionate amount of media coverage, which has great influence on shaping public discourse surrounding sharks and shark attacks (Philpott, 2002, Curtis et al, 2011, Muter et al, 2012 & Neff, 2014).

This review comes from a background of media content analysis. While many fields are explored throughout the review, the overarching, theoretical framework followed is media content analysis. Media content analysis is a well-established research methodology as a specialised sub-set of content analysis (Macnamara, 2005). It allows for the study of a large range of data over a broad time period to identify popular discourses and understand their likely meanings (Macnamara, 2005). Neuman (1997) describes media content analysis as “a technique for gathering and analysing the content of text. The ‘content’ refers to words, meanings, pictures, symbols, ideas, themes, or any message that can be communicated. The ‘text’ is anything written, visual, or spoken that serves as a medium for communication” (p.g. 272-273).
2.1 The role of the media

2.1.1 Media Reporting

Media studies have long recognized the function of the media and how their actions affects perceptions of the relative importance of issues in society (Muter et al., 2012). Mikami (1998) has explored this idea, arguing that this prioritization of issues presented to audiences by the mass media, is reflected in the audiences own personal agenda of priorities. Consequently, the amount of weight given to an issue by the media will affect how the audience will respond to that issue (Mikami, 1998). Because mainstream newspapers are often part of larger corporations driven by profit margins, unbiased objective reporting of issues is often compromised and replaced by sensationalist stories that will attract a greater audience (Mikami, 1998). Environmental frames and communication are important to consider whilst exploring the role of the media in communicating human-shark interactions.

2.1.2 Environmental Frames and Communication

The framing of the environment in the media is important to understand whilst dealing with the relationship between the public and environmental issues. Nisbet (2009) defines frames as, “interpretive storylines that set a specific train of thought in motion, communicating why an issue might be a problem, who or what might be responsible for it, and what should be done about it” (p. 15). There is no such thing as unframed information and audiences typically use frames to unconsciously understand environmental issues (Nisbet, 2009 & Lakoff, 2010). The background system of frames is the knowledge a person already holds, and frequently this system of knowledge dominates the way environmental messages are processed by an audience (Lakoff, 2010).

Environmental frames dictate the fundamental categories, words, and limits of discussion that can be used when addressing an environmental problem (Brulle, 2010 & Lakoff, 2010). Our knowledge constantly makes sense of and defines words through dominant environmental frames (Lakoff, 2010). The environmental ideas, beliefs and values we hold, along with the policies and practices we implement are largely mediated by systems of representation by human communication (Cox, 2007), and thus environmental framing (Lakoff, 2010).
Dominant environmental frames presented in the mass media influence and drive societal deliberation about environmental issues (Cox, 2007, Lakoff, 2010 & McCagh et. al, 2015) and the media often uses emotive and intent-laden imagery to frame human-shark interactions (McPhee, 2014). For example, in the summer of 2001 sensationalised images of human-shark interactions in America presented the public with a new risk of human-shark interaction and public outcry ensued (Sunsetin & Zeckhuaser, 2011). This occurred even while there was an absence of evidence that suggested human-shark interactions had increased in the summer of 2011 (Sunsetin & Zeckhuaser, 2011). Even while the risk of human-shark interaction remained minuscule, considerable public discussion led to the enactment of legislation in Florida to attempt to mitigate human shark interactions (Sunsetin & Zeckhuaser, 2011).

Nisbet (2009) notes that framing can be used to “pare down information”, to place greater emphasis on some considerations and elements over others (p.g 16). Recent research by McCagh et. al (2015) identified two opposing frames apparent in the media’s reporting of human-shark interactions; an anthropocentric-based frame and a conservation-based frame. These frames were recognized by the study, which identified a conflict between the public’s anthropocentric concerns for beach safety and a conservational concern for the environmental effects of the governments drum line policy (McCagh et. al, 2015).

It is important to be wary of the fact that discursive media frames may not necessarily be accepted by the media audience (Olausson, 2011). Audience meaning-making in relation to environmental issues is not a simple process, but a complex mix of their life experiences and mass media as a primary intermediary between science, politics and citizens which holds a pivotal role in the framing of environmental issues (Brulle, 2010 & Olausson, 2011). The mass-media audience is never passive in the process of meaning making, and their ability to negotiate and oppose media information should not be ignored (Olausson, 2011).

2.1.3 Risk Communication

Risk Communication is another important scholarly area that needs to be explored in the context of human-shark interactions and the media. Risk communication has been broadly defined by McComas (2006) as “an iterative exchange of information among individuals, groups and institutions related to the assessment, characterization and management of risk” (p.g. 76). Sensing, evaluating and avoiding harmful environmental risks are necessary for the sur-
vival of all living things (Slovic, 1987). Risk judgments are commonly influenced by the “memorability of past events and the imaginability of future events” (p.g. 404, Slovic, 1986) and experiences with the risk itself tend to come from the news media (Slovic, 1987). Perceptions of risk are shaped by both the memorability of past events and the imaginability of future events (Slovic, 1986). Consequently perception of risk is easily distorted by sensationalistic media coverage or graphic films (Slovic, 1986).

Fear has been widely understood to paralyze efforts to think clearly and calmly about risks (Slovic, 1986 & Sunstein & Zeckhauser, 2011). If risks are vivid, emotional or frightening, people are likely to be over-sensitive to the probability of harm (Sunstein & Zeckhauser, 2011). If a terrible outcome of a risk is easy to visualize, significant changes in thought and behavior are commonly expected (Sunstein & Zeckhauser, 2011). Furthermore, expert assurance surrounding the probability of terrible outcomes is often resisted (Slovic, 1986). This resistance can be linked to the public’s sensitivity to the potential for terrible outcomes and their perception of expert disagreement about the probability of such risks (Slovic, 1986).

Risk events and risk communications are complex processes, which may be influenced by social, psychological and cultural influences (Kaperson et. al, 1998 & McComas, 2006). These influences can heighten or amplify public perceptions of risk and subsequent risk behaviour (Kaperson et. al, 1998). Social or economic consequences generated by risk response behaviours commonly call for institutional responses and protective actions (Kaperson et. al, 1998). These wider phenomenons are generally termed the social amplification of risk (Kaperson et. al, 1998).

Finally, Sunstein & Zeckhauser (2011) argue that governments struggle to deal with the public’s demand for law surrounding low probability harms associated with fearsome risks and severe adverse outcomes. They state that if people act strongly and emotionally to low_probability events, governments are likely to act accordingly (Sunstein & Zeckhauser 2011). This occurs either because the government is responding to the public demand for low or because its officials suffer the same proclivities (Sunstein & Zeckhauser 2011). The authors argue that if public fear remains high after a catastrophe, governments may want to offer placebo measures to the public that may do little to reduce risk, but do a lot to reduce fear (Sunstein & Zeckhauser, 2011).
2.1.4 Human-Shark Interactions in the Media


The perception of risk is easily distorted by sensationalistic media coverage (Slovic, 1986) and the social amplification of risk often sees risk response behaviours calling for protective actions (Kasperson et. al, 1998). The frames used by the mass media to present environmental issues often drive societal debate surrounding environmental issues (Cox, 2007, Lakoff, 2010 & McCagh et. al, 2015). Media agencies, like the general majority of the public know little about sharks, and they are as much in need of accurate information as the public is (Curtis et. al 2011).

2.2 Background on the negative discourse of sharks

Within the literature examined, two main events stand out that thrust human-shark interactions into the public gaze, perpetuating the “man-eater” stereotype: the spike of attacks that occurred in 1916 in New Jersey, and the release of the Hollywood blockbuster film, Jaws (Spielberg, Jaws, 1975). Philpott (2002) reports that shark attacks were not of particular interest until the twentieth century and even in the early 1900’s many believed shark attacks to be a myth. However, this attitude transformed drastically in the summer of 1916 in New Jersey as five shark attacks resulting in four deaths occurred (Philpott, 2002). The attacks corresponded with the evolution of the American media and a shift in journalistic values, which sought out ‘shock stories’ (Philpott, 2002). Newspaper headlines such as “Whole of Jersey coast infested with man-eating monsters!” not only amplified public fears of sharks, but also saw corresponding government plans to manage the problem, such as the government call to exterminate sharks along the Atlantic seaboard (Philpott, 2002).
Neff (2014) has identified three Hollywood story lines that have underpinned the lasting strength of the Jaws film, as they are continually evident in public discourse when dealing with shark attack events. Neff’s (2014) ‘attribution to intentionality’ to a shark deals with what is often discussed as a ‘rogue’ shark. This describes a shark that is intent on attacking swimmers and is a narrative often used in real-world situations to explain multiple attacks in a short period of time in the same geographical region (Neff, 2012 & Neff, 2014). Secondly, Jaws has reinforced a narrative that human-shark interactions lead to fatal outcomes (Neff, 2014). While only 18.9% of shark attacks are fatal (International Shark File, 2015), following the release of Jaws, the prevalence of sharks in the media to portray life and death situations increased (Neff, 2014). Finally, Jaws created a belief that a shark must be killed to end its threat (Neff, 2014). This potent narrative has been reflected in a range of real-world shark management policies and has overwhelmed and displaced scientific evidence around shark behavior and policy response (Neff, 2014).

2.2.1 Negative Discourse of Sharks in the Media

The mass media is often attributed with the continuation of negative discourses of sharks through sensationalized, emotive and graphic documentation of human-shark interactions (Philpott, 2002 & Muter et. al, 2012). Previous literature that has explored the way the mass media has respond to and depicted human-shark interactions (e.g. Neff, 2012 & Myrick & Evans, 2014). The media has been recognized as being able to scare and influence audiences, thereby increasing the vigilance of audiences to a particular issue presented to them (Myrick & Evans, 2014). Neff & Heuter (2013) have argued that vivid terms such as ‘shark attack’ used in the media to describe shark events are an erroneous characterization of such events.

2.2.2 Affect Heuristic Models, Assigning Intent and Terminology

Briefly exploring affect heuristic models, the concept of ‘assigning intent’ is and the terminology used following human-shark interactions is important to explore. These concepts are important to consider in exploring the way the media communicates human-shark interactions and the way the public’s interpret them.

Slovich (2004) writes that evocative terms provide an “affect” heuristic model whereby mental shortcuts link terms with images and knowledge. This link then prompts emotional re-
responses (Slovic, 2004). This response is important because people evaluate human-shark interaction events based on immediate, emotional experiences rather than rational, evidence-based justifications (Slovic, 2004 & Neff, 2012). The vivid imagery of human-shark conflicts is deeply embedded and available in the mind of the public (Neff, 2012). Because the public overestimates fearsome risks based on negativity and availability (Slovic, 2004), shark attack imagery is difficult to undo (Sunstein & Zeckhauser, 2009).

Terms used to describe shark attack events such as “savage killer” have been shown in literature to evoke criminal narratives well entrenched in society (e.g. Boissonneault et. al, 2005 & Neff & Heuter, 2013). Such language communicates an unspoken message of how “killers” shouldn’t be allowed to run loose in any society and instead should be brought to justice (Perry, 1994).

While fear of robbery may carry connections to rape or murder, the term ‘shark attack’ amplifies fear with connections to violent and horrific images of being ripped apart by an ocean dwelling predator (Neff & Heuter, 2013). Similarly, the term ‘shark attack’ can create a false perception of a pre-meditated crime, which may lower the public’s acceptance of these events as a random act of nature (Neff, 2013). The creation of intent and agency by the media when reporting on human-shark interactions, removes any responsibility held by humans in creating conditions for interactions to take place (Eskridge & Alderman, 2010).

The media often ignores the distinction between minor encounters (such as one involving only a scrape) and major encounters (such as a fatal bite) when reporting shark encounters (Neff & Heuter, 2013). For this reason Neff & Heuter (2013) have proposed alternate terminology to the terms used by the media and policy makers in describing shark events, which evoke fear and panic. The authors propose a classification scheme based on the outcome of human-shark interactions (including sightings, bites and fatal bites), which is intended to increase the accuracy of reporting of such interactions (Neff & Heuter, 2013).

2.2.3 Analyses of Sharks in the media

A number of media analyses have been carried out reviewing and analysing the content delivered in newspapers regarding sharks (e.g. Boissonneault et. al, 2005, Muter et. al, 2013, Neff, 2014 & McCagh et. al, 2015). Analysis of the attitudes towards shark attack events and shark
conservation as expressed in mass media is a fundamental component of understanding the public discourse of sharks and how this may affect shark policy (Boissoneault et al, 2005).

Instances of shark attacks occurring in one part of the world (e.g. South Africa) will commonly make headlines in other parts of the world such as America (Muter et al, 2012). This aspect of reporting further emphasizes the saliency of the way media reporting shapes shark discourse. Muter et al (2012), have found that reports of sharks in the media are generally more negative in Australia with 58% of articles analyzed looking at ‘attacks on people’ compared to 47% of American reports. Secondly, scientists commented in 15% of reports in Australia, compared to 25% of reports in America (Muter et al, 2012). Finally politicians commented in 8% of Australian reports, 7% more than 1% of reports in America (Muter et al, 2012).

The authors of the study do not explore the reasons for these statistical disparities. The statistics appear to indicate a greater degree of sensationalisation in the Australian media’s reporting of human-shark interactions. A point to consider whilst briefly touching on this idea is Australia’s close relationship with their beaches. At least 85% of the country’s population lives within 50 kilometres of the coast (ABS, 2004 & Australian Government, 2016). This idea may indicate that the news media will frame human-shark interaction in different ways depending on the location of the media audience.

2.3 Negative Discourse of Sharks- the media and shark hazard management

The way in which discourse of shark attacks is presented in shark management and policy is a young but growing area of research (e.g. Neff & Hueter, 2013 Neff, 2014 & Neff, 2015). Clusters of emotional events, which are often low-probability, high-consequence in nature, are commonly the focus of policy response (Neff, 2015). The frequency and prevalence of hazardous events is a powerful trigger to it being considered a social problem, through ‘problem definition’ (Rochefort & Cobb, 1994). A number of human-shark interaction events within a small area or timeframe often become the subject of policy discussion (Neff, 2015). Neff & Hueter (2013) have documented a number of Australian Government shark responses that began to take shape following a third or fourth shark-bite event, suggesting, “a trigger-point based on the perception of an on-going hazard” (p.g. 90).
2.3.1 Problem Definitions

According to Neff (2012), a problem definition is a “framework [that] highlights the social and political processes that strategically manipulate objective conditions of nature into problems that governments need to solve” (p.g. 89). Problem definitions involve processes of image making where images fundamentally attribute cause, blame and responsibility (Stone, 1989). As a result, casual stories can both block and facilitate policy change (Neff, 2014). Political actors will then selectively choose elements of problem definitions that highlight the moral imperatives of an issue to increase its salience with the public (Neff, 2012). This is problematic for the management of low probability risks such as human-shark interactions because it frames the event for the public as a problem that needs to be solved (Neff, 2014).

2.3.2 Placing Pressure on Governments to Act

There is a vast array of speculations that seek to explain shark attacks (e.g. mistaken identity, territoriality or chemo-sensory attraction) and the motivation behind any unprovoked shark attack is often unclear for scientists to understand (West, 2014). Because sharks and shark attacks are poorly understood by the media and lay audience (Curtis et. al, 2011), scientists struggle to rationalize shark attacks in the public domain. Instead scientists offer narratives of sharks as important creatures of ecological systems which occasionally do bite humans, but would prefer to avoid humans all together (Neff, 2014). By contrast, casual stories of assigning intent to sharks in the media induce public panic and presents sharks as a problem to be controlled and solved (Neff, 2014). This then places pressure on governments and policy makers to act (Neff, 2014).

Neff (2012) argues that policy entrepreneurs often amplify pressure placed on governments to act. Policy entrepreneurs are those willing to devote time and energy into offering solutions to the public, prompting policy response (Neff, 2012). In the research, Neff (2012) notes that politicians, scientists, researchers, and surf lifesavers offered different problems, narratives and solutions following human-shark interactions. Solutions to problem definitions presented in the media are believable for the public, especially when scientific uncertainty exists (Neff, 2012). Furthermore, shark bite incidents can ignite a lack of confidence in governments (Neff, 2012) and Achen & Bartels (2004) have found that voters regularly punish governments for such ‘acts of god’.
2.3.4 Policy Responses

Environmental discourses of fear reflect a larger paradigm of humankind’s desire for security and control which quickly calls for the subordination of anything that threatens human’s health and safety (Eskridge & Alderman, 2010). Overreactions by the public are met with overreactions by governments known as “action bias” (Sunstein & Zeckhauser, 2009). From shark hunts to making people take off their shoes at airports, these policy outputs are directed at the public’s fear of certain outcomes (Sunstein & Zeckhauser, 2009). Stringer & Richardson (1979) have suggested “placebo policies”, that are implemented by governments when they feel “threatened by the emergence of a “hostile” issue” (p.g. 29). The reactionary banning of shark feeding on shark eco-tourism trips in Florida in 2001 in response to shark bite incidents could be considered this type of “placebo policy” (Stringer & Richardson, 1979, Sunstein & Zeckhauser, 2009).

Neff (2015) has shown that Australian policy informed by negative discourse of sharks and public pressures often contradicts scientific research and recommendations in attempt to calm public panic. For example, the 2009 NSW shark policy document ignored scientific recommendations dating back to 2006 in removing inshore gillnets in the months of September and October, the period that represents the most great white deaths and the fewest human-shark interactions (Neff, 2014). Neff (2015) has examined the way the fictional narrative from the film Jaws was used as political tools in the 2014 WA shark management scheme. Fictional narratives overwhelmed competing scientific evidence and policy discourse was closely aligned with movie-mythology (Neff, 2015). Jaws’ narrative of a rogue shark, attacks leading to death and the need to hunt and kill sharks became evident in the discourse of the policy (Neff, 2015). Such policy further perpetuates negative discourse of sharks and redefines the risk itself through collective sense making (Neff, 2012).

2.3.5 The Role of the Media in the Development of Shark Management Policy

Recent research by McCagh et. al (2015) has cast light upon a gap in this field of research regarding the role of the media on the development of shark hazard policy. Prior to this research, no academic investigation has carried out a systematic content discourse analysis to highlight the role of the media in the development of shark hazard management. Content analysis of newspaper articles identified a correlation between public hysteria following fatal shark bites and the Western Australian Government’s highly controversial decision to implement
their shark culling program (McCagh et al., 2015). The investigation carried out in this thesis seeks to build upon the work by McCagh et (2015), and offer further findings within this gap in the literature.

### 2.4 Conservation and Positive Discourse of Sharks

While negative discourse of sharks constantly pervades their representation in the mass media and popular culture, alternative discourses of sharks and human-shark interactions do exist. These discourses often explain the ecological importance of sharks as apex predators in the world’s oceans. Although these discourses are disproportionately represented in the media, they offer a number of narratives, which may help to displace negative attitudes and replace them with pragmatic and scientific based opinions (Neff, 2012, Crossley et al., 2014, Myrick & Evans, 2014 & O’Bryhim & Parsons, 2015). Thus, these discourses can help both the public and policy makers to develop more rational and carefully planned responses to human-shark interactions (Neff, 2012 & Neff, 2014, Friedrich et al., 2014 & O’Bryhim & Parsons, 2015).

#### 2.4.1 Conservation

As apex predators sharks are of great importance in maintaining the balance and stability of eco-systems, and are thus of particular conservation concern (Myers et al., 2007 & Fredriech et al., 2014). Negative attitudes, beliefs and opinions have been identified as one of the greatest impediments for shark conservation efforts (Ferguson, 2006, Muter et al., 2012 & O’Bryhim & Parsons, 2015). Public support and engagement for shark conservation is limited (Friedrich et al., 2014). While the majority of media reporting on sharks does emphasize the risk sharks pose to humans, Muter et al. (2012) have reported an increase on the number of articles focusing on shark conservation. A higher level of knowledge about sharks is connected with greater public concern about their conservation (O’Bryhim & Parsons, 2015).

A study by Neff & Yang (2013) has identified a more sophisticated public attitude towards sharks, where people living near shark frequented beaches hold high values of White shark populations and these attitudes did not waver following human-shark interactions. Furthermore, shark attack victims often become the messengers for shark conservation (Muter et. al, 2013). While these attitudes are locally significant and may be important if they are vocally expressed,
Friedreich et. al (2014) note that only a small minority of people are likely to encounter a shark in the wild, and this factor may limit support for shark conservation.

O'Bryhim & Parsons (2015) write that “due to the combination of negative attitudes towards sharks and the critical need for improved shark conservation efforts, it is imperative to change the public perception of sharks” (p. 44). Positive conservational attitudes towards sharks may shape, guide and direct an individual’s potential behaviour towards engaging with shark conservation (Friedrich et. al, 2014 & O'Bryhim & Parsons, 2015). Increased public knowledge of marine issues and potential policy solutions increases the public’s ability to place pressure on policy makers (Friedrich et. al, 2014 & McKinley & Fletcher, 2010). Finally, Weltz et. al (2013) reports changes in public perception in the management of human-shark interactions, finding that there is increasingly less justification for policy that involves killing sharks. There is a growing policy response to human-shark interactions, which are ecologically friendlier and include understanding of shark ecology to mitigate interactions (Weltz et. al, 2013).

2.4 Conclusion

Shark attacks are infrequent, dramatic and traumatising events. A negative discourse of sharks is well entrenched in society. Sensationalistic news coverage along with the fictional depiction of sharks as savage man-eaters has perpetuated human fears of sharks. There are no simple government solutions to human-shark interactions and these solutions are often aimed at placating public fears informed by negative discourses of human-shark interactions. Research examining negative discourses of sharks and responses to human-shark interactions is a young but growing body of literature. This thesis aims to untangle issues surrounding the negative communication and societal response to human-shark interactions. In doing so, this study seeks to provide information, which provides more rational steps to dealing with problematic human-shark interactions.
3. Background and Context

3.1 Humans, the Wild & Sharks

The ‘wild’ is now a place, idea or concept that humans very rarely brush shoulders with. Sometimes it takes a problematic interaction with the wild to remind us of this.

Human wildlife conflicts—when apex predators prey on humans— is one such interaction that continues to capture human interest. Apex predators are those that reside at the top of their ecosystem’s food chain. They are aggressive and well equipped to prey upon others around them. Occasionally, humans are preyed upon by apex predators. These interactions both fascinate and frighten humans. They are difficult for us to comprehend and are perceived as a problem, which needs to be managed (Crossley et. al, 2014).

The world’s oceans are a vast, alien and largely unexplored environment. The thousands of different species that inhabit our oceans are mostly benign to human intrusion and indifferent to occasional interactions with humans (Curtis et. al, 2011). Human-shark interactions are infrequent and highly traumatic events (Curtis et. al, 2011, Muter et. al, 2012 & Myrick & Evans, 2012). No human wildlife conflict is as venerated as much as those with sharks (Philpott, 2002). Shark bites, attacks and interactions with humans have caused sharks to be one of, if not the most feared creature in the animal kingdom (Philpott, 2002). Human-shark interactions elicits some of our most profound fears—fear of the unknown, fear of death, fear of being alone in the face of danger, fear of combat, fear of drowning, fear of blood, fear of dying slowly, fear of being eaten alive (Maniguet, 1991). The list goes on.

Many humans continually struggle to manage our fear of interactions with sharks (Curtis et. al, 2011, Neff, 2014). Of the most pertinent statistical analogies, which attempt to placate, our fear of human-shark interactions is drowning (Caitlin et. al, 2014 & Crossley et. al, 2014). Because both events occur in the same marine environment, they have the same parameters and thus, provide an analogous statistical comparison (Caitlin et. al, 2014). Drowning claims the lives of an estimated 360,000 people each year, while sharks take the lives of no more than 9 humans worldwide annually (Shark Attack File, 2016 & WHO, 2017). This fatality rate is incredibly minuscule considering the billions of hours humans spend in coastal waters each year.
(Shark Attack File, 2016). While these statistical analogies are pertinent, studies have shown a disparity in public perceptions and reality. A study by Crossley et al. (2014) has shown that humans are not only more worried about shark attack over drowning, but grossly overestimate the likelihood of human-shark interactions.

Sharks are a vastly diverse group of fish, which evolved over 400 million years ago (McAuley et al., 2002). As apex predators, sharks are indicators of the health of marine ecosystems. Their predatory behavior plays an integral role in balancing and stabilizing ecosystems (McAuley et al., 2002 & Friedrich et al., 2014). Despite their importance as apex predators, sharks are poorly understood by scientists and conservationists alike and urgently require further study (McAuley et al., 2002). Anthropogenic caused declines in the abundance of marine species reduces the abilities of the ocean to provide ecosystem services (Worm et al., 2013). In short, we need sharks in the ocean for it to maintain it’s ecological health and continue to offer humans a coastal livelihood.

Sharks do occasionally bite people. While there is a plethora of theories that seek to explain shark bites on humans, it is widely accepted that humans are not “on the menu” as typical prey for sharks (Neff & Hueter, 2013). Popular shark attack theories such as mistaken identity, inquisitiveness, and self defense all point to this idea (West, 2014). John West, curator of the Australian shark file writes, “unprovoked shark attacks have little in common apart from the fact that a human and a shark are in the water at the same location at the same time” (p.g. 7, West, 2014). Considering the billions of hours spent by humans in oceanic waters, the minuscule number of human-shark interactions annually suggests that humans are not a suitable prey source for sharks.

The hysteria that ensues following clusters of shark bites in a relatively small geographic area and period of time has time and time again seen humans take to the seas to catch and kill sharks (McCagh et al., 2015). This kind of management response once again conveys the idea that we find it extremely difficult to rationalize interactions with sharks.

There is something innate about our fear of sharks. Something we struggle to override. We are biologically unequipped to remain at the top of the food chain when we enter the ocean. The thought of facing death at the jaws of a shark frightens us more than any other apex predator (Phillpot, 2002). The media continues to frenzy on instances of shark bites, producing sen-
sationalistic and graphic news stories which have been largely attributed for the creation of the ‘man-eater’ stereotype of sharks (Philpott, 2002 & Muter et. al, 2012). This stereotype encompasses words, images and stories, which play on neurological pathways to remind ourselves to be scared of sharks (Slovic, 2004 & Neff, 2012).

We still find the idea that we can be prey to a wild animal dreadfully intriguing. The media happily reminds the public that when we step foot in the ocean we are at risk of being bitten by a shark. The man-eater stereotype in the media and in popular culture has proven to be extremely potent and is worthy of exploration to understand its persistence in influencing political and social responses to human-shark interactions.

3.2 Tracing the History of Human-shark Interactions & the Man-Eater Stereotype

Even before sharks were identified, named, studied and understood, humans have held both fear and reverence for their presence in the world’s oceans. The oceans to man were once mythical, legendary and unexplored. They were a deadly environment, and were rarely frequented by those other than sailors and fisherman. Interactions with oceanic wildlife birthed stories and legends of mythical monsters of the deep, irreverent demons intent on preying upon man. The earliest representation of what is suspected to be a shark attack is a painting on a vase unearthed on the Island of Ishia, west of modern day Naples, Italy. The painting depicts a man being seized by a fish, perhaps a shark, and has been dated to c 725 BC (Maniguet, 2003).

Early accounts of shark attacks are described in Greek history by Herodotus in 492 BC and later by Leonidas of Tarentum (Maniguet, 2003). While these reports did not speak specifically of sharks for the word or common scientific classification did not exist then, we can assume that the species involved were indeed sharks. Because human utilization of the ocean occurred on a very small scale during these times, we can assume that human-shark interactions occurred with a very low rate of incidence. Consequently knowledge regarding the identification of an animal involved in an interaction and the circumstances associated with it would have been very limited. Sharks then were shrouded in mystery, denizens of the sea, deeply feared and deeply misunderstood.
The first penned eyewitness account dates back to 1580 when a Spanish officer described an attack he witnessed between Portugal and India (Maniguet, 2003). The event is the earliest written account of a shark attack and no doubt consolidated and amplified fear of man-eating beasts. In the account a sailor falls overboard during a storm, and in his attempted rescue he is torn to pieces by “a big monster known as tiburón” (tiburón is the Spanish word for shark) (Maniguet, 2003).

While this written account cemented popular fears of monsters of the deep, a painting by John Singleton Copley 198 years later in 1778 immortalized the graphic and traumatic nature of shark attacks. The painting depicts the valiant rescue of Brook Watson, a 14-year-old cabin boy from the jaws of a shark in Havana Harbour, Cuba. The attack saw Watson lose his right leg to the knee. The moody and romanticized piece shows an injured Watson, reaching to his crewman in a small boat as a shark with it’s mouth open, bearing teeth approaches Watson. While Copley consulted maps and prints to create an accurate interpretation of the Cuban harbour, his anatomical depiction of the shark is much less accurate. His shark features lips, forward facing eyes and air blowing out of the shark’s ‘nostrils’ (National Gallery of Art, 2016).

Later in the 19th century, science played it’s own part in sensationalizing shark attacks and developing the man-eater stereotype. In 1776 British ichthyologist Thomas Pennant described an account of sharks devouring human corpses lowered into sea off the side of boats in Guinea in his British Zoology. Pennant wrote: “Swimmers often perish by them; sometimes they lose an arm or leg, and sometimes are bit quite asunder, serving but for two morsels for this ravenous animal” (p.g. 94, Pennant, 1776).

In 1812, Pennant wrote in British Zoology of the discovery of a full human corpse in the gut of a White shark and also of their “greediness for human flesh” (p.g. 140). In 1852 Samuel Marrauder released The Treasury of Natural History, which further cast a graver shadow upon sharks as vicious man-eaters: “They devour with indiscriminating voracity almost every animal substance, whether living or dead. They often follow vessels for the sake of picking up any offal that may be thrown overboard, and, in hot climates especially, man himself becomes a victim to their rapacity” (p.g. 60, Ellis, 2012).
Indeed, the earlier scientific accounts of sharks and their interactions were driven by mysticism, grisly narratives and speculation. Basic scientific knowledge of sharks has only been established in the latter part of the 20th Century.

In 1916 the man-eater stereotype thrust upon sharks suddenly intensified following a string of attacks in New Jersey, USA. Prior to the events, shark attacks were irregular and infrequent. Their portrayal was still built on conjecture, superstition and mythical demonization. Philpott (2002) writes “in the early 1900s, many believed that shark attacks were a myth and there were few, if any, authoritatively accepted cases of shark attacks”. Many leading American scholars and scientist’s doubted the possibility of a fatal shark bite occurring in the countries temperate waters (Capuzzo, 2002). This skepticism was short lived.

A series of attacks took place on the New Jersey coastline between July 1 and July 12 in which five people were bitten by sharks; only one survived (Capuzzo, 2002). The wave of panic that ensued, amplified by sensationalist media coverage, presented indisputable evidence that shark attacks were a very real and deadly phenomenon. The hysteria evoked by the attacks saw headlines run such as “Whole of Jersey coast infested with man-eating monsters!” (Capuzzo, 2002).

The New Jersey Government made plans to attempt to exterminate sharks from the Jersey coastline (Philpott, 2002). The attacks coincided with an exponential post WW1 spike in bather culture and beach utilization, and also a moral shift in journalistic values, which reflected a media evolution towards tabloid styled shock stories (Philpott, 2002). A study by Achen and Bartels (2004) has shown that American voters punished politicians for this concentration of fatalities- what the authors termed “acts of god”. Voter support for Woodrow Wilson, the American President at the time, fell in the affected area of New Jersey, which the study linked to the string of fatalities (Achen & Bartels, 2004).

The 1916 attacks not only overthrew shark’s popular reputation in society but also in academic circles too. Many scientists were compelled to revise their earlier assumptions of shark behaviour and shark attacks. Following the New Jersey summer, John Nichols and Robert Murphy wrote in Scientific American of the infamous Carcharodon carcharias: the Great White shark as a predator that preys upon sea turtles and would not hesitate to attack a man in open water (Capuzzo, 2002). While the authors acknowledge that little is known about the spe-
cies, they continue to build upon the mythical sensationalism ascribed to earlier scientific accounts of sharks: “There is something peculiarly sinister in the shark's make-up. The sight of his dark, lean [dorsal] fin lazily cutting zig-zags in the surface of some quiet, sparkling summer sea, and then slipping out of sight not to appear again, suggests an evil spirit. His leering, chinless face, his great mouth with its rows of knife-like teeth, which he knows too well to use on the fisherman's gear; the relentless fury with which, when his last hour has come” (p.g. 285, Capuzzo, 2002).

Unsurprisingly, popular culture has taken a huge interest in sharks and human-shark interactions. Jules Vernes 1870 Twenty Thousand Leagues Under the Sea also spoke of the danger sharks posed to man. Arronax, the stories authority on marine life, describes sharks passing overhead while the crew walks along the bottom of the ocean: “They are like monstrous fireflies who can crush an entire man in their jaws of iron!” (Verne, 1870).

While sharks have been depicted in literary classics since the nineteenth century, it was the release of Steven Spielberg’s 1975 film Jaws, based on Peter Benchley’s 1974 novel that truly cemented the man-eater stereotype. Jaws was a global phenomenon. With the film’s release, the demonization of sharks as intent-driven, man-eating monsters neared completion. The film communicated a clear message: humans were on the shark’s menu (Neff & Heauter, 2013).

The film’s success lay in its’ haunting soundtrack, an advertising campaign aimed at priming public fear and a powerful story of good (the victims and shark hunters) and evil (the rogue shark) (Neff, 2015). The film was a monumental turning point for sharks in this world and Peschak (2006, p.g. 160) writes that: “Almost overnight the white shark went from being considered – at most – an obscure ocean dweller that few had ever heard of to a man-eating monster with a lust for wanton killing, and a creature that was best eradicated from our planet forever. The film’s impact was unprecedented and as shark bite hysteria gripped the film-going world…”

Jaws was a seminal event for both sharks and humans. The emotional, vivid and graphic visualization of human-shark interactions in the film was unprecedented and unforgettable for those that have seen the film. Following the film, beach attendance fell in the United States in 1976 (Siska, 1980). The psychological impact has not been temporally constrained as Neff (2015) argues that politicians draw on analogies from the film, triggering mental shortcuts to
the film’s images to argue and explain real life events. Jaws has undoubtedly had the largest impact on the man-eater stereotype, with frightening cultural, political and social implications. The title of Philpott’s (2002) paper neatly summarises the effect of the man-eater stereotype and the seemingly undying dread humans hold for sharks: “Sharks have nothing to fear more than fear itself”.

3.3 Human-Shark interactions in the 21st Century

The turn of the century and the years leading up to the present day haves seen shark’s man-eater reputation persist. As we moved into the 2000s, we left a century notorious for cementing and perpetuating sharks as intent-laden hunters, hell-bent on attacking humans. The twenty first century has seen an increased degree of complexity in the way sharks are portrayed and perceived in society. The explosion of the internet has seen an unprecedented level of access to and sharing of information. This digital revolution has seen a tension arising between the classic man-eater representation of sharks and another grounded in science and conservation, depicting them as vulnerable and ecologically important creatures that sometimes bite humans, but would rather avoid them all together (Neff, 2014). While the media still frenzies around stories of shark bites, there has been a development in the way human-shark interactions are communicated which is slowly working to undo it’s negative discursive counterpart.

As human utilization of the world’s oceans has increased, so too have human-shark interactions (Curtis et al, 2011). Perhaps unsurprisingly, human-shark interactions are increasing annually (Shark attack file). 2015 recorded the highest number of interactions with 98 unprovoked interactions, up from the previous record, 88 in 2000 (Shark Attack File, 2016) The increase in human-shark interactions is positively correlated with human population growth and increased recreational use of coastal waters (McPhee, 2014 & Shark Attack File, 2016).

While there are some uncertainties associated with this correlation, there is no compelling body of evidence that suggests the trend is associated with an increasing population abundance of those species primarily responsible for attacking humans (McPhee, 2014). Rather, conversely what little scientific work on population abundance of these species responsible for 86% of recorded human fatalities: Bull sharks, (Carcharinus leucas), Great White sharks, (Carcharodon carcharias) and Tiger sharks, (Galeocerdo cuvier) tells us that in many localities, these
populations are for the most part declining, stable, or in some cases increasing very slightly (Philpott, 2002 & McPhee, 2014).

Following clusters of shark interactions, a popular narrative often ensues seeking to explain the events by increases in shark abundance, brought about by conservation and laws affording various species legal protection. For example, during the Southeastern United State’s 2001 “Summer of the Shark”, many strident political actors sought to use shark protection and conservation programs of Florida and the Federal Government to explain an apparent increase in shark attacks (Philpott, 2002). Sean Paige, of the most vocal of these advocates stated that conservation had driven shark populations to dangerously high numbers in “reckless disregard for the public safety implications” (p.g. 445, Philpott, 2002).

Similarly, following an unprecedented concentration of fatal shark bites in the years leading up to the infamous Western Australia ‘shark cull’, both the public and politicians drew connections between the fatal interactions and shark conservation. Western Australia Fisheries Minister Norman Moore said he would lift the protected status of Great Whites if the Federal Government did, allowing commercial and recreational fishing to lower their populations (Milman, 2012).

As the human population increases, we can expect further increases in human-shark interactions. It is important to be cautious and wary of short-term fluctuations in interactions, as the abundance of both humans and sharks in local waters is influenced by local meteorological, oceanographic, and socio-economic conditions, and thus the likelihood of an interaction taking place too (McPhee, 2014 & Shark Attack File, 2016). It is now widely accepted by shark scientists and experts that human-shark interactions are a by-product of humans and sharks being in the same place at the same time, rather than anything malicious on the shark’s behalf (e.g. Neff & Hueter, 2013 & Shark Attack File, 2016). In many instances, dangerous sharks have been spotted swimming in very close proximity to populated beaches, taking no notice or interest in nearby swimmers (Neff, 2013).

While academic circles are accepting to this idea, sensationalism is still commonplace in popular mass media. One rather pertinent example of this is Florida’s “Summer of the Shark”. As briefly discussed, the “Summer of the Shark” is the name given to the American media’s coverage of human shark interactions in the summer of 2001. Despite a lack of reliable evi-
dence at the time indicating an increase in human-shark interactions, the media heavily focused their reporting on interactions until the September terrorist attacks in New York re-shifted their attention away from beaches. Vivid imagery and sensationalism employed by the media, a “more voracious beast” one journalist wrote (Roeper, 2002), convinced the public of an escalating risk in human-shark interactions in the absence of more noteworthy stories (Philpott, 2002 & Sunstein & Zeckhauser, 2011). The “Summer of the Shark” is now understood to be a creation of the media, perpetuating a story with no real merit, other than to draw ratings.

Following the Summer, results from a survey on public perceptions of sharks showed that 80% of respondents believed shark populations were “just right” or “too high” (National Aquarium of Baltimore, 2002). Predictably, political discussions were initiated to introduce legislation to control the ‘problem’ (Sunstein & Zeckhauser, 2011). Soon after, operators of shark cage diving tours in Florida were banned from using bloody baits to lure in sharks, which was one theory which sought to explain the apparent increase in human-shark interactions (Philpott, 2002). This management response is typical of knee-jerk, placebo policy responses to shark attacks aimed at placating public hysteria rather than understanding and dealing with a threat (Stringer & Richardson, 1979 & Neff, 2015). The “Summer of the Shark” is a potent reminder of the power the media holds in influencing public perceptions of sharks, in lieu of growing shark conservation ideologies.

The advent of instant communication via the Internet, and readily available recording devices such as mobile phones and digital cameras has seen a huge increase in the reporting and recording of human-shark interactions (Curtis et. al, 2011). The digital stream of sightings, incidents and interactions with sharks now seems relentless. The expansion and increased awareness of the International Shark File has also played a part in the increased number of interactions.

3.4 Human-Shark Interactions and Management in Australia

Australia experiences the second highest incidence of human-shark interactions in the world, surpassed only by the United States (ISAF, 2017). In 2014 the West Australia ‘shark cull’ ignited controversy in Australia surrounding state led methods of mitigating human-shark interactions (McCagh et. al, 2015). The cull ignited public debate on the issue of shark management
and has since, remained a polarising issue in Australian society. An unprecedented spike in human-shark interactions in Northern NSW in 2015 reignited this debate. In late 2015, the NSW government announced it’s ‘Shark Management Strategy, a multi-faceted, science led and non-lethal approach to mitigating human-shark interactions. It is this context in which this study takes place and these ideas will be discussed throughout this chapter.

Australia is a coastal nation. Boasting more than 40,000km of coastline with an estimated 10,685 beaches, the coast is an integral part of Australia’s identity (Australian Government, 2016). Australia has a rich history of bather culture, and nowadays at least 85% of the country’s population lives within 50 kilometers of the coast (ABS, 2004 & Australian Government, 2016). The Australian coastline provides the intersection for three of the worlds great oceans: The Southern, Pacific and Indian oceans (Australian Government, 2016). With mostly favorable climate, large concentrations of urban settlements and high leisurely utilization of the coast, it comes as no surprise that Australia experiences a relatively high incidence of human-shark interactions (West, 2011).

The Australian Shark Attack File (ASAF, 2016) has recorded 1024 provoked and unpro- voked interactions which date back to 1791, since it’s establishment in 1984 (ASAF, 2016). Australia’s increasing trend in shark attacks mirrors global trends. Australia’s population has grown from 17 million in 1990 to 24 million today (ABS, 2016). As Australia’s population continues to grows, so too does utilization of coastal marine waters and in turn, human-shark interactions (West, 2011 & ASAF, 2016). A rising popularity in water sports such as swimming, snorkeling, surfing and SCUBA has seen more people visiting beaches, harbors and rivers in Australia (West, 2014). Of all the shark species implicated in interactions, Bull, Tiger and White sharks present the biggest threat to humans, compromising 48% of interactions (West, 2011). Those species are also implicated in all known fatalities in Australian waters (West, 2011).

In a ten-year period between 2006 and 2016, Australia recorded 151 non-fatal interactions and 20 fatal interactions. This averages to 15.1 non-fatal interactions and 2 fatal interactions annually (ASAF, 2016). The distribution and abundance of human-shark interactions in Australia are unequal between the 7 territories (see Figure 3.1). Over the last 10 years, NSW has recorded 49.09% of all interactions, Western Australia has recorded 23.03% and Queensland has recorded 11.51% (see Table 3.1) (ASAF, 2016). West (2011) notes that 91% of incidents
between 1990 and 2009 have occurred on the eastern coast, away from major urban population centres and where shark control management is not deployed. This focused distribution of interactions on the East Coast of Australia will be explored in greater detail later in this chapter.

**Table 3.1:** The number of human shark interactions by territory between 2006 & 2016 (ASAF, 2016)

<table>
<thead>
<tr>
<th>Territory</th>
<th>Total Interactions</th>
<th>% of Total Interactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Australia</td>
<td>38</td>
<td>23.03%</td>
</tr>
<tr>
<td>Northern Territories</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>South Australia</td>
<td>12</td>
<td>7.27%</td>
</tr>
<tr>
<td>Queensland</td>
<td>19</td>
<td>11.51%</td>
</tr>
<tr>
<td>NSW</td>
<td>81</td>
<td>49.09%</td>
</tr>
<tr>
<td>Victoria</td>
<td>10</td>
<td>6.06%</td>
</tr>
<tr>
<td>Tasmania</td>
<td>3</td>
<td>1.81%</td>
</tr>
</tbody>
</table>
Figure 3.1: Map showing the distribution of human-shark interactions by territory for all interactions that occurred between 1700 and February 17th, 2016 (ISAF, 2016).

Australia has had a lengthy history of shark management. Clusters of human-shark interactions gaining widespread media attention have seen Australian state governments respond with policy and management solutions attempting to manage shark hazards despite the infrequent hazard they present (McPhee, 2014). The 1929 NSW Government Shark Menace Committee is one such example (Neff, 2102). The Western Australia Government’s ‘Imminent threat policy’ is a more contemporary example. The infamous and highly controversial policy, dubbed the ‘Western Australia Shark Cull’ by the media, saw the state government take drastic measures to manage shark hazards (Gibbs & Warren 2015 & McCagh et al., 2015).

Five fatal shark bites over a ten-month period during 2011 and 2012 were unprecedented in terms of fatalities in Western Australia (Gibbs & Warren 2015). Following the fifth fatality in June 2012, the WA government drastically changed its environment and fishery policy, allowing for pro-active killing of dangerous sharks posing risk to nearby beach goers (Gibbs & Warren, 2015). Following the sixth fatality in November 2013, the government responded with a
policy provoking substantial debate within public, media and academic communities (McCagh et. al, 2015).

In the Summer of 2014 three ‘Marine Monitored Areas’ (dubbed ‘kill zones’ by the media) were established near popular beaches which saw baited drum lines deployed to catch and kill dangerous sharks measuring 3 meters and over in length. In order to carry out the policy, the WA government sought and received exemption from federal laws protecting White sharks, which were among the program’s target species (Gibbs & Warren, 2015). While previous study (Holland et. al, 1999) has shown the use of culling to be statistically ineffective at reducing human-shark interactions, the WA government went ahead with the program, even when over 100 of the world’s leading shark scientists argued that the measure would not only be inefficient at reducing interactions, but also negatively impact shark conservation (McCagh et. al, 2015). This dissent and condemnation was not only felt by scientists, but the public too (McCagh et. al, 2015).

The world took to social media to protest the response, while large environmental protests took place at Cottesloe Beach, Perth’s most popular beach and the location of one fatality leading up to the cull (Catlin et. al, 2014). Neff (2013) has argued that popular narratives from the film Jaws were employed by politicians to justify various aspects of the management strategy including the idea of a ‘rogue’ shark- one with intent and the belief that to end the threat of ‘rogue’ shark, it must be killed. These ideas grounded in fictional pop cultural, which overwhelmingly displaced scientific knowledge and recommendations (Neff, 2015).

In March 2014, the WA Environmental Protection Agency recommended against continuing the drum line program due to a high degree of scientific uncertainty regarding the impact it would have on the White shark population (McCagh et. al, 2015). A study by McCagh et. al (2015) has shown a correlation between panicked public reactions and hysteria to shark attack events and subsequent policy response as evidenced by evolving discourse of human-shark interactions in the Western Australia newspaper. The WA shark cull was an extremely high profile event, drawing worldwide attention. Like previous shark ‘finning’ campaigns carried out by conservationist groups which sought to document and publicize the gruesome removal of fins off of live sharks, online images of captured sharks being shot in the head with a firearm on fishing boats evoked an emotional public response.
The intentionality of killing a shark in such ruthless circumstances provides a potent contrast to false sense of intentionality given to them by the media when reporting on human-shark interactions. The program highlighted the mistreatment and disregard for science and shark conservation in not only the media, but policy response too. The rationale for hazard management that involves killing sharks is increasingly losing justification and support, while ecologically friendly measures are being sough to reduce the risk of human-shark interactions (Weltz et al., 2013).

Queensland has had a very extensive and comprehensive history of shark management. Queensland’s Shark Safety Program was implemented in 1962 following a number of fatal shark bites, particularly in the state’s south east coast (Queensland Government 2006 & Sea Shepherd, 2014). The program aims to lower the populations of potentially dangerous sharks (Tigers, Whites and Bull sharks) utilizing nets and drum lines. As of 2014, there are more than 360 drum lines and 30 shark nets deployed along the state’s coast all year round (Queensland Government 2006 & Sea Shepherd, 2014). The deployment of the equipment is focused on high human population densities (Queensland Government 2006). In the program’s history, there has only been one fatality in January 2006, which prompted the government to immediately publish reports reviewing the circumstances of the fatality and the efficiency of the equipment (Queensland Government 2006).

Between 2001 and 2013, the program caught and killed an average of 480 animals annually (Meeuwig, 2014). While, the program seems effective, it is undoubtedly a blunt tool with severe ecological impacts. One of the main justifications for the WA ‘shark cull’ was the efficiency of Queensland’s shark management program (Sea Shepherd, 2014). The WA shark cull captured and killed 172 sharks during its three-month period (Bembridge & Winter, 2014). Given the high profile of the shark cull, it is surprising that Queensland’s program didn’t also come under intense scrutiny. This is most likely related to the historic circumstances in which Queensland’s Shark Safety was brought about (Sea Shepherd, 2014). The program was implemented following a string of fatalities in the early 60’s, and the longevity of the program in reducing shark populations is likely to be related to it’s success in almost entirely reducing shark fatalities.
3.5 Human-Shark Interactions and Management in NSW

Shark management in NSW spans back to 1929 with the commissioning of the Shark Menace Committee (Neff, 2012). The committee was formed following thirteen shark bites resulting in seven fatalities between March 1918 and February 1929 (Neff, 2012). Following the incidents NSW Fisheries expert stated that “sharks do not patrol beaches on the off-chance of occasionally devouring human prey” (Neff, 2013). As attacks continued into the early 30’s, a report was published in 1933 by Sydney Surgeon Sir Victor Coppleson, which attempted to combine international theories seeking to explain human-shark interactions.

Despite earlier descriptions of human-shark interactions as “accidents”, Coppleson’s report concluded, “evidence that sharks will attack man is complete” (Neff, 2013). In 1934, four shark attacks resulting in two fatalities saw the Australian Lifesaving calling for government action (Neff, 2013). Perhaps surprisingly, considering Copplesons report just a year earlier, the government responded by commissioning the Shark Menace to placate public fear and restore calm (Neff, 2013). This period of human-shark interactions gave rise to the popular ‘rogue’ shark theory.

In 1937, the NSW government introduced the Shark Meshing (Bather Protection Program), perhaps under the influence of amplifying public fear of human shark interactions (DPI, 2015). Nets were placed at the states most popular beaches and were designed to mitigate human-shark interactions by lowering local shark populations (DPI, 2015). Rather than creating an impassable barrier between the ocean and the beach, the nets are designed to catch and drown target shark species (DPI, 2015). While the mesh size is designed to entangle large sharks, by-catch species such as Grey-nurse sharks provides an ecological impediment to the nets (McPhee, 2014).

Like the historical longevity of Queensland’s shark program, nets are still set for 8 months of the year in NSW from the 1st of September to the 30th of April (Sea Shepherd, 2014). NSW’s Department of Primary Industries writes on the meshing information sheet: “While the nets cannot provide a guarantee that a shark interaction will never happen, we believe they have been effective in greatly reducing the potential number of interactions.” (p.g.1, DPI, 2015).
The program sees 51 nets set between New Castle and Wollongong, leaving a significant stretch of coast from Wollongong northwards un-netted (see Figure 3.2) (DPI, 2015). Since the nets were put in place in 1937, there has been just one fatality at a netted beach at Merewether Beach in Newcastle in 1951 (DPI, 2009). Neff (2012) notes that the action taken by the NSW government to mitigate the likelihood of human-shark interactions in 1929, 1934 and 2009 all took place following a third or fourth incident, suggesting the idea of a trigger point initiated by the perception of an on-going hazard (Neff, 2012).
Figure 3.2: Map showing the location of Shark Meshing Program Beaches (DPI, 2015)
One focus of shark management in NSW is education. Following the formation of National Plan of Action for the Conservation and Management of Sharks by the Australian Government, territories were encouraged to educate the public and increase awareness of both shark conservation and the actual risk of human-shark interaction (Crossley et. al, 2014). A study by Crossley et. al (2014) has investigated the public understanding and perceptions of shark attack mitigation measures in Australia. The study has shown that while respondents in NSW do not fully understand all of the methods used in shark mitigation, respondents understand the general operations of the methods and their purpose. The study also showed that awareness and education campaigns in NSW had resulted in a higher degree of knowledge held by NSW respondents than others, such as South Australia respondents (Crossley et. al, 2014). These educational efforts in NSW have been seen to be effective in educating individuals about current shark management and the conservation status of sharks (Crossley et. al, 2014).

3.6 Human-shark interactions on the NSW North Coast in 2015

2015 recorded a relatively high number of human-shark interactions for NSW (ISAF, 2016). A large proportion of these attacks were concentrated around NSW’s Northern Coast (see Figures 3.3 & 3.4) (ISAF, 2016). Of the states 14 human-shark interactions for the year, 8 were recorded on the North Coast, including the states only fatal interaction for the year at the huge-ly popular Byron Bay (ISAF, 2016). These North Coast interactions took place on a stretch of coast roughly 60km in length from Belongil (the most Northerly distributed of the North Coast interactions) to Evans Head (the most Southerly distributed interaction) (see Figure 3.4).
Figure 3.3: Map showing the distribution of human-shark interactions in NSW in 2015 (Google Maps, 2016).
Figure 3.4: Map showing the distribution of human-shark interactions on NSW’s North Coast during 2015 (Google Maps, 2016).

Even before the numbers of interactions in the state became significant for the government, NSW Premier Mike Baird re-iterated the states stance on shark management in January, just months after the cessation of WA’s highly controversial shark cull. “One thing we will not be doing in NSW is culling sharks” (Needham, 2015). Baird identified technology as the way forward, announcing trials testing sonar as a means to detect sharks swimming near to popular beaches (Needham, 2015).

The fatal mauling of Tadashi Nakahara at Byron Bay was a seminal point during the year’s cluster of interactions on the North Coast. Tadashi Nakahara, an avid surfer in Ballina, was fatally mauled by what is believed to be a Great White on the 9th of February (Olding, 2015).
attack took place following an attack on Jacob Reitman just one day before, on the 8th of February. Following the fatal bite, police closed beaches along the North Coast’s 15km stretch from Lenox Head to South Ballina.

Following these two interactions, three non-fatal attacks took place on the North Coast on the 24th of April, 2nd of July and the 3rd of July. With these interactions, the total for the North Coast amounted to 6 for 2015, just one less than the total interactions recorded for NSW as a whole in 2016 (ASAF, 2016). While incidents on the 3rd and 24th of July were minor interactions resulting in no injury to the water-user, an attack by a White shark on Matt Lee on the 2nd of July was much more serious (Aubusson & Wood, 2015). Lee was mauled at the North Wall of Ballina’s Lighthouse Beach, less than 2km from the spot Nakahara was fatally bitten months earlier (McElroy & Houghton, 2015). Following the attack on Lee, the NSW’s Department of Primary Industry (DPI) issued a permit authorizing the shark to be killed, while beaches in the Ballina area were closed (Aubusson & Wood, 2015).

On the 3rd of July, Ballina Shire’s Mayor David Wright rejected calls for the Northern Coast to be netted (McElroy & Houghton, 2015). Wright noted the logistical limitations of netting the region’s coast and the area’s environmentally interested population as reasons not to deploy nets (McElroy & Houghton, 2015). Following this, former surfing world champion Mark Occhiluppo and a prominent Gold Coast politician voiced their concerns over Ballina’s inaction towards managing sharks and called for the regions beaches to be netted (Houghton, 2015).

In wake of the attacks and growing concerns over shark management in the area, on the 21st of July Wright met with local police and life guards to discuss the recent shark activity (“Ballina Mayor David Wright fears”, 2015). A helicopter pilot at the meeting confirmed that he had seen an increase in “very large sharks” in the area (“Ballina Mayor David Wright fears”, 2015). Wright discussed poor water quality from the Richmond River along with the movement of baitfish close to the coast as possible reasons for the increased shark activity in the area (“Ballina Mayor David Wright fears” 2015). And on the 10th of August, local surfers met to discuss what Lennox-Ballina Board riders Club President Don Munro believed to be an “unprecedented crisis” (Forbes, 2015). The surfers called for a “limited shark cull” to control the juvenile White shark population in the area (Forbes, 2015).
Figure 3.5: Screenshot of NSW Premier’s Mike Baird’s Facebook post explaining his concerns surrounding calls for a cull of Great White sharks on the North Coast (Baird, 2015).

Just a day later NSW Premier Mike Baird voiced his personal concerns on Facebook (figure 3.5) of the North Coast as local surfers called for a limited cull (Baird, 2015). He questioned the effectiveness of the WA cull in controlling shark numbers and the ecological impacts of shark nets (Baird, 2015). Baird iterated that management would be carried out “based on fact, not emotion” (Baird, 2015). The Ballina Shire Council also issued a press release stating that it does not support any culling of sharks and announces the establishment of the shark mitigation advisory committee (Ballina Shire Council, 2015).
As fear and anxiety amplified in the region, both Baird and Wright began to fast track political action in managing the crisis. On the 13th of August, Wright announced that he had pressured the DPI to assist with aerial and boat surveillance in the area and admitted that public pressure and calls for a “limited cull” had fast tracked the states efforts to assist the council (Farrow-Smith & Shoebridge, 2015). Included in Baird’s Facebook post was the announcement of the coming shark summit in Sydney and an added $250,000 spent on surveillance and tagging in the immediate term to reduce the risk of further attacks.

On the 1st of September, Baird announced that the NSW government would consider deploying nets on the North Coast as a temporary measure to control interactions (“NSW Premier open to”, 2015). In the days leading up to the shark summit, Wright once again ruled out the installation of shark nets on the North Coast (Mcelroy, 2015). Wright explained the ecological impact of shark nets and calls for better alternatives to come out of the NSW shark summit. (Mcelroy, 2015).

On the 29th of September, shark experts from around the world met at Sydney’s Taronga Zoo to discuss non-fatal shark technologies such as physical and visual barriers, sonar technologies, satellite and acoustic technology and electrical deterrent barriers. Political scientists and guest speaker Christopher Neff re-iterated the public’s desire to move away from netting and cull sharks. Just under a month later, Nial Blair, the minister for Primary Industries announced the $16 million Shark Management Strategy.

The integrated approach to shark management planned to increase aerial surveillance of coastal waters, along with the trialing and development of new shark technologies (DPI, 2015). Technologies include shark ‘listening stations’ designed to receive information from tagged sharks, smart drum lines and ‘clever buoy’ in water shark sonar stations. $7 million of the strategy is to be invested in additional research and further work done on shark tagging on the states North Coast (DPI, 2015). The North Coast is prioritized by the strategy, which sees it as the location for the trialing of the first eco nets.

On the 10th of November, local competitive surfer Sam Morgan was mauled by a bull shark surfing at the North Wall at Lighthouse beach, in Ballina (Aubusson, 2015). The attack marks the third attack for the year on the short stretch of beach in which the attacks on Matt Lee and Tadashi Nakahara took place. Just a day after the attack at Ballina’s Lighthouse Beach, Ballina
Mayor David Wright demanded the government brings in extra aerial patrols, eco-shark nets and lifeguards immediately. Premier Mike Baird agreed, but again ruled out the culling of sharks on the North Coast. On the 25th of November, the DPI announced the testing of smart drum lines at Ballina along with the fast tracked deployment of shark listening stations and increased helicopter surveillance (DPI, 2015).

Following pressure from the Ballina council along with growing public anxiety over human-shark interactions, NSW premier Mike Baird and Niall Blair announce that Ballina will receive the strategy plan’s first eco-nets (DPI, 2015). The eco-nets are non-lethal shark barriers and the first net is announced to be installed at lighthouse beach, the site of three interactions during 2015 (DPI, 2015). Again, the minister’s plan to fast track the deployment of the nets.

2015 saw an unprecedented and exceptional amount of shark activity on NSW’s North Coast. Reports from helicopter pilots, fisherman and life guards suggest a concentrated distribution of sharks in near shore waters on NSW’s North Coast. A concentration of severe interactions took place in a relatively short stretch of coast on highly popular beaches in Ballina. As a densely populated area and a popular tourist destination, many of these interactions were high profile, gaining a significant amount of media attention. Following the WA shark cull, pro-conservation attitudes were popularly associated with sharks and shark management. These attitudes were evident in both NSW Premier Mike Baird and Ballina mayor David Wright’s continual refusal to net the North Coast and to invest in non-fatal and technological solutions to shark hazards. The increase in shark activity in the region coupled with conservational attitudes towards shark management and growing public anxieties saw the creation of the worlds most comprehensive shark management plan.
NSW UNVEILS $16 MILLION WORLD-FIRST SHARK STRATEGY

Minister for Primary Industries Nial Blair today announced an increase in aerial shark surveillance as well as trials of new technologies as part of the NSW Government's five year $16 million shark strategy.

Mr Blair today unveiled the strategy at Sydney's Coogee Beach and said the NSW Government would take an integrated approach to protecting beachgoers not seen anywhere else in the world.

"After considering the advice from experts attending a recent summit in Sydney and consulting with communities including the North Coast, we will take a multi-faceted approach to the issue of detecting and deterring sharks," Mr Blair said.

"What's more, we are proud to be the first jurisdiction anywhere in the world to adopt an integrated approach toward keeping our beaches safe."

There will be $7.7 million set aside for trials of new technologies and aerial and coastal surveillance, including up to $3.5 million for aerial helicopter surveillance to provide early warning to bathers and assist shark tagging operations.

The NSW Government will also invest in 20, 4G listening stations. Ten stations will be positioned between Tweed Heads and Forster, with the rest to be positioned at known shark attack locations.

The data will eventually be made available to provide details of tagged shark locations via the SharkSmart app in real time.

These measures will be complemented by six barrier net trials and five 'clever buoy' in-water sonar technology trials. The North Coast has been identified as a priority trial site for two barrier nets.

Another $7 million will be set aside for additional research into how to keep our beaches safe from sharks in their natural environment, and the expansion of the shark tagging program currently underway on the state’s North Coast.

A further $1.3 million will be set aside to educate the community to be shark smart and build on the popular SharkSmart mobile app.

An independent report into shark technologies also recommended the adoption of smart drum lines, which will be considered in consultation with local communities.

MEDIA: Siobhan McCarthy 0407 791 802

Figure 3.5: NSW DPI press release announcing the forthcoming NSW Shark Management Strategy (DPI, 2016)
The research question for this thesis is: What role did the media play in the development of shark management policy in NSW in 2015?

4. Research Method

Media discourse analysis was undertaken to attain the findings in this study. The methods used in this study are largely built upon methods carried out by McCagh et. al (2015). The study carried out by McCagh et. al (2015) was the first of it’s kind that explores social, political and media responses to human-shark interactions using media content analysis as a means of investigation. Their study offered valuable insights into the way governments, publics and the media responds to a series of human-shark interactions. By better understanding these processes, this field of academia may be able to offer information and guidance to mitigate damaging responses to human-shark interactions discussed earlier in this thesis.

Their study analyzed media discourse to examine the role of the media in the development of shark management policy, along with mapping patterns of public and political responses to human-shark interactions. Similarly, in this study media discourse was examined relating to human-shark interactions and governmental policy responses and outputs. The research focuses on interactions on the North Coast of NSW in an area deemed to be North of Coffs Harbor and south of the NSW and Queensland state border. 8 of the 12 human-shark interactions took place in this area and a large portion of NSW’s Shark Management Strategy is dedicated to research and mitigating interactions in this area. These interactions generated considerable media coverage. The authors of this thesis have deemed these events as an appropriate case study to further the work carried out by McCagh et. al (2015). Interactions were examined that took place within the aforementioned area during 2015.

This study has attempted to develop the methods of McCagh et. al (2015) in terms of scope and depth by collecting data from two newspapers. The McCagh et. al (2015) study collected data from just one newspaper. A statewide publication and a smaller circulation, regional publication have been chosen to gain a broad range of insights into the events that ensue following human-shark interactions. As a large range of the human-shark interactions in NSW in 2015 were confined to a small stretch of coast, the authors of this study have speculated that a regional publication may offer more detailed coverage of these events.
The authors of this study expected dissimilar results compared with the McCagh et. al (2015) study. Following the fierce public opposition to the West Australian Shark Cull as documented by McCagh et. al (2015), we expected a less inflammatory and measured rhetoric offered by the media and government following human-shark interactions in NSW. As discussed, the Shark Cull was an extremely high profile event that drew world wide coverage and protest. It highlighted a blatant mistreatment and disregard for science and shark conservation in the way the West Australian Government managed the issue. Consequently, we expect the social, political and media response following human-shark interactions in NSW in 2015 to be divergent from the results of the McCagh et. al (2015) study.

It is important to briefly note the strengths and weaknesses of the McCagh et. al (2015) that were considered in the design of this study. As discussed, their paper analyses content from just one publication. This may have limited the findings of their study, as the coverage and views represented in the media is limited to journalists working for just one publication. Analysing content from multiple sources broadens the range and scope of the coverage which will in turn, strengthen the findings of the research.

One strength of the McCagh et. al (2015) study is the investigation into the development of shark management policy. The study closely details the media’s coverage of human-shark interactions, the public’s demand for government action and the policy offered by the government. The investigation into these processes is the most substantial of it’s kind in the academia reviewed for this study. It provides valuable insights into the interplay between publics, the media and the government in relation to the development of shark management policy.

4.1 Data Collection

The media output in this study was collected from The Northern Star and The Sydney Morning Herald newspapers (from hereon in, termed ’NS’ and ‘SMH’ respectively. The weekly combined print and digital readership of the NS is 119,000 (APNARM, 2017), while the SMH’s combined print and digital readership is 5,367,000 (Ad Centre, 2017). It should be noted that in the study carried out by McCagh et. al (2015), the authors only collected articles from one newspaper (The West Australian) due to logistical and time constraints. This study collected from both the NS and SMH newspapers to broaden the scope of the research and to
investigate differences in the reporting of sharks and human-shark interactions between regional and statewide publications.

An online internal search of the two newspaper’s websites identified articles using the search term ‘shark’. The search was limited to articles published in a time period of one month before and one month after each human-shark interaction recorded on the North Coast between 1 January 2015 and 31 December 2015. There were instances of overlap between interactions for the specified search parameter of one month before and one month after each interaction. While the McCagh et. al (2015) study did not specify how data would be collected in these circumstances, the authors of this study ascertained from their results that articles would be collected for each interaction in the case of overlap.

It should also be noted that in two instances during the study there was a minor interaction (bumping or minor lacerations/ puncture wounds) just a day before a more severe interaction (loss of limb or fatal bite). Because of the greater reporting focus on the severe interactions, articles collected for the minor interactions were combined with the interaction prior. In this case, articles collected for Jacob Reitman were combined with those collected for Hamish Murray and articles collected for Michael Hoile were combined with Matt Lee. This reduced the number of interactions from 8 to 6.

Articles were selected based on their relevance to the broad topic of human-shark interactions (e.g. shark bites, sightings, science relating to sharks, shark management such as nets and deterrent technologies) including Australia wide and international stories. A total of 792 articles were collected. It should be noted that the Cronulla Sharks NRL sports team created a significant amount of noise in the search. Articles were collected in chronological order. The article’s title, URL and content were strategically copied and pasted into an excel spreadsheet. Different sheets were used for articles relating to each interaction. Different sheets were also used for the data sources for each interaction.

4.2 Analysis

Content analysis was used to analyze the data collected. Content analysis has been used to investigate the media’s reporting on sharks and human shark interactions and it’s effect on public perceptions of sharks (e.g. Boissoneault et. al, 2005, Muter et. al, 2013, Neff, 2014 &
McCagh et. al, 2015). Both manual and automated methods were undertaken to analyze the text data.

Manual analysis was carried out to investigate the number of media articles associated with each interaction in their respective time frames. The data was compiled in an excel table and plotted as a time series graph. A word search counted the number of times emotive and prescriptive language was used to describe sharks and human-shark interactions in each data set. 7 Emotive words such as ‘horror’ and ‘jaws’ along with 3 prescriptive words such as ‘sighting’ and ‘encounter’, proposed by Neff & Hueter (2013) and analyzed in the McCagh et. al (2015) study were examined. These words were counted for each interaction and newspaper. Words for each of the emotive and prescriptive language were then combined to give an emotive and prescriptive total for each interaction and newspaper. These totals were divided by the total number of articles for each newspaper for each interaction to give a frequency occurrence per interaction. This was conducted to allow for comparative investigation between newspapers and interactions and to identify trends in the language throughout the period examined.

Finally, the occurrence of emotive and prescriptive words were calculated to give a combined total for both newspapers for each interaction, and then divided by the total number of articles for each interaction to give a combined newspaper frequency occurrence for each interaction.

Automated content analysis of the articles was performed using Leximancer. The software was also used by McCagh et. al (2015) and this study has chosen to use the same software to best replicate their methods. Leximancer is a text mining software that carries out quantitative content analysis using a machine learning technique, where the program identifies and learns the main concepts of a text and how they relate to each other (Ward et. al, 2015). Leximancer conducts a thematic and relational analysis of data (Ward et. al).

The analysis identified themes, concepts and frames that defined the media framing of shark related articles. Content analysis was carried out using Leximancer for 3 separate data sets: NS, SMH and a combined NS and SMH dataset.

For each data set the concept list generated by Leximancer was examined for sensibility and accuracy. Concepts that were considered insensible or irrelevant were deleted. The following
concepts were deleted for all three data sets: ‘down’, ‘including’ and ‘told’, while the concept ‘advertisement’ was deleted for the SMH data set. Concepts considered analogous were merged. The concepts ‘attack’ and ‘attacks’, ‘beach’ and ‘beaches’, ‘day’ and ‘days’, ‘shark’ and ‘sharks’ and ‘surfer’ and ‘surfers’ were merged for all three data sets, while the concepts ‘animal’ and ‘animals’ and ‘Fanning’ and ‘Mick Fanning’ were merged for the SMH and combined datasets.

A relational analysis was carried out in Leximancer to provide a cross sectional insight into how closely the themes and concepts were related to one another for each data set. The results of this analysis were mapped to give a visual insight into the connectivity between themes and concepts. The four highest-ranking themes were examined in terms of usage and context, as well as their connectivity to one another (expressed as percentages). The four highest ranking concepts listed in the ‘shark’ theme were examined in terms of usage and context.

Finally, a further manual analysis of the data was conducted to develop a timeline of events mapping patterns of response between the media, public and politicians. Keywords and phrases related to human-shark interactions, policy development/implementation and public opinion/response were identified. A timeline was constructed by summarizing the sequence of events as evidenced by the media reporting following each human-shark interaction. The opening/summarizing statements of each article were scanned to identify predominant themes or messages expressed by the media. Responses from the public and politicians were identified and obtained through direct quotes in the articles from members of the public and political actors, along with descriptions of their actions by the media.
5. Findings

5.1 Media Output

A total of 792 articles were analyzed in the study. 457 articles were analyzed from the NS, while 335 were analyzed from the SMH. All articles analysed met the search criteria described in section 4.1.

Figure 5.1 is a visualization of table 5.1. The graph shows a number of trends. A positive trend can be seen for the number of articles published over the course of the year by the NS. The number of articles published by the NS generally increases over the course of the year and peaks sharply for the timeframe associated with the Craig Ison interaction before sharply falling. A negative trend can be seen in frequency of reportage carried out by the SMH. While there is a very slight increase for the number of articles between Tadashi Nakahara and Woody Vigens, the number of articles decreases gradually for each interaction.

Figure 5.1: Line graph showing the number of media articles for each newspaper associated with each interaction reported.
Table 5.1: The number of media articles associated with each newspaper and the combined total for each interaction.

<table>
<thead>
<tr>
<th>Interaction</th>
<th>Time frame</th>
<th>Number of articles NS</th>
<th>Number of articles SMH</th>
<th>Total Number of articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hamish Murray</td>
<td>24/12/14 - 24/02/15</td>
<td>40</td>
<td>74</td>
<td>114</td>
</tr>
<tr>
<td>Tadashi Nakahara</td>
<td>09/01/15 - 09/03/15</td>
<td>31</td>
<td>54</td>
<td>85</td>
</tr>
<tr>
<td>Woody Vidgens</td>
<td>24/05/15 - 24/07/15</td>
<td>75</td>
<td>62</td>
<td>137</td>
</tr>
<tr>
<td>Matt Lee</td>
<td>02/06/15 - 02/08/15</td>
<td>78</td>
<td>58</td>
<td>136</td>
</tr>
<tr>
<td>Craig Ison</td>
<td>31/06/15 - 31/08/15</td>
<td>159</td>
<td>48</td>
<td>207</td>
</tr>
<tr>
<td>Sam Morgan</td>
<td>10/10/15 - 10/12/15</td>
<td>74</td>
<td>39</td>
<td>113</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td></td>
<td><strong>457</strong></td>
<td><strong>335</strong></td>
<td><strong>792</strong></td>
</tr>
</tbody>
</table>

5.2 Automated content analysis

5.2.1. Themes

As described in section 4.2, data was analyzed by Leximancer for the following data sets: NS, SMH and the combined data of the NS and SMH data sets.

Fifteen themes were generated for the NS dataset. ‘Shark’ was the foremost theme, followed by ‘surfer’, ‘sightings’, ‘beaches’, ‘water’ and ‘whites’.

Fourteen themes were generated for the SMH dataset. ‘Shark’ was the foremost theme, followed by ‘beaches’, ‘attack’, ‘people’, ‘world’ and ‘time’.

Fifteen themes were generated for the combined dataset. ‘Shark’ was the foremost theme, followed by ‘attack’, ‘beaches’, ‘water’, ‘people’ and ‘during’.
5.2.2 Concepts

Fifty seven concepts were generated including three name-like concepts (Ballina, Lennox Head and North Coast) for the NS dataset. Frequencies ranged from 2310 instances (100%) to 66 instances (3%). ‘Shark’ was the foremost theme (100%), followed by ‘attack’ (35%), ‘surfer’ (22%), ‘beaches’ (21%) and ‘water’ (20%). The highest-ranking keywords associated with the concept ‘shark’ were ‘expert’, ‘large’, ‘sightings’, ‘waters’ and ‘recent’.

Sixty-three concepts were generated including six name-like concepts for the SMH dataset (e.g. Australia and NSW). Frequencies ranged from 2444 (100%) to 69 instances (3%). ‘Shark’ was the foremost concept (100%), followed by ‘beaches’ (24%), ‘attack’ (23%) and ‘water’ (22%). The highest-ranking keywords associated with the concept ‘shark’ were ‘sightings’, ‘killed’, ‘attacked’, ‘government’ and ‘coast’.

Seventy-two concepts were generated including six name-like concepts for the combined data set. Frequencies ranged from 4957 (100%) to 113 (2%). ‘Shark’ was the foremost concept (100%) followed by ‘attack’ (28%), ‘beaches’ (20%) and water (20%). The highest-ranking keywords associated with the concept ‘shark’ were ‘attacks’, ‘attacked’, ‘sightings’, ‘lines’ and ‘research’.

5.2.3 Themes and Concepts

Visual maps derived from each data set were generated, showing the relationships between themes and concepts. The maps allow for the connectivity between themes and concepts to be examined (see Figures 5.2 & 5.3). The themes are represented in the map by circles, with each color corresponding to a different theme. The concepts that make up each theme are labeled in black and are marked by solid dots within the circle. The lines between each concept indicate connectivity, where the shorter the lines are, the stronger the conjunctural relationship between the concepts in the corpus.
Figure 5.2: NS Leximancer Concept Map

Figure 5.3: SMH Leximancer Concept Map
The structure of the themes and concepts in each map indicates the predominant frames and discursive narratives each publication favored in their reporting of human shark interactions on the North Coast. Overlapping themes in the visualization can represent reoccurring themes and topics.

5.2.4 Frequency of Emotive and Prescriptive Terms

A manual word search was carried out to understand the frequency of emotive and prescriptive terms per article. The results allude to the way the discourse surrounding shark related stories may develop throughout the course of the year as evidenced by the use of emotive and prescriptive words. Both newspapers exhibit similar trends for the frequency of emotive terms per article (see Figure 5.4). Figure 5.4 shows that the frequency of emotive terms per article is higher for the SMH than the NS.

![Emotive Terms](image)

**Figure 5.4:** Line graph showing the use of emotive terms expressed as a frequency per article for each interaction.

As for the use of emotive terms, both newspapers exhibit similar trends for the frequency of prescriptive terms per article (see Figure 5.5). Over the course of the year, the usage of prescriptive language by both newspapers can be seen to decrease (see Figure 5.5). Figure 5.6
combines Figures 5.4 and 5.5, for the sake of comparison of emotive and prescriptive terms for each newspaper.

**Figure 5.5:** Line graph showing the use of prescriptive terms expressed as a frequency per article for each interaction.
Table 5.2: The frequency of emotive language identified by a manual search of the NS data set.
<table>
<thead>
<tr>
<th>Personified/ emotive language Phrase</th>
<th>Number of hits</th>
<th>Example of use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Man-eater</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Rogue</td>
<td>3</td>
<td>“There is little argument to support that an entire species will be endangered by eradicating a single large dangerous animal - the removal of what could be a rogue animal would prevent the risk of further unnecessary fatalities.” ‘Remove food sharks like and they eat what they dislike (us)’. 29/07/15</td>
</tr>
<tr>
<td>Shark Attack</td>
<td>461</td>
<td>“Beaches remain closed between South Ballina and Lennox Head following a fatal shark attack in the area yesterday”. ‘Beaches remain closed as “situation assessed”’ 10/03/15</td>
</tr>
<tr>
<td>Jaws</td>
<td>12</td>
<td>“Without even thinking about Jaws, hearing the word 'shark' anywhere near the water is enough to invoke an adrenaline-filled flight response in anyone who isn't Mick Fanning.” ‘COMMENT: Making the decision on surfing with sharks’. 10/08/15</td>
</tr>
<tr>
<td>Killer</td>
<td>14</td>
<td>&quot;But they aren't mindless killers,&quot; Dr Bucher said. ‘Top experts all agree - the &quot;shark&quot; is really a dolphin.’ 08/07/15</td>
</tr>
<tr>
<td>Monster</td>
<td>2</td>
<td>“A fisherman named Matthew has confirmed he hauled in the monster tiger shark off the Tweed Coast and kept its teeth as a souvenir.” ‘Fisherman's 'souvenir': The jaws of a giant tiger shark’. 12/08/15</td>
</tr>
<tr>
<td>Horror</td>
<td>7</td>
<td>&quot;It evokes a very very different kind of horror or terror because a person might feel quite helpless in that situation.” ‘Psychologist: Shark attacks cause depression, anxiety.’ 25/07/15</td>
</tr>
<tr>
<td>Prescriptive Language Phrase</td>
<td>Number of hits</td>
<td>Example of use</td>
</tr>
<tr>
<td>Sightings</td>
<td>169</td>
<td>“The Westpac Life Saver Helicopter had been conducting a sweep of the coast from Ballina to Lennox this morning and had no sightings of any sharks.” ‘VIDEO: Helicopter tracks shark suspected of attack on surfer’ 03/07/15</td>
</tr>
<tr>
<td>Bite</td>
<td>100</td>
<td>“Shark encounters and bites have harmed people we love and have also had a huge impact on our psyche as a community.” ‘OPINION: Tamara Smith supports non-lethal shark strategies’ 24/08/15</td>
</tr>
<tr>
<td>Encounter</td>
<td>111</td>
<td>“Mr Blair said the government had brought together the &quot;best minds&quot; to nut out the best possible technology to prevent tragic shark encounters in the future.” ‘Trial of shark deterrents will happen this summer’ 16/10/15</td>
</tr>
</tbody>
</table>
**Table 5.3:** The frequency of emotive language identified by a manual search of the SMH data set.

<table>
<thead>
<tr>
<th>Personified/emotive language Phrase</th>
<th>Number of hits</th>
<th>Example of use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Man-eater</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Rogue</td>
<td>3</td>
<td>&quot;The growing popularity of wetsuits has surely contributed too, even though a surfer's rudimentary shark evasion system is a simple &quot;don't piss in your wetsuit&quot;; some talk of rogue animals, others blame marine parks and whale hunting bans.” ‘Shark attack: the true Australian Story.’ 14/08/15</td>
</tr>
<tr>
<td>Shark Attack</td>
<td>388</td>
<td>&quot;A friend of Tadashi Nakahara, who died after being attacked by a shark at Ballina earlier this year, has said it is &quot;time to find out what is going on&quot; with the &quot;freakish&quot; number of shark attacks in the region.” ‘Marine ecologist: We don’t belong in the ocean.’ 27/07/15</td>
</tr>
<tr>
<td>Jaws</td>
<td>58</td>
<td>“Torn between public safety and economic reality, David Wright realises he is like the mayor in Jaws.” ‘Mayor of Ballina Shire David Wright: ‘We've got to get on top of this thing so Ballina does not become a byword for shark attack’. 12/08/15</td>
</tr>
<tr>
<td>Killer</td>
<td>18</td>
<td>&quot;The Esperance man who lost his left arm and both hands in a shark attack last October said he stared into the eyes of the killer before it attacked him.” ‘Esperance shark victim says he stared into the eyes of a killer’. 15/02/15</td>
</tr>
<tr>
<td>Monster</td>
<td>5</td>
<td>&quot;Sharks have been making news yet again, after a spate of sightings in Newcastle, New South Wales, prompted days of beach closures and reports of oceangoers allegedly being &quot;stalked&quot; by &quot;monster&quot; specimens.” ‘Sharks aren't criminals, but our fear makes us talk as if they are.’ 27/01/15</td>
</tr>
<tr>
<td>Horror</td>
<td>11</td>
<td>&quot;Since February there have been 11 attacks along a 50-kilometre length of coast between Byron Bay and Evans Head that has become a horror stretch with Ballina smack dab in the middle.” ‘Shark attack: the true Australian Story’. 14/08/15</td>
</tr>
<tr>
<td>Sightings</td>
<td>150</td>
<td>&quot;Beaches in the Ballina shire on the NSW north coast will remain closed with concerns after shark sightings.” ‘Shark sightings keep NSW beaches closed.’ 02/08/15</td>
</tr>
<tr>
<td>Bite</td>
<td>114</td>
<td>“While there has been the predictable media frenzy - one newspaper's front page screamed &quot;Death Hunt&quot;, describing a natural bite from a separate tiger shark on a dolphin as &quot;savage&quot; – so far there have no prominent calls for NSW to follow the lead of Western Australia and to start culling sharks.” ‘Shark watch: how to minimise the risks of a bite.’ 07/01/15</td>
</tr>
</tbody>
</table>
"While shark bites are rare and random events, and just below half of all encounters end without injury to the person or shark, there have been a higher number of fatal shark bites in the past year."

‘Shark encounters on the rise as more people enjoy the ocean.’ 02/01/15

The low frequency of emotive phrases compared to the previous study carried out by McCagh et. al (2015) shown in the tables 5.2 and 5.3 may indicate a less inflammatory discourse taken by media outlets on reporting on human-shark interactions. While usage of the term ‘shark attack’ remained frequently and consistent in reporting, other phrases such as ‘killer’ and rogue were used infrequently. The usage of such words was commonly found in contexts atypical of sensationalized media reporting of human-shark interactions. For example usage of the word ‘rogue’ for the SMH dataset was collected in an article outlining different theories for shark bites as apposed to a typical fear-laden report of sharks intent on biting humans.

The manual analysis detected re-occurring themes of pragmatism in the process of implementing management approaches, the precedence of science and non-lethal approaches to management over traditional management methods and the continual iteration that shark management would not involve killing sharks. While the theme of human safety was the focus of discussions regarding shark management, the theme of shark conservation was consistently part of the same discussion. While public pressure and local government pressure was directed at the NSW state government to implement various management approaches to mitigate shark bites, the government was cautious to implement approaches that were not already proven to be effective. The government attempted to alleviate these tensions at various stages of the year by announcing the forthcoming implementation of various technological management approaches in Ballina. The following excerpts are taken from articles in each data set and are representative of these themes.

"One thing we will not be doing in NSW is culling sharks… Instead, as well as continuing measures that have already proved successful, today I announce we will unleash new technology to make our beaches even safer for swimmers."

Baird pledge: Shark detecting sonar to protect beaches 25/01/15, SMH
"The police and myself and council’s view is that we need to put something in place," Cr Wright said. "We've had a sighting yesterday and a sighting the day before and these were whites, so we just can't wait the two months.”

Ballina community and DPI scientist hold shark conference 11/07/15 NS

“There have been calls for various potential solutions to the issue, including the installation of shark nets in the region. Authorities must play an intricate balancing act of respecting the fears within the community, and taking into account the scientific data available to them.”

Nets are not the answer 26/08/15 NS

"This program will provide vital information about sharks and their movements on the North Coast the more information we have, the better equipped we are to implement measures to reduce the risk of further attacks," Mr Blair said.”

VIDEO: Great white shark bolts after tagging by scientists 27/08/15 NS

"I hope to come out of this inquiry with a strong, evidence based list of recommendations to Government about the best way to keep people safe and also ensure we preserve healthy and biodiverse oceans.”

Ballina MP on State Government’s new shark safety committee 28/08/15 NS

“Fearing that locals will "take matters into their own hands" and start killing sharks, Cr Wright wrote to the Department of Primary Industries on Tuesday to demand researchers be dispatched to the area immediately to investigate why there are so many sharks and what can be done to combat it… We've asked the DPI to find out why because we've got people absolutely petrified, it is totally unprecedented," Cr Wright said.

NSW North Coast surfers support a partial shark cull amid unprecedented attacks 12/08/15 SMH

“NSW Minister for Primary Industries, Lands and Water Niall Blair said the state government ruled out shark culls earlier this year and had no plans to change this. He said it was looking at ways to improve shark protection on the North Coast, including spending $100,000 to investigate new detection and deterrence technologies.”
NSW North Coast surfers support a partial shark cull amid unprecedented attacks 12/08/15 SMH

“The NSW government is set to announce new measures to reduce the number of shark attacks on the state's beaches. The $250,000 campaign comes as a response to community concerns in northern NSW that the shark population has increased in the area, following a spate of attacks in recent months... Ballina Shire mayor David Wright said the community had been pressing the Department of Primary Industries all week and was happy it had responded to the community's concerns. “

NSW to announce campaign for sharks 14/08/15 SMH

"After considering the advice from experts attending a recent summit in Sydney and consulting with communities including the North Coast, we will take a multi-faceted approach to the issue of detecting and deterring sharks... We are proud to be the first jurisdiction anywhere in the world to adopt an integrated approach toward keeping our beaches safe."

Shark detecting drones to fly above NSW beaches 25/10/15 SMH

“Cr Wright said he hoped the NSW government would now fast track plans to fit out Lighthouse Beach with specially designed eco-shark nets. "At least now the state government can see we have a problem," he said.”

Man attacked by shark at East Ballina, northern NSW 11/11/15 SMH

“In what could quickly become a costly exercise, the State Government is under pressure to test technologies which may end up having little impact on reducing the risk of a shark encounter.”

Public meeting on shark summit to be held in Lennox Head 15/10/15 NS

“DPI shark expert Dr Vic Peddemors who is leading the shark tagging program of Ballina said that the recent independent review highlighted that there "wasn't a lot of technology ready to be tested". "We're dealing with human lives, so we have to be 100% sure that these things are effective," Dr Peddemors told The Northern Star. "Any devices that we use must provide that safety. "I think it would be very reckless throwing things in the water claiming they will work when they haven't actually been tested properly.”
"There has been some criticisms we have been doing a lot of talking, well what we're doing is basing our decisions that we will be making in the very near future on the (expert) advice, and consultation with communities, and we will be trialling things this summer… We will be trialling different methods that we have not seen in NSW this summer. We understand that you are hurting ... but we want to make the decisions on good information and expert advice."

Trial of shark deterrents will happen this summer 16/10/15 NS

Another theme evident in the tension between the public and the government was speculation surrounding the various speculations for the rise in sightings, interactions and bites on the North Coast. Speculative theories were assigned to an apparent increase shark activity near North Coast beaches such as rising shark populations, the distribution of baitfish closer to beaches, warmer water temperatures and larger populations of whales migrating past the coast. While science was limited in evidencing these claims, the re-iteration of such claims communicated a new problem that needed to be managed. The following excerpts are taken from articles in each data set and are representative of these themes.

"Every couple of years we're seeing more and more juveniles. "This isn't about increased numbers of people in the water, it's about more sharks. "That's directly the result of the protection afforded to them by the Federal Government."

Fisher says great whites sightings are on the rise. 12/03/15, NS

“Marine parks are a feeding ground for them. With mullet and fish stocks generally dwindling, they're coming in closer.”

Frequency of shark attacks has local surfers scared. 11/03/15 NS

"We're also seeing plenty of nutrients and other food sources coming from rivers, creeks and lakes, and there are a lot of those waterways on the coast… The number of fish shoals has gone up and that's attracted salmon, tailor, whiting and that attracts the bigger creatures like seals, which in turn attracts the sharks."

Sharks lurk close to swimmers on NSW south coast over summer. 19/01/15 NS
"I've noticed there's a lot of fish around, I've noticed that fishy smell, and the water's a bit cloudy from all the rain... Certainly around Byron at the moment the banks are such that there's a lot of deep water channels, I'm pretty wary when we've got a few deep water channels in close, it just provides easy swimming for (sharks)."

Local surfer: Conditions right for sharks 02/07/15 NS

“He said a combination of conditions including gannets diving on fish schools near the surface, rain washing dirty water out of the river and great whites following the whale migrations and fish runs were bringing the predators close to the shore”.

Nets, culls, tags won't reduce shark attacks, expert warns 07/07/15 NS

“In the last 15 to 18 months, I think a lot of people would agree with me... there have been so many more sightings and so many more incidents that everyone's getting cold feet I think... and not just because it's winter... Fatalities, attacks, sightings, incidents with surf craft and that huge shark actually swimming in and out of the broken surf for hours after last Thursday's attack have led me to suggest that something has to be done.”

Shark fear is growing with increased sightings: lifesaver 10/07/15 NS

“I have noticed a large increase in the size and number of a range of species from whalers and tigers through to bull sharks.”

Pro fisherman says sharks increasing in size and number 10/07/15 NS

“In 35 years of surfing the local breaks I have observed a noticeable rise in shark activity in the last two. There appears to be a number of factors contributing to this rapid increase in shark numbers on the North Coast, including warmer sea temperatures, greater fish numbers due to extensive marine parks in the region, and last but not least the politically correct decision to restrict local fisherman from catching a yearly quota of larger sharks that frequent the shoreline.”

YOUR STORY: Who are we protecting - humans or sharks? 20/07/15 NS

“The DPI's Dr Paul Butcher said it was a "very unusual" year for bait schools on the North Coast and "we still believe when these bait schools disappear the sharks will too. He said researchers had spotted whale species who usually frequent only deep waters
much closer to shore. Surfers were also advised by Dr Butcher and shark expert Dr Vic Peddemors to not surf near large baitfish schools.”

Minister urges patience on solving North Coast shark problem 16/10/15 NS

5.3.1 Determining Temporal Patterns

Figure 5.7 displays the media, social and political timeline. The timeline of events displays a summary of the responses of the media, public and policy maker’s governments for each interaction. A manual analysis of the articles derived the results for the timeline. Due to the low rate of media reporting on the Woody Vidgens interaction (a minor one which involved Vidgens being knocked off of his surf ski resulting in no injury), public and political response could not be ascertained from the data.

Hamish Murray 24/01/15
- Media: Discusses ecological factors involved in interaction and the correlation between increasing interactions and increasing human population.
- Public: Could not be ascertained from the data.
- Political: Premier states that NSW will not cull sharks and management strategies will be focused on technological solutions.

Tadashi Nakahara 09/02/15
- Media: Largely stays impartial to management options and discourse for the most part is non-inflammatory.
- Public: Boardriders discuss various ecological factors associated with the rise in sightings and interactions including a speculative White shark population increase.
- Political: Premier iterates that NSW will not cull sharks. He states technologies are being fast tracked.

Woody Vidgens 24/06/15
- Media: SMH did not report on the interaction in which Woody was knocked off of his surf ski.
- Public: Could not be ascertained from the data.
- Political: Could not be ascertained from the data.
Matt Lee 02/07/15

-**Media:** The media continues to stay non-inflammatory and the NS notes that risk of shark bite is something surfers accept.

-**Public:** The public states that confidence in the safety of the local ocean is wavering, sharks are continually frequenting near-shore waters and sightings are increasing as they have been for at least 15 months.

-**Political:** DPI shark scientist meets with members of the Ballina community and dismisses theories of increasing shark populations and baitfish sighted close to the coast. Ballina mayor calls for fast tracking of state government assistance.

Craig Ison 31/07/15

-**Media:** Remains non-inflammatory, acknowledges the risk of shark bite is ultimately carried by those who choose to enter the ocean, condemns culling and reports polls of the readership as opposed to culling.

-**Public:** Some North Coast surfers are no longer surfing because of interactions. In a public Le-Ba board riders meeting, local surfers call for a ‘limited cull’. Surfers welcome the trialing of deterrent technologies.

-**Political:** The Ballina government states it does not support culling while the NSW government again rules out culling on the North Coast. DPI announces tagging and increased aerial surveillance to start immediately. Premier announces a shark summit to explore technological approaches to management.

NSW Shark Summit Announced 14/08/15

NSW Premier Mike Baird takes to Facebook to announce the NSW shark summit at Syndey’s Taronga Zoo on September 29th. The summit brings together shark experts to discuss non-fatal shark management strategies such as barriers, shark detection strategies, and tracking technologies. Baird acknowledges the “extraordinary levels” of “shark attacks” on the far North Coast.

Sam Morgan 10/11/15

-**Media:** The media continues to remain non-inflammatory, welcoming non-lethal approaches to shark management and advising the readership take caution when entering the ocean. The SMH runs a piece criticizing the use of ‘smart’ drum lines.
-Public: Le-Ba president calls for NSW politicians to holiday on the North Coast to experience the fear gripping the community and calls for initiatives to be fast tracked to be installed by the summer holidays. A Lennox head surf coach discredits the NSW community education program, as surfers already know the information being communicated. A North Coast shark action group calls for the deployment of traditional shark nets until emerging technologies are deployed as tourism businesses are suffering.

-Political: A public hearing is held in Ballina as part of the Legislative Assembly's inquiry into whether shark bites have negatively impacted tourism in the area and how the government could support the local community. The NSW government trials shark detecting drones at Coffs Harbor as part of the Shark Management Strategy. Following the shark bite on Sam Morgan, DPI minister Niall Blair announces eco-barriers to be trialed at Lighthouse Beach in the coming Summer.

**NSW Shark Management Plan Announced 25/01/15**

DPI Minister Niall Blair announces the NSW Shark Management Strategy. The $16m plan will fund the trialing of various shark management strategies and continual projects including shark barriers and tracking technologies over the next 5 years. The plan focuses the trialing of these technologies on the North Coast in response to an increased shark activity in the area.

**Figure 5.7:** The media, public and political response to each of the interactions in 2015 as portrayed by the NS and SMH (see the appendix for the full, detailed and referenced timeline).

Reoccurring themes are evident in the timeline. These themes reflect the themes identified in the primary manual analysis of the data such as pragmatism in the process of implementing management approaches and the precedence of science and non-lethal approaches to management over traditional management methods. The media remained non-inflammatory throughout the year and each interaction, reporting on each interaction with a significant degree of non-bias and impartiality. While there were instances of articles in each data set acknowledging that action needed to be taken to mitigate shark bites, they did not promote lethal management responses such as culling. Conversely, they condoned culling as a management response and promoted non-lethal management measures, whilst acknowledging that the risk of shark bite is carried by those who enter the ocean.
The timeline evidences a growing concern held by the public, particularly surfers that the risk of shark bite increased in 2015 had increased based on speculations surrounding ecological developments in the marine environment and sharks being distributed closer to the coast. This uncertainty and wavering public fear, translates into a public call for government action following the Craig Ison and Sam Morgan interactions, as the Le-Ba board riders call for a ‘limited cull’ and a North Coast action group calls for the deployment of traditional shark nets.

A pattern of government response to growing public anxiety can be derived from the timeline. In the initial stages of the year and following the first two interactions, both the NSW state government and the Ballina Shire iterate that they do not support culling sharks. As the year progresses the central government begins to respond to public anxieties surrounding sharks and on various occasions meets with North Coast communities to discuss their concerns. In the latter stages of the year, David Wright began to appeal to the state government to fast track technological measures outlined at the shark summit and assist the Ballina Shire Council with aerial surveillance. Following the Craig Ison interaction the DPI announced an immediate shark tagging operation and increased aerial surveillance in the area. Just one day after the Sam Morgan interaction, the DPI announced the trial deployment of eco shark nets at Lighthouse beach in Ballina as part of the NSW shark management strategy.
6. Discussion

The aim of this study is to investigate the role the media has played in political responses to human-shark interactions in NSW in 2015. The NSW Shark Management Strategy was implemented in late October 2015 following an unprecedented increase in human-shark interactions. An increase in the near shore distribution of sharks was widely reported by surfers, fisherman and other water users. While the role media discourse has played in influencing the development of policy and government responses to societal issues has been explored in previous studies (e.g. Boissoneault et. al, 2005), the authors of this study are cautious in directly implicating the medias reporting on human shark interactions with the development and implementation of the NSW Shark Management Strategy.

This discussion will be laid out in two sections. Discussion of results will draw on evidence from the results section and the data collected in this study. Comparisons will be made with the McCagh et. al (2015) study to understand how the media discourse surrounding human shark management may differ or evolve in space and time. While the research methods of this study mirrored those carried out in McCagh, et. al (2015), the media agencies investigated in each study differed. This is an anomaly that should be considered whilst making comparisons between the two studies.

Future Work will outline areas of interest that prospective studies may investigate. The section will acknowledge the limitations of this study in terms of scope and focus, and explore how future studies may expand this growing topic of literature.

A Discussion of context can be found in the appendices of this thesis. This appendix may be helpful in painting a broader picture of this thesis investigation. This section draws on academic findings, anecdotal evidence and personal communications collected on a trip to the North Coast and Sydney, NSW related to this study in July 2016.
6.1 Discussion of results

6.1.1 Trends in Media Output

The overall trends in media output exhibited by each newspaper are important to consider in the context of drawing conclusions from the data collected. The NS appears to be more invested than the SMH in the reporting of sharks and interactions on the North Coast. This idea is evidenced by the NS’s positive trend in terms of reporting on human shark interactions in 2015 (see. Figure 5.1). The increasing rate of reportage by the NS conveys a steady increase in the North Coast’s local perceptions, dialogue and fear surrounding the idea of human-shark interactions in the area. The peak of the newspapers media output occurs during around the Craig Ison interaction. This period reflects a spike in the dialogue surrounding shark management on the North Coast surrounding mitigating further interactions, which included both the public and policy makers.

The shark decline in the NS’s reportage during data collection around the Sam Morgan interaction may have been influenced by the NSW Government’s announcement of the forthcoming Shark Management Plan, and it’s perception by the public and media as a problem solution. The incremental development in the NS’s dialogue surrounding policy response reflects previous studies where management responses begin to develop following the third or fourth shark bite (Neff & Hueter, 2013 & Neff, 2015). These trends do suggest a relationship between a panicked public response to shark bites and subsequent political response (McCagh et. al, 2015).

The increasing rate of media output by the NS and patterns in dialogue surrounding shark bites reflects the newspaper’s regional focus. It demonstrates the NS’s investment in reporting on a local issue as the North Coast public’s confidence in water safety fell throughout the year. Furthermore, of the states 14 human-shark interactions, 8 (of which 6 were investigated in this study) were geographically confined to the North Coast area, which may have communicated the idea of a regional, rather than a statewide problem (ISAF, 2016). This idea is reiterated by the Strategy Plan’s focus on trialing emerging management technologies on the North Coast in response to the unprecedented number of interactions that took place in the area.
Conversely, the SMH data does not exhibit these trends. The newspaper’s media output surrounding sharks decreased throughout the year (ref. figure 1). The data does not appear to show any significant responses to human-shark interactions on the North coast, the perception of a growing problem or policy response as outlined in previous studies (e.g. Neff & Hueter, 2013 & Neff, 2015). This may reflect the SMH’s broader editorial and geographical focus. This idea is evidenced by the name-like concepts generated for the SMH data set by Leximancer, e.g. ‘Australia’ and ‘NSW’, while the name-like concepts generated for the NS dataset were: ‘Ballina’, ‘Lennox Head’ and ‘North Coast’.

The SMH’s relative detachment compared with the NS from the issue means that caution will be taken whilst drawing conclusions from the dataset on the topic of their reporting of human-shark interactions on the North Coast. This idea may be important to consider in future studies that investigate newspaper reportage of human-shark interactions.

The local newspaper in this study demonstrates a clearer trend in it’s reporting on human-shark interactions and the development of policy response. The NS’s regional focus also means the dataset contains less noise, e.g. reporting on overseas human shark interactions. Consequently, a greater focus of this part of the discussion will explore results from the NS dataset.

6.1.2 The Role of the Media

Previous studies have emphasized the mass media’s role in the continuation and development of the negative stereotype of sharks through fear-laden, sensationalized and emotive depictions of human-shark interactions (Philpott, 2002 & Muter et. al, 2012). This idea suggests that the framing of sharks when presented in this type of media discourse drives deliberation surrounding the issue of shark management (Cox, 2007, Lakoff, 2010). The media’s framing of sharks and human-shark interactions is of relevance considering the effect discourse can have on public opinions and behaviors (Cox, 2007, Lakoff, 2010 & McCagh et. al, 2015).

Neff & Heuter (2013) have explored the tone of media reports and the erroneous use of definitions such as “shark attack”, which may have implications for the way in which the public interprets human-shark interactions (McCagh et. al, 2015). While the inflammatory role the media plays in communicating shark behavior in the media is understood (e.g. Philpott, 2002 & Muter et. al, 2012), the role it plays in policy response is not (McCagh, et. al, 2015). McCagh
et. al (2015) proposed that future studies should take less emphasis on challenging the Jaws, mythology-laden discourse as argued by Neff & Hueter (2013).

The results of this study are consistent with this observation by McCagh et. al (2015), which presents the media in an intermediary/reflective role. The themes generated in the study reflect an eco-centric and pragmatic discourse surrounding human-shark interactions. The framing used by the media outlets studied remained consistent throughout the year, which may have been strategic in reflecting the priorities and ethos of their wider readership (McCagh et. al, 2015). While the coverage of human-shark interactions increased throughout the year for the NS, the newspaper did not adjust its stance on condemning lethal methods of shark management.

The discourse identified has shown not to be sensationalized, emotive or fear-mongering which previous studies have emphasized (e.g. Philpott, 2002, Muter et. al, 2012 & Neff, 2012). These results suggest that the media did not play an inflammatory role as emphasized by previous literature (e.g. Philpott, 2002 & Muter et. al, 2012). Instead, the media have shown to be impartial and pragmatic in their reporting of human-shark interactions as per (McCagh et. al, 2015). The results of this study demonstrates a significant focus on the ecological conditions which may be conducive to the North Coast’s increase in interactions and sightings.

6.1.3 Discourse and Framing of Human-Shark Interactions

While usage of the term ‘shark attack’ remained frequent and consistent in reporting, other phrases such as ‘killer’ and ‘rogue’ were used infrequently. The usage of such words was commonly found in contexts atypical of sensationalized media reporting of human-shark interactions. For example usage of the word ‘rogue’ for the SMH dataset was collected in an article outlining different theories for shark bites as apposed to a typical sensationalized report of a shark that has seemingly developed a taste for human flesh.

The results of the McCagh (2015) study demonstrated how the media oscillated between an anthropocentric and eco-centric framing of human-shark interactions. The framing used by the media in this study has very rarely shown to be anthropocentric and in many instances the NS outlined to its readership that the onus of risk is taken on by the water-user when they enter the ocean. The valuing of human and shark life is a complex environment, sociological and ethical
debate which is occasionally raised by public commentators in the media’s reports on sharks and human-shark interactions.

The debate is one, which is provocative and arguably pertinent. While the issue is often at the crux of arguments, which attempt to justify management approaches involving killing sharks (McCagh et al., 2015), it was an argument that both newspapers did not include in their reporting of shark management approaches. The newspaper’s decision to exclude this argument may be indicative of the newspaper’s stance on shark management and may reflect the views and opinions of their readership. While the NS did increasingly report on the unprecedented number of interactions and sightings on the North Coast, their depiction of management solutions echoed that of the state government; that management should be non-lethal, trialed and scientifically validated. This line of dialogue surrounding shark management could have been expected following the Western Australia shark cull just a year earlier.

The cull was highly controversial and lacked support from both the WA public and scientists worldwide (Gibbs & Warren, 2014, Meeuwig & Ferreira, 2014 & McCagh et al., 2015). Shark management strategies that involve killing sharks raise significant moral, ethical and biological considerations (Smith, 2016). The cull demonstrated how the government may have underestimated the public’s level of sophistication and understanding of shark conservation and wildlife management (McCagh et al., 2015).

The lack of public support gained for their policy may be explained by the government’s over-simplification of a complex and multi-faceted issue and their dogmatic support of their decision to implement the policy (McCagh et al., 2015). In contrast, the NSW government was flexible in the way they framed the management of human-shark interactions. They continually iterated their desire to move away from management approaches that involved killing sharks, whilst acknowledging shark management is a complex issue that involves many unknowns.

The issue attracted widespread attention and scrutiny, and ignited substantial debate in both the media and academia (McCagh et al., 2015). Neff (2014 & 2015) has argued that policy response to shark bites often contradicts scientific research and recommendations in attempt to calm public hysteria (Neff, 2014 & Neff, 2015). The W.A policy shunned scientific recommendations made by shark and environmental scientists against the cull as the government emphatically maintained that killing sharks was an appropriate means to mitigate further interac-
tions. The W.A shark cull was seminal for shark conservation as it widely communicated the message that sharks should not be killed, a sentiment that was supported by both the W.A public and shark scientists worldwide (McCagh et al., 2015).

6.1.4 Eco-centric and Anthropocentric Tensions

The condemnation of killing sharks following the shark cull was pertinent. In January 2015, NSW Premier Mike Baird outlined that NSW would not implement further lethal shark management strategies- "One thing we will not be doing in NSW is culling sharks…” (SMH, 25/01/15). This was a position he and the NSW government held throughout 2015. The media reflected this idea in their reporting of human-shark interactions and management responses. When reporting on the topic of culling, the NS consistently included opinions that criticised culling, such as the article ‘Nets, culls, tags won't reduce shark attacks, expert warns’ (White, 2015), which includes the opinions and recommendations against culling of a local marine ecologist.

It may be important to briefly consider that the media’s reportage may have reflected political views held by each of the publications. While the methodology of this study does not provide the means to investigate this idea, the authors hold the position that it would not significantly affect the conclusions of this thesis.

This study cannot directly attribute these attitudes with the shark cull event. In light of the public and expert scrutiny the Barnett led W.A government faced during and following the cull, it seems likely that both the newspapers studied and the NSW government would be sensitive, conversationally aware and non-inflammatory in their framing of human-shark interactions in 2015. It could also be argued that the Baird government employed this style of framing to garner support for his NSW government. This idea may have been evidenced by Baird’s reiteration that his government would not ‘cull’ sharks. ‘Cull’ was the term popularly assigned to the W.A government’s ‘Imminent Threat Policy’; the policy that implemented the targeting killing of sharks using baited drum lines in near shore W.A waters in 2015.

The way clusters of shark bites induce public anxiety and the subsequent demand for government response has been well documented by Neff (2014). Before the NSW’s elections in March 2015 and even before the state experienced higher levels of shark sightings and interac-
tions, Baird pledged to begin trialing shark sonar detecting technology if his Liberal and National governments were re-elected in March (Needham, 2015). This politicization of shark bites demonstrates the reciprocal nature of communication between the public and government. It shows how governments may proactively and tactfully employ rhetoric surrounding shark bites and shark management to attempt to gain voter support.

This ecological focus identified in this study is atypical of media reportage surrounding human-shark interactions. The dominant theme in the study carried out by McCagh et. al (2015) was the issue of beach safety. Their study of a West Australian newspaper demonstrated that the focus of dialogue was overwhelmingly focused on policy (McCagh et. al, 2015). The emphasis the media takes on communicating the risk sharks pose to humans and the negative attitudes, beliefs and opinions held by the public is well understood to be one of the greatest impediments to shark conservation efforts (Ferguson, 2006, Muter et. al, 2012 & Bryhim & Parsons, 2015). While the media explored in this study cannot be said to be conversationally focused (e.g. decline of shark populations and the importance of sharks in apex predators), the NS sought to investigate the increased incidence of sightings and interactions by drawing on various ecologically focused comments and opinions made by scientists and water users.

6.1.5 Reframing Human-Shark Interactions in the Media

As the W.A shark cull threw shark management into dispute, it highlighted a seemingly greater degree of public complexity in the way they interpret and understand shark conservation (McCagh et. al, 2015). Weltz et. al (2013) has reported upon the evolving public perceptions of shark management, and the way management strategies that involve killing sharks are increasingly less justified. As an intermediary between citizens, policy and science, the media’s framing of environmental issues is not always accepted by audiences (Olausson, 2011). Olausson (2011) has outlined that audience meaning making of issues is a complex process and their ability to negotiate and oppose media information should not be ignored. The widespread rejection of the shark cull in W.A may have evidenced this idea.

The NS was flexible with their framing of a growing issue in the public sphere. They negotiated the topic with caution and impartiality. They did not actively promote policy responses or oversimplify what slowly became a controversial and hotly debated local issue. Higher levels of knowledge about sharks is connected with greater public concern about their conservation
(Bryhim & Parsons, 2015). The framing of sharks and interactions on the North Coast by the NS may have been beneficial in communicating to the public a complex, multi-faceted issue that is not yet well understood or explained by science. Neff (2012) has explored the use of “problem definition” frameworks that policy entrepreneurs may employ in strategically promoting policy outputs.

While the concept is politically focused, it may hold relevance in the context of the media. According to Neff (2012), a problem definition is a “framework [that] highlights the social and political processes that strategically manipulate objective conditions of nature into problems that governments need to solve” (p.g. 89). The NS did not appear to manipulate elements of the ‘problem’ to coax the public into supporting one or more policy solutions.

6.1.6 The NSW Government's Framing of Human-Shark Interactions

As briefly explored earlier in this discussion, the NSW government’s framing of human-shark interactions was found to be measured, consistent and scientific. The political response to each interaction on the North Coast did not focus or prioritize alleviating short-term public anxieties surrounding water safety. As fears escalated on the North Coast, DPI Minister Niall Blair, outlined these ideas as he spoke to the media on the topic of shark management: "Let's not forget the ocean is the domain of the shark, however, this Government is taking action to gain a better understanding of the local risks and how they can be reduced to help inform and protect the public” (“Increased surveillance", 2015).

The government regularly iterated its stance on moving away from lethal methods of shark management. Neff's (2012) case study of three shark bites in NSW found that there were few political incentives in supporting policy that promoted conservation that may harm the public. Again, in lieu of the W.A shark cull, the priorities of both the public and government appear to have shifted away from killing sharks and moved towards conversationally concerned methods of shark management. Neff’s (2012) study demonstrated that policy entrepreneurs utilized doubts and uncertainties surrounding shark science as a way to mitigate conservation concerns and overcome the conservation definition. In contrast the NSW government called for further scientific investigation into shark behavior on the North Coast as a means to reaching management solutions: "This program will provide vital information about sharks and their movements
on the North Coast the more information we have, the better equipped we are to implement measures to reduce the risk of further attacks” (“Great White bolts after tagging”, 2015).

They remained dedicated to management approaches, which were non-lethal, scientifically driven and proven to mitigate shark bites. The efficacy of lethal shark management programs in lowering the risk of human-shark interactions has been shown to be equivocal or ineffective (Wetherbee et. al, 1994 & Meeuwig, 2014). Following the scrutiny faced by W.A government surrounding the speculation of whether the government’s drum line program actually worked to lower the risk of shark bite, the NSW appeared to be cautious in developing shark strategies that were not backed by science: “We're dealing with human lives, so we have to be 100% sure that these things are effective," Dr Peddemors told The Northern Star. "Any devices that we use must provide that safety. "I think it would be very reckless throwing things in the water claiming they will work when they haven't actually been tested properly” (Broome, 2015).

This idea of scientifically driven management may have been epitomized with the NSW government’s Shark Summit, which brought together some of the world’s best shark experts and scientists to explore options for shark management in NSW. The NSW government firmly stood by non-lethal shark management strategies and even after North Coast surfers called for a “limited cull”, targeted at lowering White shark populations, the government did not adjust it’s policy position: “In response, the DPI reiterated the NSW Government did not support culling, but said Ballina was being seriously considered as a trial location for new shark repellent and detection technologies after a review into such methods was completed next month” (Broome, 2015).

The W.A’s overzealous and dogmatic commitment to their drum line policy meant that under public and scientific scrutiny the government was unable to retreat from their policy position, which may have been interpreted by the public as weak governance (McCagh et. al, 2015). In contrast, the NSW government was pragmatic and scientific in the way they went about framing the water safety risk posed by sharks in 2015.

Following the North Coast’s second shark bite, which resulted in the year’s only fatal interaction, the Baird government outlined that management technologies were being fast tracked: “Mr Baird said his government had recently announced a trial of sonar which gives a direct signal to lifeguards when a shark is detected in an area. "This technology does seem that
it would make a difference and we are fast-tracking that and doing all we can," he said” (Broome, 2015).

In conclusion, the NSW Government’s management of human-shark interactions was measured, flexible and scientific. The government was heavily invested in science and dedicated management to approaches that were non-lethal and proven to mitigate shark bites. The government appeared to be cautious in implementing policy that were not backed by science. This position held by the NSW government did not waver when North Coast surfers called for a “limited cull”.

6.1.7 Tensions Between the NSW Public and Government

At the same time, the Le-Ba Board riders president Don Munro was quoted by the NS, explaining that shark encounters have been increasing as sharks have moved from overfished waters and into local marine parks (e.g. Cape Byron Marine Park), along with a speculated increase in White shark populations. The responses to the fatal bite on Tadashi Nakahara came to typify public and political response to interactions on the North Coast in 2015. The government continually promised to fast track trialing of management technologies following shark bites on the North Coast, while the public continued to call for state government intervention as sightings and interactions increased.

An increased distribution of sharks in near shore waters was widely reported by water users on the North Coast such as surfers and fisherman: “In his 64 years as a surfer, Mr Munro said he has never seen the number of shark attacks the North Coast has experienced in the last year. "It is definitely unusual," he said. "People have got to understand that sharks have always been there, in greater numbers this year…” (White, 2015).

The speculations included a population increase of White sharks. Chapman & McPhee’s (2016) analysis of shark bites at ‘regional hotspots’ such as Reunion Island and Western Australia has suggested that spates of unprovoked shark bites are not completely random, independent events as described by Neff (2014). Their study comes after McPhee (2014) identified that human population increase and increased utilization of the oceans was insufficient in explaining increases in human-shark interactions. Conclusions made by the study outlined that regional clusters of shark bites are more likely to be influenced by a set of environmental con-
ditions that increase the likelihood of human-shark interactions at a local scale (Chapman & McPhee, 2016).

These conditions may not persist consistently through time (Chapman & McPhee, 2016). This idea is described in the North Coast context by a marine ecologist who identified environmental conditions that may influence the distribution and abundance of sharks: “Dr Paul Butcher, of the DPI, told the summit it had been a very unusual year for bait fish schools. "I still believe when the bait fish schools disappear the sharks will too," he said. He said researchers had spotted whale species who usually frequent only deep waters much closer to shore” (Broome, 2015).

The same idea was also evidenced in an article written for the NS by a North Coast surfer: ‘In 35 years of surfing the local breaks I have observed a noticeable rise in shark activity in the last two. There appears to be a number of factors contributing to this rapid increase in shark numbers on the North Coast…”’ (Russell, 2015).

Environmental conditions such as warmer water temperatures, deeper rip gutters running through surf beaches, the increased presence of baitfish near beaches and migrating whales near the North Coast and increased rainfall were all reported in the media examined by this study as factors that may influence the distribution and abundance of sharks on the North Coast.

From the data collected, it seems that the NSW government interpreted and communicated the bites on the North Coast in 2015 as the random and independent events. In addressing the spate of human-shark interactions on the North Coast, the NSW government did not address or explore the environmental factors that may influence the distribution and abundance of sharks that were widely discussed and debated by the North Coast public.

At a conference held with key members of the Ballina community in July 2015, senior DPI shark scientist Vic Peddemors dismissed theories surrounding shark population increases or the presence of baitfish (White, 2015). It could be argued that by exploring environmental drivers that may increase the likelihood of human-shark interaction on the North Coast, the NSW government may have damaged it’s own policy stance by framing the bites as a problem that needs to be solved. Such discourse may have been inflammatory and problematic for the NSW government, as it justified to the public that the bites were an ongoing and continual issue, rather
than a series of random events. Based on the media examined in this study, it appears that many North Coast water-users interpreted the series of human-shark interactions as causal and driven by environmental factors. This presented a tension between the public and government as the North Coast communities increasingly called for state government management response, while the NSW government was hesitant to implement measures that may negatively influence voter support.

As the year progressed, the NSW government came under scrutiny as the North Coast’s public and local government (Ballina Shire Council) directed pressure at the NSW state government to implement various management approaches to mitigate shark bites. The government attempted to alleviate these tensions at various stages of the year by announcing the forthcoming implementation of various technological management approaches in Ballina.

As dialogue and fear surrounding human-shark interactions on the North Coast heightened following the Craig Ison interaction in July, both the North Coast and the North Coast public continued to call for state government assistance. While calls were made for eco-barriers to be installed, sharks to be culled and drone and helicopter surveillance to be initiated, the NSW government remained tentative in implementing state driven shark management on the North Coast.

Just a day after North Coast surfers called for a “limited cull” in August, NSW Premier Mike Baird took to Facebook to announce the forthcoming NSW Shark Summit and an added $250,000 to be spent on surveillance and tagging on the North Coast in the immediate term. The NSW government announced a team from the DPI would be sent to the North Coast to tag sharks and conduct aerial surveys to investigate the issue.

In September at a community meeting at Lennox Head, DPI Minister Niall Blair announced that deterrent technologies would be trialed on the North Coast during the coming summer. In Late October the NSW government announced the $16m Shark Management Strategy. Just a day after the Sam Morgan interaction in December, the NSW government announced the installation of a shark eco barrier to protect Lighthouse Beach, the same beach Sam Morgan was bitten at. Days later the government also announced the installation of a watch tower at Lighthouse Beach to improve shark surveillance.
The various announcements surrounding shark management made by the NSW government in the latter half of 2015 could be argued to be direct responses to public fears and anxieties surrounding water safety on the North Coast. It seems the North Coast public and local government spurred the state government into action as tensions escalated. As the shark technologies outlined by the NSW Shark Strategy were not yet tested, the NSW government walked a precarious tightrope in dealing with pressures directed from the North Coast. The situation was problematic for the NSW government, as they were forced to respond to pressure and placate fear while implementing management strategies that would not be criticized by the public.

The management of the shark human interactions in 2015 by the NSW government seems to have been a fragile balancing act of managing public anxieties surrounding water safety and developing shark management strategies that would be supported by the public. In this context, shark management is not directed at shark control, but at human behavior, as the government seeks to regulate, calm and placate the public (Neff, 2012).

### 6.2 Future Work

This study has highlighted scope for future study in the emerging and multi-disciplinary field of shark studies which includes but is not limited to the media’s communication of human-shark interactions, public and political response to human shark interactions and statistical and environmental investigation into clusters of human-shark interactions. This discussion has highlighted the complex nature of public and political responses to human-shark interactions. Future events may not be analogous in space and time. Social, political and conservational attitudes will differ, as will human-shark interactions because of species distribution and abundance. The decision to install shark nets on the North Coast has demonstrated the unpredictable nature of events in this area of study. Future work needs to be flexible and adaptive to address and react to these uncertainties surrounding the way the public and governments respond to human-shark interactions.

Further discursive analysis of newspaper reporting of human-shark interactions should examine a wider range of sources. Because of time constraints, this study has been constrained to collecting data from just two newspaper sources. Future studies in Australia may want to col-
lect from both Newscorp and Fairfax media. These media companies are the two largest in Australia and own a large majority of Australian media outlets. Including both Fairfax and Newscorp newspapers in future studies may paint a more representative picture of the Australian media landscape.

This study has offered insights into the reliability of a regionally focused newspaper on reporting on human-shark interactions. This study has demonstrated the way regional newspapers may be used as a means of accurately examining public and political responses due to their impartial and un-sensationalistic nature of reporting on human-shark interactions. Nevertheless, study of more media sources may offer insights into the broader discourse of human-shark interactions. It may be advantageous to study nationwide publications to gauge wider perceptions of human-shark interactions.

Future studies may want to move away from text analysis as a means of investigating public and political responses to shark attacks. Previous studies have emphasized the sensationalized, emotive and fear-mongering discourse employed by the media in reporting on human-shark interactions (e.g. Philpott, 2002, Muter et. al, 2012 & Neff, 2012). The media in this study has been shown to be impartial and pragmatic in their reporting of human-shark interactions, but again the limitation of news sources needs to be acknowledged whilst addressing this idea. The complex nature of public and political response to human-shark interactions means that analyzing discourse may not be an appropriate means of investigating and understanding such events.

While text analysis will continue to be an effective way of mapping and examining the events following human-shark interactions, future studies may want to broaden their means of inquiry. Socio-political investigation, which closely examines media discourse, public attitudes in coastal communities and political developments surrounding human-shark interactions, may be a more robust and worthwhile means of investigating responses to human-shark interactions.

As discussed, a study of relevant environmental and ecological factors on the North Coast in line with the study carried out by Chapman & McPhee (2016) may be helpful to understand what may have increased the likelihood of human-shark interactions that took place in the area during 2015. Their study and further studies may be of great value in understanding the circumstances or conditions, both temporally and geographically, that increase the likelihood of hu-
man-shark interactions and the implications that knowledge may have for management responses.
Conclusion

This study paints a picture of the intricate political and social processes at play following clusters of human-shark interactions. An unprecedented spike in human-shark interactions on NSW’s North Coast in 2015 saw the escalation of public anxieties surrounding water safety and the development of the state’s Shark Management Strategy. A discursive study of two newspapers reporting of human-shark interactions on the North Coast has provided insights into the media’s communication of human-shark interactions as well as public and political dialogue surrounding the interactions and the development of shark management policy.

Local media sources appear to be more accurate sources of investigating attitudes and anxieties surrounding human-shark interactions as hypothesised earlier in this thesis. Media collected from the NS conveys an increase in human-shark interaction associated dialogue, which later suggests a correlation between a panicked public response to shark bites and subsequent political response. This result reflects the results of the McCagh et. al (2015) paper from which this study borrowed it’s methods. The SMH, which has a broader editorial focus, does not reflect these trends. Text analysis has demonstrated that the discourse in the media examined is not fear-laden, sensationalized or emotive which previous studies have emphasized (e.g. Philpott, 2002 & Muter et. al, 2012).

Instead, the depiction of interactions and management solutions reflected that of the NSW state government; that management should be non-lethal, trialed and scientifically validated. This study has suggested that the NSW government employed this rhetoric following Western Australia’s highly controversial shark ‘cull’, as a means of attempting to maintain voter support.

Government response to each of the year’s human-shark interaction reflects this rhetoric. The NSW government did not respond to human-shark interactions or public anxieties surrounding water safety with short-term ‘placebo’ policies. Instead, the government insisted on the investigation of non-lethal management solutions and the role of science in guiding management response. The public regularly punishes governments for ‘acts of god’ and the NSW government appeared to be cautious in implementing policy solutions that may have negatively influenced voter support. Amidst the interactions, public dialogue surrounding causal environmental factors that increased the likelihood of human and sharks interactions heightened.
This study has expressed caution in assuming that the media played a significant role in the development of shark management policy. The development of shark management policy is a highly complex and multi-faceted issue with varying economic, environmental, political, ethical and social considerations. While previous literature has explored how the media’s framing of issue can influence public opinions, attitudes and subsequent policy response, it would be simplistic and naive to assume the media played a pivotal role in the processes of public and political response to human-shark interactions in this study. This study has instead highlighted the complexities, which may be associated with the development of shark management policy in contemporary society.

Various theories and opinions held by the public sought to explain what many water-users believed to be a concentrated near shore distribution of sharks on the North Coast. This created a tension between the public and local governments who began to call on the state government for assistance in the latter half of 2015. The state government attempted to alleviate these tensions by announcing the forthcoming trials of various shark detection and deterrent technologies on the North Coast.

The management of the shark human interactions in 2015 by the NSW government seems to have been a fragile balancing act of managing public anxieties surrounding water safety and developing shark management strategies that would be supported by the public. The timing of government policy during heightened periods of public anxiety may suggest that the NSW government was responding to placate and calm public fears surrounding water safety.

Like many controversial or polarizing public issues, maintaining voter support seems to be at the crux of the governments handling and management of a particular issue. The management of human-shark interactions is a pertinent example of this idea and the NSW government’s decision to install shark nets on the North Coast in late 2016 perhaps best evidences this idea. The political move contradicts a year and a half of rhetoric offered by the NSW government that insisted that shark management on the North Coast should be non-lethal and scientifically driven. The move to install nets demonstrates how a government’s policy stance on a particular issue may evolve to align with the dominating public opinion on a controversial issue.

The results in this study surrounding the communication of human-shark interactions and the development of policy do not necessarily reflect the literature explored earlier in this thesis.
This conclusion mirrors conclusions made by McCagh et. al (2015). Such literature has given weight to the influence of the media’s ability to scare audiences and in turn, ignite public debate surrounding low-probability, high-risk events, which may lead to the development of government policy.

The findings of this study however suggest the emergence of environmental and conservative tensions, which may dampen or impede the development of the inflammatory responses to human-shark interactions. As explored, tensions evident in this study mirror the opposition against the Western Australia Shark cull, which was popularly documented by media. In this context, McCagh et. al (2015) concluded that the media took a reflective/ intermediary role in the way they framed fatalities and the government’s drum lining policy. This study has further documented this idea where the media and government were seen to be measured and pragmatic in their framing of human-shark interactions. This idea calls for a renewed flexibility in not just this field of literature focusing on human-shark interactions, but on communicative studies that examine and investigate the series of events, which may occur following controversial and polarizing issues in contemporary societies.

For governments, shark management is a controversial and costly endeavor to embark upon. Education and public awareness is the most cost effective means of shark management. In attempt to manage public overreactions to human-shark interactions, governments need to reframe the beach as a wild and potentially dangerous environment. Governments should not overstate their ability to manage human-shark interactions and should be transparent in their communications of risk management. If a public is well informed surrounding the risk of human-shark interactions and the ability of management approaches to mitigate risk, they may be less likely to blame governments for the perceived mismanagement of risk.

Science which seeks to understand the habitat use and movements of sharks, may offer insights into the conditions that increase the likelihood of humans and sharks interactions. Governments should also encourage or possibly subsidize the public uptake of personal shark deterrents, which have been independently proven to be effective in deterring sharks. This study ultimately highlights the need for a paradigm shift in shark management that sees the responsibility of water-safety and the onus and responsibility of risk moving away from governments and further towards the public.
@NSWSharkSmart - Jan 8
@NSWDPI Helicopter report a 1.8m Bull Shark at Forster Beach, Nambucca. No swimmers.

(NSW SharkSmart, 2016)
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sharkinfested-ballina-for-the-gold-coasts-safer-waters/news-story/5bbce0ec266a7875ef90019680d90f21


Appendices

2015 NSW Timeline

Total Attacks: 14.
Total Fatal Attacks: 1

Northern NSW Attacks: 8
Northern NSW Fatal Attacks: 1

Western Australia Background

-27th November, 2012. The WA fisheries department releases guidelines to the public explaining the circumstances in which it would kill a shark believed to pose a risk to humans.

-4th January, 2014. 4000 gather at Cottesloe Beach to protest the implementation of drumline fishing for sharks. Conservationists and some politicians label the policy as nothing more than a “shark cull”.

-20th January, 2014. The successful contractor to operate the drumlines pulls out because of death threats. The fisheries Minister announces that the Fisheries department would operate the lines, while another private contractor had been found for the South West.


-26th January, 2014. The first shark was killed under Western Australia’s imminent threat policy. A tiger shark caught alive by a baited drum line is pulled in and subsequently shot and killed. Images of the event ensued outrage on social media.

-28th January, 2014. The Animal Rescue Team and West Australians for Shark Conservation claim to have footage of rescue and release of stingrays on drumlines. The groups accuse the government for downplaying and dismissing the lines by-catch.
-1st February, 2014. 6000 protest at Cottesloe beach for the second time.

-12th February, 2014. The topic of the WA imminent threat policy was shifted to the Environmental Protection Authority at the national level and a one week public consultation period begun.

-30th April, 2014, the WA drum line summer-autumn season ends. During this seasonal period, 172 sharks were caught. 50 were tiger sharks, greater than 3m which were killed. No great whites were killed. Eight other animals including stingrays were caught.

-9th June, 2014. The Environmental Protection Authority begins taking public submissions and feedback on the proposal to operate drum line fishing for sharks for a 3 year period.

-11 September, 2014. The Environmental Protection Authority recommends against the WA government implementing the imminent threat policy and its shark kill zones for the next 3 summers due to scientific uncertainty surrounding the effects of drumline fishing. Shortly after, Premier Colin Barnett rules out against using drum lines for the coming summer.

2015 NSW


-NSW Premier Mike Baird announces that if the Liberal and Nationals government is re-elected he will boost public shark management with $100,000 to be spent on trialling sonar technologies. He announces surf clubs will also be given training and education on shark management as well as shark deterrent equipment. Baird iterates that the NSW will not cull sharks and shark management efforts will be focused on new technologies.


-9th February, 2015. All beaches along the North Coast’s 15km stretch from Lennox Head to South Ballina are closed by police following the fatal mauling of Tadashi Nakahara. Rescue crews are deployed to search for the shark, believed to be a Great White responsible for Nakahara's death. Lifeguards search the coast for the shark in jet-skis, rescue boats and a helicopter.


July 28th, 2015. Beaches between Lennox Head and Ballina are closed for an hour following sightings of four large sharks off the NSW North Coast. The sharks were spotted by aerial spotters near Boulders Beach. The closure follows new protocols which combines the work of Ballina Surf Club, Ballina Jet rescue, police and the council to quickly close beaches when sharks are spotted.

-6th July, 2015. Ballina Mayor Dave Wright reports that he does not support the culling of sharks on the North Coast. Wright rejects a suggestion from a local MP saying the netting of beaches is impractical. Wright outlines that the area has 15km of beaches and that they would have to come up with other solutions. He calls for an integrated national approach to shark management and that Ballina could lead the way with shark management.

-10th August, 2015. 200 surfers from Evans Head to Byron Bay met to discuss the increase in shark sightings, human-shark interactions and possible management solutions. Lennox-Ballina Boardriders Club President Don Munro calls the phenomenon an “unprecedented crisis”. Munro reports the surfers are calling for a changed approach to the current management situation. A “limited shark cull” was the favourable solution agreed on by surfers at the meeting. Munro acknowledges are “large cull” is not favourable and the Northern Beaches are “their domain and we enter it at our own risk”, but a limited cull would work to minimise the Great White juvenile population in the area.

-13th August, 2015. Ballina Mayor Dave Wright reports that he has pressured the Department of Primary Industries to assist his council with shark management. Wright outlines that the Department would send teams to the North Coast to aerial and boat surveillance and possibly shark tagging. Wright cites public pressure and the ‘limited cull’ called upon by North Coast surfers has fast tracked the states efforts the assist the North Coast.

-14th August, 2015. NSW Premier Mike Baird takes to Facebook to voice his personal opinions about human-shark interactions on the North Coast. Baird acknowledges the increases in encounters, his own experience being chased out of the water by a shark near Crescent Head and the public calls by members of North Coast Boardrider Surfers for a shark cull. He states that there are no easy solutions and that it is sceptical if the Western Australia really had any effective in minimising human-shark interactions. He admits that shark nets in NSW between Newcastle and Wollongong have reduced shark attacks in those areas, but that the by-catch is not ecologically sound. Baird announces the coming shark summit in Sydney and an added $250,000 spent on surveillance and tagging in the immediate term to reduce the risk of further attacks. Baird iterates that management would be carried out “based on fact, not emotion”.

-1st September, 2015. NSW Premier Mike Baird announces that he would consider deploying shark nets as a short term solution to the increase in human-shark interactions on the North Coast. He acknowledges that shark nets should not be a long-term solution and instead shark management should be focused on deterrent technologies.


-15th September, 2015. Minister for Primary Industries announces a new radio campaign to be aired on NSW’s North Coast to help educate listeners about being ‘shark smart’. The NSW government and lifesaving NSW will broadcast announcements to beach goers on ways to reduce shark encounters during the build up to Summer. The announcements will be aired on radio stations between Port Macquaire and Ballina. The tips broadcasted includes swimming between the flags, swimming in groups, avoiding swimming at dawn and dusk and avoid swimming at dawn and dusk.

-28th September, 2015. In light of the NSW shark summit, Ballina Mayor Dave Wright reports that while the areas tourism industry has been greatly affected by the coasts shark crisis, he would continue to refuse the installation of shark nets on the North Coast. Wright iterates the ecological impacts of shark nets and calls for better alternatives to come out of the NSW shark summit.

-29th September, 2015. Shark experts from around the world meet at Sydneys Taronga Zoo to discuss the effectiveness of shark technologies to be deployed in NSW. The meeting, convened by NSW Premier Mike Baird discusses solutions such as physical and visual barriers, sonar technologies, satellite and acoustic technology and electrical deterrent barriers. Baird emphasises that "no stone unturned to make sure we look at new and innovative ways to protect our beaches.” Political scientists and guest speaker Christopher Neff re-iterates the publics desire to move away from netting and cull sharks.
13th October, 2015. Niall Blair announces a public forum on shark management on the states North Coast. The forum which he will host on the 16th October at Lennox Head will provide the North Coast community with information on shark mitigation and technologies. The forum will also update the community on the progress of the states tagging program underway on the North Coast.

25th October, 2015. Minister for Primary Industries Niall Blair announces $16 million shark management strategy. The integrated approach to shark management plans to increase aerial surveillance of coastal waters, along with the trialling and development of new shark technologies. Technologies include shark ‘listening stations’ designed to receive information from tagged sharks, smart drum lines and ‘clever buoy’ in water shark sonar stations. $7 million of the strategy is to be invested in additional research into ‘how to keep [NSW] beaches safe from sharks and their natural environment’, and further work done on shark tagging on the states North Coast. Finally the strategy also invests into community education and the ‘SharkSmart’ mobile app (Media Release).


Just a day after the mauling of Sam Morgan at Ballina’s Lighthouse Beach, Ballina Mayor David Wright demands the government brings in extra aerial patrols, eco-shark nets and lifeguards immediately. Premier Mike Baird agrees, but again rules out the culling of sharks on the North Coast. Wright calls for help from the state government for increased helicopter surveillance of the North Coast, “the state government has reacted to our problem by having the shark summit and implementing new technology, but the trouble is the rollover of that technology is going to take time”.

25th November, 2015. NSW Ministry of Primary Industries announces the launch of shark technology testing. Minister Niall Blair visits the Mid North Coast to make the announcement of of the testing of drone surveillance and smart drum lines. Drone surveys are to be tested at Coffs Harbour while the first smart drum line is to be deployed at Ballina. The NSW Government focus’s it’s management efforts on the North Coast, with the announced fast tracked deployment of shark listening stations to Ballina and Byron Bay and also an increase in aerial hel-
icopter surveillance. Helicopters are to fly at least 3 hours daily from 1 December until 26 January, 2016 (Media Release).

-17th December, 2015. Niall Blair announces the deployment of two 4G listening stations at Sharpes Beach, Ballina and Clarkes Beach, Byron Bay. The listening stations provide live updates of the movements of tagged sharks within 500m of the listening station. When a shark is detected, alerts are sent out issuing it’s location. The detection system is being developed in conjunction with the development of the states SharkSmart App which will send notifications if a tagged shark is in the area.

-21st December, 2015. NSW premier Mike Baird and Niall Blair announce that the North Coast will receive the first shark barriers deployed under the states strategy plan. The ministers made the announcement after inspecting shark technologies trials in Ballina. The barriers will be deployed at Ballina’s Lighthouse Beach and will run the length of the beach (650m) while the barrier at Lennox head is announced to be about 150m. Mr Baird announces the construction of the nets will be fast-tracked to ensure they are in place as soon as possible. Mr. Baird also announces the smart drum line technology is underway and if the trial is successful, smart drum lines will be deployed permanently off the North Coast.

-18th March, 2016. Surfers gather at Lighthouse Beach, Ballina to protest against the installation of eco shark barriers at Ballina’s Lighthouse beach. Around 150 protesters, mainly surfers turned up to the beach to voice their opinions of the nets. The surfers believe that the nets are dangerous to surfers and may ruin the break. The surfers believe that the nets will be in the surf zone on many different swell angles and surfers would become entangled in the net. Ballina Shire mayor, Dave Wright arrives at the protest and calls patience and acceptance towards the nets.
Discussion of context

Exploring environmental drivers

The increased distribution of sharks in near shore waters reported by a wide range of water users on the North Coast supports Chapman & McPhee’s (2016) study of ‘regional hotspots’. As explored earlier in this discussion, their study has suggested that regional clusters of human-shark interactions are likely to be influenced by a set of environmental conditions that increase the likelihood of such interactions taking place. In the past, human-shark interactions have in the past been described as random, indiscriminate events (Chapman & McPhee, 2016). Considering the overwhelming anecdotal evidence reporting a concentrated distribution of sharks in nearshore waters, it would be myopic and simplistic to ascribe shark attacks on the North Coast in 2015 as random events. It is worthwhile to briefly explore environmental conditions that may have increased human-shark interactions in the area. This part of the discussion will briefly draw on grey literature and interviews conducted on NSW’s North Coast to further explore this idea.

Great White Shark Population Increase

A popular theory associated with the spate of attacks on the North Coast is a speculated Great White population increase. Australia has two genetically distinct Eastern and Western populations of Great White sharks, with limited interaction between the two populations (Parliament NSW, 2016). Studying and determining population trends of Great Whites in Australian waters is extremely difficult because the species is a “widely dispersed, low density, highly mobile apex predator” (p.g. 8, Australian Government, 2013). Genetic studies have estimated Australia’s Great White population to be 1500 breeding individuals (Blower et. al, 2012). Other estimates have put the East Coast’s population at 500 breeding individuals (No Shark Cull, 2015). Great White sharks were protected in Australian waters in 1999 (Australian Government, 2013) and many have speculated that their populations have rapidly grown in recent years.

Shark scientist Vic Peddemors of NSW’s DPI, has discredited the theory explaining: “to me, knowing a little bit about the biology of the animals, and reproduction rates, we know they are long lived, we know they reach sexual maturity late in life— it’s impossible for them to boom…. 

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Certainly I don’t believe it’s possible for the great white population to have skyrocketed, but that’s just based on the biology of the animal.” (Peddemors, coastalwatch, 2016).

Reid et al.’s (2011) study of decadal trends in shark capture by the NSW Shark Meshing program suggests that White shark numbers have not substantially recovered since receiving protection. Evidence from Queensland’s shark control program also indicates a long-term decline in the capture of Great Whites (Australian Government, 2013). In the paper ‘Shark Attack Theories’, West (2014) writes that “there is clear evidence from a range of sources (game fishing records, shark control programs, monitoring at the Neptune Islands) of a decline in the relative abundance of the White shark population in Australian waters over the last 60 years” (p.g. 6). Considering the array of evidence suggesting Great White populations have not increased significantly since protection in 1999, it does not seem that the North Coast’s spate of attacks was directly linked with an increasing Great White population.

The El Niño–Southern Oscillation

One theory which has received little attention in the media examined in this study is the the El Niño–Southern Oscillation. The El Niño–Southern Oscillation (ENSO) has a strong affect on year-to-year climate variability in Australia (Aus Govt, 2014). The natural weather cycle is associated with a cyclic warming (El Niño) and cooling (La Niña) each with varying climatic affects. The ENSO cycle operates on a timescale from one to eight years in the central and eastern tropical Pacific (BOM, 2014).

One set or processes associated with the phenomenon is the movement of coastal sediments on the North Coast. In 2015 surfers on the North Coast reported a slow winter in terms of swell. This was described by Dr. Daniel Burcher, a Marine Biologist at Southern Cross University in Lismore, Australia; “So last winter at least, the surfers were saying it was one of the flattest years they’ve known for a long time. And that allows, you tend to get the sand bars move further in with a deep channel close to shore between them” (D. Burcher, personal communication, 03/08/16).

The idea has also been described by David Wright, Mayor of Ballina; “There was a big gutter and the gutter went right along the beach [Lighthouse beach] and virtually out and around
that headland. And that’s where Tadashi got taken. So the sharks have actually come in and do that circuit” (D. Wright, personal communication, 03/08/16).

The build of sand on beaches and in tidal areas is linked with a strengthening El Nino weather pattern (Burcher et. al, 2015). The El Nino oscillation results in smaller Southerly/ South-Easterly swells, which allows for the accretion of a very pronounced long shore parallel bar with deep water close to the beach (Burcher et. al (2015). Burcher et. al (2015) writes that the “depth and proximity to shore of the channel produced by the long shore bar allows prey seeking refuge from larger predatory fish, and the sharks following them, to move closer to shore” (p.g. 4). Beach meshing programs in NSW and Queensland have shown significantly higher catch incidence of White and Tiger sharks during the occurrence of deep water closer to shore (Krogh, 1994 & Taylor et. al, 2011). The build of up long shore bars and deep-water channels has the effect of increasing the likelihood of humans and sharks interacting.

This presence of sharks closer than usual to beaches has been echoed widely by water-users in the media examined in this study. Because the accretion of a pronounced long shore bar and deep water channel is understood to be driven by the El Nino Oscillation as the climate cycle moves away from the El Nino extreme, we could expect this particular accretion phenomenon to lessen. As Southerly/ South-Easterly swells increase in size and frequency during forthcoming winters on the North Coast, long shore bars and deep water channels will move further away shore. This affect may reduce the likelihood of humans and sharks interacting in coming years.

The presence of unusually large schools of baitfish close to the coast was widely reported by water-users in the media examined by this study. There have been many speculations surrounding a holistic eco-system shift closer to the coast on the North Coast. Dr. Burcher has described this phenomenon: “There certainly was a lot of fish. The last, well 2 years, everyone has been saying “stacks of baitfish, stacks of bird activity, stacks of dolphins and stacks of sharks” (D. Burcher, personal communication, 03/08/16). As has David Wright: “Those bait balls normally happen further out” (D. Wright, personal communication, 05/08/16).

For sharks, food availability is driven by seasonal changes in ocean currents, weather patterns and water temperatures (Burcher et. al, 2015). Burcher et. al (2015) writes: “the abun-
dance of schools of fish on the North Coast over the past few months is likely to be one of the most important factors in juvenile White shark concentration” (p.g.3 Burcher et. al, 2015).

During El Niño, sea surface temperatures are substantially warmer in the central and eastern tropical Pacific Ocean (BOM, 2014). Warmer currents running closer to shore may have driven the concentrated ecological activity close to the North Coast. This factor may have again driven the concentrated distribution of sharks in near shore waters, increasing the likelihood of sharks and humans interacting. Like the accretion of long shore bars close to shore, it may be another factor that will lessen as the ENSO cycle moves away from the El Nino phase, which may in turn decrease the likelihood of humans and sharks interacting.

An increase in ecological activity close to the coast was widely reported, both anecdotally and scientifically in California in 2015 and 2016 (Houck, 2015). Currents bringing warm water to the Californian coast driven by El Niño saw a pronounced increase in marine life such as whales, dolphins and seals close to the coast. (Houck, 2015). In August 2015 Marine Biologist Giancarlo Thoma explained that the currents pushed exotic baitfish further north up the coast of California from Southern California (Jones, 2015). Chris Lowe, director of California State University's Long Beach Shark Lab reported a large spike in Great White sightings, stating that there were more sightings in 2016 than in the last 30 years (Dupont, 2016). In 1997, also an El Niño year, an increase in shark sightings and encounters was reported in California (Houck, 2015).

Lowe has reported that tagged Great White sharks normally migrate South during the winter, but all the sharks his team tagged in the summer of 2014 and 2015 have sharks remained in the Californian region during winter (Chaney, 2015 & Suter, 2015). Climate variability can influence the distribution of sharks and their prey (Chin et al, 2010 & Perry et al, 2005). An altered distribution of sharks can in turn alter the number of human-shark interactions if a greater environmental overlap is shared by humans and sharks (Chapman & McPhee, 2016). Chapman & McPhee (2016) have identified a correlation between a substantial increase in the number of shark bites that occurred over a relatively small stretch of coastline in South Africa during the 1998 El Niño year with warm sea surface temperatures in the Indian Ocean and decreased rainfall in the southern part of Africa.
The mirroring of increased ecological activity close to the coast in California and Australia correlated with the El Niño event seems worthy of further investigation. Chapman & McPhee (2016) have identified a variety of factors that may draw sharks to certain locations or alter traditional behavioral patterns. This discussion has brought together an array of factors that may have influenced the distribution of sharks, causing a greater environmental overlap between sharks and humans on the North Coast. Chapman & McPhee's (2016) study has demonstrated how the environmental conditions that may be implicated in clusters of shark bites can be investigated. This discussion has identified scope for a similar study to be carried out focusing on the spate of shark bites on the North Coast in 2015.

Finally, catch statistics published in the 2015-16 Shark Meshing Program Annual Performance Report may be indicative of the 2015 El Niño year as an ecological anomaly. In the 2015-16 meshing year there were 748 interactions with shark nets in the Sydney area (DPI, 2017). In the 2014-15 shark-meshing year there were 189 interactions with shark nets in the Sydney area (DPI, 2016). While the catch statistics are naturally variable from year to year, this marked increase in interactions with the net may reflect the concentrated distribution of marine life close to the coast that was so widely reported on the North Coast during 2015.

The ENSO seems to be implicated in a range of these factors and limited historical evidence has demonstrated how shark sightings and interactions have increased in other El Niño events. If the 2015-2016 El Niño event and it’s associated environmental conditions is a major factor in influencing the distribution of sharks on the North Coast and thus increasing the likelihood of humans and sharks interacting, it could be predicted that as the ENSO cycle moves away from the El Niño phase there will be a decrease in human shark interactions on the coast.

Evaluating Management Strategies

The NSW Shark Management Plan was widely applauded as the world’s first non-lethal, multi-faceted approach to shark management. This part of the discussion will briefly explore the efficacy of the various approaches of the Management Plan.
Aerial Patrols

In April 2016 NSW’s DPI announced that aerial beach patrols would be conducted year round for the next 12 months on selected weekdays, weekends, school holidays and public holidays until April, 2017 (DPI, 2016). Robbins et. al (2012) has demonstrated the limited efficacy of both fixed wing and helicopter shark surveillance. Aerial beach patrols have received considerable public support in Australia and are often presented as an affective preventative measure against human-shark interactions (Robbins et. al, 2012).

The study evaluated the ability of observers in both forms of aircraft in spotting fixed shark analogues at various depths and positions (Robbins et. al, 2012). Preliminary tests demonstrated that aerial observers have limited ability to detect sharks deeper than 2.6m below the water surface (Robbins et. al, 2012). The observability of fixed analogues at a depth of 2m was shown to be limited, with overall sighting rates of only 12.5% and 17.1% for fixed-wing and helicopter observers, respectively (Robbins et. al, 2012).

Further, the tests were not conducted along coastal beaches, but in sheltered waters, which presented favorable sighting conditions unlikely to be experienced during genuine aerial beach patrols (Robbins et. al, 2012). The detectability of sharks by aerial patrols is affected by overhead cloud cover, rain, reflected glare on the water, distance, aircraft type, sun glare and sea conditions. Their study has shown the limited efficacy of what has traditionally been understood to be an affective early warning system to prevent shark attacks. In light of their study, unmanned aerial vehicles (UAVs) have been suggested as a lower cost alternative with better sight ability (Bryson & Williams, 2015). The NSW DPI has expressed its desires to move further towards UAVs as a means of carrying out aerial beach patrols (Parliament NSW, 2016).

A challenge associated with aerial beach patrol is attempting to determine whether the presence of a shark is dangerous or not. Sharks often frequent inshore waters to rest in surf zones after feeding and it may be difficult for aerial patrols to determine whether a shark may be resting in the surf zone or hunting. Aerial observations of sharks frequenting the same waters as humans have in the past shown that there is no simple relationship between environmental overlap and dangerous human-shark interaction (West, 2014). Evacuating beaches every time a shark is sighted may install paranoia in water-users and communicate the idea that sharks are an unrelenting and dangerous threat. Nonetheless, aerial patrols could be used to gain an under-
standing of marine and shark activity on any given day as a means to inform water-users. Water-users can then make informed decisions about how they use the ocean.

**Shark Tagging, Tracking and Detection Technologies**

Another detection component of the NSW Sharm Management Plan is shark tagging and sonar technology. In conjunction with CSIRO, the DPI has been carrying out an extensive tagging operation in NSW with a focus on the North Coast. As of December 8th, 2016 the DPI had tagged 68 great white sharks and 88 bulls (DPI, 2016). In water Satellite receivers known as VR4G satellite shark listening stations can detect the presence of tagged animals swimming within a 500m radius of the listening station (DPI, 2016). 20 listening stations have been deployed, with 10 deployed in Northern NSW waters (DPI, 2016). Listening stations can then provide real time updates of tagged sharks on the SharkSmart app or twitter page and notifications are sent out. (DPI, 2016). Aerial sightings of sharks are also updated on the page (ShambSmart, 2016). Water-users are able to check either the SharkSmart app or Twitter page to make informed decisions about how they want to use the ocean (see Figures 6.1 and 6.2).
Figure 6.1: Screenshot of SharkSmart twitter page (NSW SharkSmart, 2016).

Figure 6.2: Screenshot of SharkSmart twitter page (NSW SharkSmart, 2016).
SharkSmart has been reasonably popular and well received by the NSW public. The operation is unobtrusive for sharks and easy to use for water-users. The process of observation and warning means that by informing the public, the public is aware of the risk at a particular location. Little attention has been given to the number of sharks tagged by the DPI and how many sharks have not. While SharkSmart may offer notifications regarding the proximity of tagged sharks to listening stations, it obviously gives little insight into the movements of sharks that have not been tagged. It would be inappropriate for water-users to check the app to see if a shark had been detected at a listening station at a particular beach and then make assumptions on whether they may or may not encounter a shark at that particular beach based purely on whether a shark had been detected or not.

Based on population estimates of Great Whites, one could assume that less than 10% of the East Coast Great White population has been tagged. That’s not to consider the population of Bull sharks or Tiger Sharks that frequent or live in the waters around the North Coast. This idea that the app may not be representative of shark movements has not been communicated by the DPI or discussed in the media. While the app may offer some insights into the movements of sharks in the area, the capabilities of SharkSmart needs to be clearly communicated to the public to ensure that they clearly understand the purpose of the app.

VR2W listening stations deployed on the seabed provide finer scale information on shark movements and habitat use (DPI, 2016). Along with the VR4G stations, the receivers provide scientists with data which in time will be able to be used to understand seasonal and regional movements of sharks. This information can then be used to gain a better understanding of human-shark interactions in NSW and the conditions or seasons that may increase the likelihood of humans and sharks interacting. This information can then be used to educate the public and again let them make educated decisions regarding how and when they use the ocean.

SMART (Shark Management Alert in Real Time) drumlines is another major component of the strategy plan. SMART drumlines are not designed to kill sharks (DPI, 2016). Smart drumlines are fitted with an alarm that alerts a response team who can then immediately tag, relocate and release the shark (DPI, 2016). A tissue sample from captured sharks also contributes to a genetic base of knowledge, which helps scientists to infer population estimates (Parliament NSW, 2016). Shark capture and relocation programs have been implemented with great success.
in Recife, Brasil (Meeuwig & Ferreira, 2014). Between 1992 and 2011, there were 55 human-shark interactions, with just over a third of them being fatal within an ~20-km stretch of coastline (Hazin & Afonso, 2014). Shark attack rates fell by 97% during periods that the capture and relocation program ran (Hazin & Afonso, 2014). When captured and relocated, large sharks tend to move away from protected beaches (Meeuwig & Ferreira, 2014) and overall the scheme seems to be far less detrimental to non-target marine life than shark meshing programs (Hazin & Afonso, 2014).

15 SMART drumlines have been deployed along the NSW, with an additional 85 drumlines to be rolled out. The capture and relocation program carried out in Recife demonstrated an effective means of lowering the risk of human-shark interactions that moves away from the catch-and-kill approach, whilst minimizing detrimental effects to non-target marine life (Meeuwig & Ferreira, 2014). The use of SMART drumlines are also an effective means of tagging sharks, so the program will further increase data available to scientists surrounding shark movements and habitat use in NSW waters.

Other components of the strategy includes in water sonar detection technology, which is currently being tested and the now defunct shark eco-barrier, which failed testing at Lennox Head and Lighthouse Beach. In the initial stages of implementation, NSW’s broadly focused Shark Management has shown promise. A focus on research is beneficial for both scientists and the public, as science on shark movement and behavior can be used to reduce the risk of human-shark interactions. The most cost effective means of mitigating the risk of human-shark interactions is through public awareness and education. The DPI needs to continue to educate water users on the risk of shark encounters on specific days and conditions.

*Shifting the Onus of Risk*

A paradigm shift needs to take place in shark management that sees responsibility and the onus of risk shifted away from governments and further towards the public that enter the ocean (D. Burcher, personal communication, 03/08/16). Shark management has been seen to be a costly and controversial exercise that is targeted at protecting a limited group of water-users. If publics are educated surrounding the risks of sharks, it may lessen public responses to human-shark interactions, which often calls for drastic governmental response. There is no silver bullet
to mitigating human-shark interactions and while our understanding of shark movements and habitat use on the North Coast is limited, so too is effective management responses.

The public needs to be educated and wary of the fact that when they enter the ocean, they are entering a wild environment where the risk of dangerous encounters with sharks is a reality. Governments need to re-frame beaches as wild and potentially dangerous environments. In helping to shift the onus of risk towards water-users, governments should also consider, encourage and push water-users to purchase personal and protective deterrent devices (D. Burcher, personal communication, 03/08/16). After exploring the efficacy of the NSW Shark Management Plan, it appears that shark management in NSW is about offering policy solutions, which are perceived by the public as attractive and effective.

While in the long term the plan will undoubtedly provide scientists with invaluable data surrounding shark movements and habitat use on the North coast, it is dubious as to whether the plan will meaningfully reduce the risk of human-shark interactions in the short-term. It is important governments do not overstate their ability to manage and mitigate human-shark interactions (Hart & Huveneers, 2016). Governments need to be transparent in their communication of shark management. Communication needs to clearly outline how different management strategies may lower the risk of human-shark interactions. This may lessen public reactions to human-shark interactions, which seek to blame governments for the mismanagement of risk.

Because human-shark interactions are such infrequent and variable incidences, interpreting statistical trends over short periods is troublesome. When frequencies are too low statistical chance may be interpreted as causation. Chapman & McPhee (2016) has demonstrated that clusters of human-shark interactions may be driven by a set of environmental drivers. The ocean is a dynamic and ever-changing environment and concentrated distributions of human-shark interactions have often been seen to be temporary rather than long-term trends (Chapman & McPhee, 2016). Consequently, periods of time that see lower frequencies of human-shark interactions may be interpreted as causally driven by shark management responses, even though they may be the result of changing environmental conditions (Chapman & McPhee, 2016) or statistical chance.

For aforementioned reasons, NSW’s North Coast may very likely see lower frequencies of human-shark interactions. In this case, the phenomenon may be interpreted as management
success. Amidst the environmental complexities surrounding 2015’s spike in human shark interactions on the North Coast, along with the newly implemented NSW Shark Management Plan, it will be difficult to untangle causal factors for trends in human-shark interactions in the coming years. The nature of shark management as political ploy aimed at placating an anxiety-ridden public and maintaining voter support, means that governments will likely promote their own policy solutions if they are seen to ‘work’.

This may lead to a normalization and acceptance of government driven shark management schemes as an effective means of mitigating the risk of human-shark interactions. As discussed the practice of shark management, responsibility and the onus of risk needs to move away from governments and towards water-users. This idea may be jeopardized in years to come if large scale government run shark management schemes are accepted by the public as an effective means of minimizing the risk of human-shark interactions.

**The North Coast’s Shark Nets**

In December 2016, at the time of writing this thesis, the DPI installed 5 shark nets on the state’s North Coast as part of a 6-month netting trial in the area (DPI, 2016). Following non-lethal shark attacks in September and October 2016 and reignited anxieties surrounding water safety the government announced plans to trial shark nets over a 6 month summer period. In a policy backflip, the Baird government in October announced plans to introduce shark nets on the North Coast. Like the announcement of the NSW Shark Management plan, Baird took to Facebook to announce the state’s decision to net on the North Coast. The DPI explains it’s decision to introduce nets on the North Coast on it’s website: “The Government has an obligation to do all it can to ensure public safety – balancing the benefits of its actions with any impacts on wildlife and the environment. It has made the decision following a spate of shark attacks on the north coast and calls from sections of the local community to introduce shark meshing nets. The Government believes shark nets are worth trialling - along with all possible measures to reduce the loss of life of non-target marine animals coming up against the nets. Coastal communities need to have some areas made as safe as possible from ocean predators” (DPI, 2016).

This study has identified that the majority of interactions in the area during 2015 occurred over a 5-month period between May and October. The two human-interactions that took place on the North Coast in 2016 also occurred in this period. The higher incidence of interactions during
this period may be linked with seasonal distribution of certain shark species. If the distribution and abundance of sharks in the area remained constant throughout any given year, we could expect human-shark interactions to increase as human utilization of coastal waters increased in the summer period.

Trailing shark nets on the North Coast during the summer period, when human-shark interactions are known to decrease is an inaccurate means of gauging the effectiveness of shark nets in the area. It could be argued that the shark nets are ‘trialed’ during the summer months as a means to install confidence back in local communities. Furthermore, because human-shark interactions are such infrequent events, a trial lasting just 6 months is an inadequate time frame to evaluate the effectiveness of the measure. The summer period is likely to experience lower rates of human-shark interactions and both the government and publics should be cautious in correlating lower incidences of interactions with the trialing of shark nets on the North Coast.

The NSW Government’s decision to net on the North Coast highlights the political and social complexities associated with the development of shark management policy. Non-lethal strategies offered by the Baird Government were at first popular and well received by the public. After interactions on September 26 and October, 12, Mike Baird justified the decision to net the North Coast because of changing community sentiment surrounding shark management: “The sentiment in that North Coast community has shifted. It was against nets. The recent attacks have started to shift that. There is a mood and a change within that community” (Coultan et. al, 2016).
Thursday, 8 December 2016

FIVE SHARK NETS DEPLOYED ON NSW NORTH COAST

NSW Minister for Primary Industries, Niall Blair, today announced the deployment of the five shark nets to be trialed on the NSW North Coast, ahead of the school holidays.

After extensive community consultation, following a shark attack off Lighthouse Beach in September five beaches were chosen for the six-month trial - Lighthouse Beach, Sharpe Beach and Shelly Beach at Ballina, Seven Mile Beach at Lennox Head and Evans Head Beach.

"The initial testing of the nets over the past few weeks has allowed contractors to make amendments to help withstand local conditions and give the trial the best chance of success," Mr Blair said.

"While the shark nets have been successfully deployed since 1937 off Sydney, the objective of the trial is to determine whether they are effective at minimising the risk on the far north coast.

"The nets have been fitted with 'whale alarms' and 'dolphin pingers' like those used between Newcastle and Wollongong to assist in deterring whales and dolphins and will be checked twice daily."

The NSW Government also began the roll out of an additional 85 SMART drumlines, taking the number available to 100 for potential use along the NSW coastline.

Today we also installed a further 10 SMART drumlines from Lennox to Evans Head (taking the total deployed to 25), other NSW beaches will begin to see drumlines progressively rolled out over the next few months.

The north coast net trial and SMART drumlines will complement measures in place under the $16 million Shark Management Strategy, including VR4G listening stations to identify tagged sharks, research grants, increased traditional aerial surveillance and trials of drone surveillance.

NSWDPI have tagged 68 great white sharks and 88 bulls on SMART drumlines since August 2015. All animals caught using SMART drumlines have been released alive.

MEDIA: Evie Madden | Minister Blair | 0409 682 163

(DPI, 2016).
Conclusion

This study has also explored the various environmental drivers, which may have increased the likelihood of humans and sharks interacting on the North Coast in 2015. Chapman & McPhee (2016) have examined clusters of human-shark interactions and causal sets of environmental drivers. Understanding when, where and what increases the likelihood of humans and sharks interacting is an important means of mitigating future interactions. While the methods used to explore the cluster of interactions experienced on the North Coast and causal environmental drivers during 2015 in this paper are by no means as rigorous in practice or in methods as those employed by Chapman & McPhee (2016), initial findings indicate that the El Niño–Southern Oscillation may have played a significant role in increasing the likelihood of humans and sharks interacting on the North Coast. This idea may further indicate that human-shark interactions will decrease as the climatic cycle moves away from the El Niño extreme.
Creative Component

Nameless, Unreasoning, Unjustified Terror

March 4th, 1933. Franklin D. Roosevelt, spoke to his country in his first inauguration as President. The Great Depression had brought the United States to its knees. Unemployment was peaking millions as the nation’s economy began to collapse. In panicked desperation, many Americans were rushing to the banks and withdrawing their savings.

The effect of which, only furthered the crippling effects of the Great Depression. In a social climate of paranoia and anxiety, the typically affable Roosevelt told his country that they had one thing to fear… “fear itself- nameless, unreasoning, unjustified terror”. He explained to his country that the effect of fear was only making the depression worse.

Roosevelt’s wary words to the American people etched themselves into history. With his address, he alluded to the debilitating, overwhelming and paralyzing effects of fear and called to his people to act upon reason.

Sensing, evaluating and avoiding harmful risks is necessary for the survival of all living things. Fear has the ability to rationally shape, or irrationally overwhelm human perception of risk.

It holds a power like no other emotion and triggers some of our most deep-seeded, primal instincts. It can drive us to stand to fight to death, to flee in frenzied panic or freeze in vulnerable helplessness. It can drive us to a state of persistent paranoia or perpetual madness.

Sharks are, perhaps the most feared animal on this planet. To humans, the ocean is wild. It is a unique and unpredictable environment where for once, we are at the mercy of nature. As the father of Gonzo journalism, Hunter S. Thompson once wrote, “It was the Law of the Sea, they said. Civilisation ends at the waterline. Beyond that, we all enter the food chain, and not always right at the top”.

Sharks were once perceived as a mysterious, innocuous ocean dweller who posed little risk to water users. Thanks to a certain 70’s Hollywood blockbuster, the worlds’ perception of sharks
evolved almost overnight. It communicated a simple message; the sharks are hungry and humans are on the menu. The films victims were innocent and it’s villain guilty. It demanded justice.

The film offered a grisly and nightmarish depiction of what was then, an extremely infrequent and rarely photographed or videoed event. It provided a vivid set of imagery that became deeply embedded in the minds of the public. Hysteria ensued.

No other animal has been so negatively and unjustly misrepresented with such conviction as sharks have.

For the past year I have studied the way societies and governments respond to shark attacks. My study, along with my own experiences as a surfer, has taught me that humans are for the most part, poor evaluators of risk.

The answer is fear.

Humans tend to overreact to risks that are emotional, frightening and easy to visualize. This might explain why we so deeply fear sharks, but to a lesser extent more pressing issues, say global warming. We respond to these fears and act accordingly, whether it is rushing to the bank in times of economic peril, avoiding flying following terrorist attacks or demanding for sharks to be killed, following clusters of shark attacks.

Fear makes great news. The mass media have long been recognized as being able to scare and influence audiences, thereby increasing the vigilance of audiences to a particular issue presented to them. Terrorism, cancer, unruly youth, car crashes frequent our news almost daily. The media frenzies around shark attacks and have offered sensationalistic accounts of sharks as merciless, malevolent, monsters for almost a century now.

Under pressure from hysterical publics, governments often respond to fearful risks with policy. You could call these types of policy, ‘placebo’ policy. They are directed at managing and placating a fearful public rather than the risk itself.

Their answer to shark attacks is commonly to kill sharks.
Killing sharks is about managing and placating the public. It is not about managing sharks. It is about managing people. It is about responding to whoever shouts the loudest. It is about governments maintaining voter support in times of hysterical fear. It ignores science and it ignores risk analysis.

Sharks have become victims of our fear. We need to explore and understand this fear. Humans kill an estimated 100 million sharks a year. On average, sharks kill 13 humans a year. So in the words of Roosevelt himself, sharks have nothing to fear, but fear itself—“nameless, unreasoning, unjustified terror”.

Untangling the Politics of Killing Sharks

Bottlenose Dolphins, Grey Nurse sharks and Green Turtles were among the dead hauled out of shark nets around Sydney in 2015. The NSW government’s most recent performance report details the marine life captured by the Shark Meshing Program.

Since 1937, shark nets have been deployed seasonally at 51 beaches around Sydney. In theory, shark nets lower the risk of humans and sharks encountering one another, by lowering the number of sharks in the close vicinity of popular beaches. Interestingly, 2015 saw a huge surge in marine life entangled in the nets.

2015 recorded 748 “marine life interactions” with the nets, up from 189 in 2014. Of the animals caught by the nets, 86% were threatened, protected and/or non-target species, while the other 14% of animals caught were target shark species.

Unfortunately for all marine life, shark nets are blind and indiscriminate. The mesh size is designed to entangle sharks, which is also well suited to catching dolphins, rays and turtles.

The report describes two performance indicators, the first being to reduce the risk of shark attacks in the meshing program region. Just one water-user was bitten at a beach while nets were set in the Sydney meshing region. The second performance indicator is to "minimise the impact on non-target and threatened species".

The report doesn’t explicitly state whether the performance indicators were achieved. While the DPI might argue that the program was a success in protecting the beaches around Sydney, their aim of minimizing ecological harm seems to be a hopeless failure. The vast majority of marine life caught was non-target.

Given the spike in marine life caught by the program, it seems surprising that the report hasn’t captured initiated meaningful discussions surrounding how the risk shark attacks can be better managed in Sydney.
In contrast, West Australia’s 2014 imminent threat policy, dubbed the ‘shark cull’ by media, was hugely controversial. Following an unprecedented string of 7 fatalities between 2010 and 2013 in W.A waters, Premier Colin Barnett announced the state’s ‘Imminent Threat Policy’. The policy saw the deployment of 72 baited drum lines near popular W.A beaches.

The program was simple- if a shark was hooked, alive and over 3 meters in length; it would be shot in the head. The premise of the policy was that, by lowering the population of large sharks, the likelihood of humans and dangerous sharks encountering one another would be reduced.

The announcement of the policy saw instantaneous public outcry. Scientists excoriated the program as an immoral, unscientific witch-hunt. Protests saw thousands turning out to condemn the ‘cull’ at localities like Cottesloe Beach in Perth (which experienced a fatality in 2011), Manly NSW (where perhaps ironically, a shark net was set a few hundred meters off shore behind the protestors) and even internationally in New Zealand and South Africa.

The shark cull was depicted worldwide as an environmental catastrophe, an unjust calamity driven by irrational, emotional fear. The announcement of the cull saw an open letter decrying the cull signed by over 100 shark experts. It even saw the vandalisation of W.A Premier Collin Barnett’s office by a protestor, who took to his office windows with a hammer, before spraying the words ‘EGO MANIAC’ in fluorescent, splattered all caps.

On January 26th, the program’s first victim, a Tiger shark was hauled up, shot in the head 4 times with a 22. caliber rifle, dragged out to sea and dumped. Media documented the execution style death and pandemonium ensued. Social media erupted into a furor of frenzied protest.

Images of the Tiger shark being shot in the head offered a potent narrative for those who opposed the cull. It flipped the criminalized media portrayal of sharks as worthy of prosecution on its head. It depicted sharks as vulnerable and man as dangerous.

Barnett’s catch-and-kill dictatorship in the waters around West Australian was in full swing. As sharks continued to be hauled up, shot and dumped, the torrents of criticism directed at the W.A government only intensified. The popular media who have for so long offered sensationalized and damaging reports of sharks as man-eaters, had a field day tearing into the governments drum lining policy.
The drum lining trial ended in April, and in September Colin Barnett announced the discontinuation of the program. During the ten-week drum lining trial, 172 sharks were caught. Fifty of the sharks caught were Tiger sharks measuring over 3 meters, which were subsequently shot and dumped. No Great Whites were caught.

While no shark attacks were recorded in W.A waters during the drum line trial, any statistician would be hesitant to attribute success to the policy. Correlation does not mean causation. Shark attack statistics are patchy and variable, meaning that making sense of a miniscule sample size over such a small amount of time is inadvertently flawed and wildly inaccurate.

When drum lining had kicked off in February, W.A fisheries minister Ken Baston was asked by the media for a response to the protest in Manly against the shark cull. Baston rightly pointed out that shark nets had been used around Sydney for years.

Baston’s answer insinuated hypocrisy - how could the NSW public protest the shark cull, when sharks were also being killed in NSW for the same purpose of protecting water-users?

Of all marine life caught by the W.A drum line program, only 4.6% was non-target. The statistic provides a stark contrast with the NSW Shark Meshing Program, whose non-target marine life comprised 86% of 2015’s total catch.

So why then, did a program that did seem to manage to successfully ‘minimise the impact on non-target and threatened species’, came under intense public scrutiny, while a program that kills a huge amount of non-target and endangered marine life is largely ignored? The answer may lie in the historical longevity of the meshing program.

The Shark Meshing Program dates back to the mid 1930s. Between 1927 and 1930, the state recorded 9 fatal shark attacks. The string of fatalities installed a new breed of post war paranoia in the NSW public.
The harbinger for NSW’s war on sharks was Victor Coppleson, a doctor and advisor to the Surf Lifesaving Association of Australia. Coppleson believed the public was being misled by research stating that sharks do not intentionally bite people. Coppleson on the contrary, believed sharks were indeed responsible for attacking humans and set out to change the rhetoric that explained shark attacks.

In 1933, Coppleson published “Shark Attacks in Australian Waters” in the Australian Medical Journal. “The evidence that sharks will attack man”, he argued, “is complete”.

Sharks were no longer benign and mysterious creatures of the deep, but prowling monsters waiting for man to enter the ocean. Coppleson ignited an all out war on sharks, a battle of man against beast. In 1937 the NSW government introduced the Shark Meshing Program.

Ever since, shark nets have been deployed every summer in Sydney. They’re out of sight and out of mind. Their success in reducing fatal shark attacks has been heralded by the NSW government and the public rarely questions their deployment each summer. They were installed at a time when sharks were understood to intentionally hunt man.

Nowadays the prevailing scientific rhetoric is that shark attacks are commonly a case of mistaken identity- if sharks did want to hunt humans, many more would die at the jaws of a shark each year. Science has taught us that the ocean’s eco-systems badly needs sharks.

Our modern understandings of shark’s means that the implementation of any new policy that involves killing sharks is often met with fierce opposition. But at the same time, we rarely question the continuation of old policies that have for decades, killed sharks.

Even after the W.A shark cull in January 2015, the then NSW Premier Mike Baird announced, “One thing we will not be doing in NSW is culling sharks”. Baird continued to offer this sentiment of not “culling sharks” throughout 2015.

His tactful choice of words- “cull”, instead of “kill”, suggested to the public that his govern-
ment would never do such a thing as barbaric as the W.A government, whilst ignoring the fact his government does indeed, kill many sharks, as well as dolphins, turtles and rays each year.

Considering the vast array of non-target marine life caught by the *Shark Meshing Program*, in some ways, it seems bizarre that the issue is swept under the rug in NSW. Why are we so critical of new policies that involve killing sharks, but comparatively complacent in criticizing old ones?

Images of sharks entangled in a net doesn’t seem to elicit panicked emotional responses like images of a shark with a hook in it’s mouth and a gun to it’s head does. Hooking and shooting a shark seems barbaric. Entangling and drowning a shark doesn’t.

Reporting of the W.A shark created a simple narrative for the public: sharks bit people in W.A, so the government led by a myopic tyrant on a violent vendetta, tasked his fisheries goonies with the simple mission of hunting and executing all large sharks, guilt or innocence irrelevant. The policy was understandably controversial.

In December last year, the NSW government announced the forthcoming trial of 5 shark nets on the North Coast. The announcement came in the wake of an unprecedented spate of attacks around Ballina. While the deployment of the nets has been controversial for many environmentalists living in the area, the Baird government has managed to avoid significant criticism by the NSW public and media.

The events leading up to the deployment of nets on the North Coast offered a different narrative all together: sharks bit people on the North Coast and Mike Baird, the good-guy, surfing Premier, who didn’t want to “cull” sharks, employed scientists to research and study sharks, so water-users could better learn how to co-exist with them. But when tensions heightened he had to protect the people, so he deployed shark nets fitted with whale and dolphin pingers, to be rigorously checked by fisheries staff.

The 6-month trial of the shark nets on the North Coast ends in May this year. At that point, the NSW government will decide whether the seasonal deployments of nets on the North Coast
will carry on in unison with the *Shark Meshing Program*. The decision is likely to be marred in controversy.

Removing shark nets from any beach would be a high-risk political move. If someone were to be attacked at that beach, the government would be in the firing line and in the public’s eyes, responsible for the attack.

If the nets are discontinued, North Coast board riders will undoubtedly ask why beaches are protected around Sydney, but not around Ballina. And if someone is attacked there next summer, the NSW government *will* be in the firing line. It’s a risk the NSW Government may not want to take.

Shark nets are undoubtedly a blunt tool with severe ecological implications. At some point in the future, the development of shark deterrents may reach a point where shark nets will no longer be necessary. But for now, it’s likely that shark nets are here to stay.
Sharks and the Bhagavad Gita

On a baby blue sea sky day, I left my friends beachside apartment and skated down Manly’s main road. I was grateful for the mid-winter heat. My lazy eyes were sinking into my skull, veiled by a pair of brown shades hiding amass of red rivers. A light breeze. Easy, oceanic warmth. A beaming sky. I drifted slowly through the morning crowd.

Sharks were on my mind. I was on the way to Manly Sea Sanctuary, a small harbor front aquarium. The aquarium boasted 6 Grey Nurse sharks, aptly named and by no means ‘man-eaters’. The Grey Nurse once held a false reputation as a dangerous denizen of the deep- the same notoriety carried by White, Tiger and Bull sharks today. While they are large, toothy and frequent the same inshore shallow waters as swimmers and surfers, they are harmless.

Due to unusually low reproduction rates and exploitation from shark oil, shark finning and shark meat industries, Grey Nurse Sharks are a vulnerable species.

Their population now sits around 1500 on the East Coast of Australia. I was keen to meet the sharks in person and apologize for the wrongdoings of my kind and apologize even further that 6 of these sad fish now live a sorry existence swimming laps of an undersized tank under the craning necks and gawking eyes of stupid tourists like myself.

I was day dreaming of the ocean and magnificent sharks, cruising deep, evading humans, the great stubborn, parasites of the world, hunting and feeding and mating and … “hello!”

Huh? I stumbled off of my board looking around, almost hurtling into a poor old man. I turned, looking over my shoulder and laid my eyes upon a smiling Indian man. I was confused. “Hello” he offered again. He stared softly with warm, brown eyes.


“My name is Baba, what’s yours?”

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“Sam”
“Nice to meet you Sam, where are you from?”
“New Zealand, what about you man?”
“India, where this book comes from”.

I flicked through the pages, peering from behind my glasses. “Beautiful pictures” he remarked. A blue elephant man rested amidst all types of holy deities covered the page in front, heavenly divine. They were beautiful pictures. “It is translated from the oldest language in the world, Sanscript. But don’t worry about brushing up because it has been translated into English by this Monk here”, he pointed at a photograph on the back of the book that did look like a monk.

“So what is it all about” I asked him, now looking up at him. My hair blew over my face and shades, and I let it sit there waver ing in the breeze like another veil to hide behind.

“It is the wisdom of Krishna, his stories, his teachings”. I scanned the pages and imagined exploring it’s wisdom and taking small lessons from it and carrying on a little wiser. A future was looming, one that was starting to make me nervous. Ever since I sat next to a monk on an aero plane who had lectured me on the topic of meditation for 2 hours only 8 weeks ago, I decided that a little wisdom wouldn’t go astray and a monk passing me this book 2 months later mustn’t be a coincidence, but fate, or the unseen hand, or Krisna, or the stars or the way of the world or something like that.

“We only ask for a small donation to help pay for the cost of printing”. A handful of Australian coins weighed heavy in my wallet. I was glad to part ways with them and help out my dear friend Baba. He began telling me about the far reaches of his faith and centers around the world, namely ones I could visit in New Zealand. I looked down again scanning words and sentences…’supreme holiness’… ‘devotion’… ‘the way’ … ‘gods watching eyes’…”

My mind wandered. If Krishna or whoever wrote it can articulate all of life’s wisdom into one book he must be one hell of a writer. Maybe he did. Sanscript must be even vaster than the oceans of the Grey Nurse. But Keroauc said it when he was losing his mind- this life is beyond words. Or experience is?

Perhaps.
“Hey Baba, I don’t think this book is for me”.
“OK have a nice day”.
“You too”.

So I left Baba and the Bhagavad Gita and sailed through the streets ahum with the warm winter morning, the heavens beaming down, smiling gods, blind fate twisting and turning, at ease in the warm angelic breeze, my mind floating at sea again, in all of it’s vastness, imagining sharks gliding through great gelid depths and tropical warm white sand lagoons, chasing fish and migrating great distances unbeknown to man or god, the mysterious lives only they know.
The Life of Riley Elliot AKA Sharkman

Part 1: Becoming The Sharkman

What started out as fear quickly turned to fascination when waterman Riley Elliott AKA The Sharkman had his first (brief) encounter with a harmless one-meter School shark in Fiordland's Doubtful Sound.

In a three-part series we chat to Riley about his beginnings, his experiences and encounters with sharks, working for change and what the future holds.

SFB: Has the ocean always been an important part of your life?

RE: I was born in Vancouver Canada, but moved to New Zealand at age 5. I grew up as inland as you can get, in Hamilton. But being a skinny island in the middle of the South Pacific, I was still only 40 minutes away from the sea – Raglan in fact, one of the world's best left hand point breaks for surfing. Surfing was the catalyst to my interest in marine animals, and ironically the source of fear that resulted in sharks becoming my life passion.

SFB: What sparked your interest in sharks?

RE: I surfed every day in Dunedin between studies on dolphins in Fiordland as part of my Honors and Masters at Otago University. Surfing in the deep south and diving in Fiordland, which is quite a 'you're a very small person in a big natural world kind of place', meant sharks were always in the back of my mind in both of those environments. One day when I finally saw a shark while diving in Fiordland, I broke all the rules of scuba diving and boosted to the surface. I turned around and it was a one-foot long School shark – totally harmless.

SFB: Did that encounter cause you to question popular human perceptions of sharks?
**RE:** Yeah. I kind of laughed and then somewhat felt ashamed. I questioned why I had reacted like that because clearly in the situation it was totally unjustified. This was a harmless animal, but everything I knew about sharks up to that point was purely based on the movie Jaws and whatever we see in the media. So I basically asked myself, ‘what is a shark and is their reputation justified?’

**SFB:** How did you get into studying sharks?

**RE:** I went to South Africa and I worked with the Oceans Research internship program which teaches people about how to study sharks. It changed my life. Every morning I would get up at dawn and I’d drive out to Seal Island and we would observe and study the predatory strategies of Great Whites on seals. And then in the afternoons, I would come home and surf the awesome point breaks that was like a kilometer away from this island I was just watching these apex predators hunt at. And then in the evenings I would go back to this island and see them nail seals again.

**SFB:** So you still surfed after watching Great Whites hunting seals?

**RE:** Surfing is the most beautiful thing in the world. It is a huge addiction. And even if you’re standing on shore and the surf is pumping and you know there’s sharks, you’ll most likely still go out. At the end of the day it’s a personal choice, the shark is like the ground is to a sky diver or the cold is to a mountaineer. It’s the harsh reality that makes the wild environment thrilling.

**SFB:** Did your experiences in South Africa inspire your studies on Blue sharks in New Zealand?

**RE:** Yes 100%. I came back from South Africa with all this knowledge and passion and I said to myself, “I want to do a PHD”. I saw the film Sharkwater which is the catalyst for global awareness of shark finning. I started reading up about New Zealand and it was actually one of the top 10 exporters of shark fins in the world.

We were one of the most blind nations when it came to shark sustainability and there was no scientific data to back up the amount of sharks that they were killing, which was in the hundreds of thousands a year purely for their fins. So basically I decided I was obliged to use the
skills I had acquired along with my scientific background and do my PHD in New Zealand. So I focused my study on Blue sharks which are the most exploited shark in the world for shark fins.
Part 2: Swimming with sharks

For the second installment of our three-part series with Riley Elliott AKA The Sharkman, we discover what it is like for a human to get 'up close and personal' with sharks and how the mind can alter ones reaction when faced with these misunderstood creatures.

SFB: Are there rules you follow when you swim with sharks?

RE: There are three golden rules - eye contact, clear water and a calm persona.

SFB: Has there ever been times where you have felt threatened or endangered by a shark?

RE: You know I’ve free dived with every single large shark species in the world. I’ve still got all my toes, all my fingers and I’ve never once had a dodgy encounter with one or a moment where I thought, ‘this animal is going to hurt me’. That’s because I’m playing by their rules.

It’s very complex and only after 15 years of diving with sharks, do I have an adequate understanding of a range of species. It’s 100% not recommended to anyone to go free dive with sharks without the proper professional supervision and experience because you can make wrong decisions.

SFB: Do you have to conduct yourself differently with different species of sharks?

RE: Each species of shark has a different mentality, a different technique and a different body language that you have to use to interact with that animal to swim with it. For example the Tiger shark, the third deadliest shark on earth, are actually the shiest, most cautious shark in the ocean. It takes hours to gain their trust for you to be able to free dive with them, and that’s because they hunt for dead things, they’re a scavenger. So you literally have to curl up in ball, look away from them and act like something that’s dead and floating in the water. You then have to bluff them into coming closer to you and then when they get close to you, you have to slowly reveal yourself without scaring them away.

You go to the other end of the spectrum of that and you swim with Marko sharks. Marko sharks
are like hyperactive gangsters. Their hierarchies are based primarily on size and they are an anti-social animal. You have to portray that confidence to a shark because a shark isn’t used to another predator doing that, especially one that’s smaller than it. And with a Great White for example, the ultimate shark, you need to have clear water to be able to maintain eye contact because they are an ambush predator, they are very cautious.

**SFB:** What has been the most powerful experience you have had in the water?

**RE:** Hands down resuscitating a Tiger shark with Ocean Ramsey in Western Australia in 2014. It was during the West Australia shark cull. After a handful of tragic shark attack fatalities, the state government decided to catch and kill sharks using baited drum lines. That experience over there was the most horrific, human negligence event I’ve ever witnessed in my life.

So we basically picked up one of these nearly dead baby Tiger sharks that the state government said they were releasing alive and we grabbed it off the bottom of the ocean where it would have died. We swam with it for an hour and a half to resuscitate it, which we managed to do. This drew an enormous crowd of helicopters, boats and media crews because all of a sudden we were swimming with what the Western Australian government was calling an ‘imminent threat’.
Part 3: A Turning Tide

In the final installment of our three-part series, we explore the challenges and triumphs of Riley Elliott AKA The Sharkman’s career, as well as his shark conservation mission.

**SFB:** Why do we need sharks in the oceans?

**RE:** In simple terms, sharks are the Doctors and garbage men of the sea; they remove the sick, dead and mutated, and they maintain and enforce natural selection and reproduction through top down predation pressure. Without sharks, the ecosystem balance that they have crafted over their 400 million years of existence would be lost. Science has shown that more sharks actually means more fish in the sea, and healthier populations of fish.

**SFB:** What are some global challenges for shark conservation?

**RE:** Well the greatest global challenge, which still continues, is shark finning. Shark finning is the number one issue for sharks on a global nature. Some scientific studies predict that 90% of the world’s sharks have been removed in the last 30 years because of shark finning. You know 3 sharks a second are finned around the world, which equates to 100 to 240 million sharks a year.

There’s been huge conservational success with shark finning around the world, but it still persists at what is a threatening level to populations of sharks around the world. So education, especially educating the Asian community that shark fin soup is not only toxic, but is threatening the global status of the ocean ecosystem, is key to solving that issue.

**SFB:** Why are humans so scared of sharks?

**RE:** Jaws; single handedly. If you ask any public person, what is the one piece of information they’ve learned about sharks and where it’s from, 99% of the time it’s Jaws. And most fear stems from the fact that we are afraid of what we don’t know. And there is nothing more unknown than this perceived demon that is swimming below the water that you don’t have your head under.
I teach people internationally how to free dive with sharks. And as soon as their head actually goes underwater, they see the true being that they’ve demonized for so long and it’s like a switch turns immediately. Their fear transforms to fascination.

**SFB:** So images of you swimming with sharks helps to challenge widespread Jaws misconceptions of sharks as mindless, malevolent, man-eating machines?

**RE:** Yes, it immediately removes the perception that sharks just eat you, it also draws a crowd and like any good David Attenborough film, people are attracted to imagery and then digest the science laced within it. It’s all about education at the end of the day. People protect only what they value, and they value only what they are taught to. I say I use stimulating visual imagery to capture an audience to help me communicate science to the public.

**SFB:** What have been some shark conservation success stories you’ve been involved in?

**RE:** Helping get shark finning banned in New Zealand in 2014 was a major. It was 3 years of hard work in the media, in political boardrooms and scientific meetings. But in the end, through education, the public voice was so large, that the industry had to fold on the black trade they were partaking in. The NZ public is famous for standing up for what is right, and banning shark finning was a no brainer to the people of NZ.

Helping stop the Western Australia shark cull was also a major conservational victory I helped in. Both of these showed me that the recipe of using stimulating visual imagery to communicate science works. It’s what I continue to do today. I recently finished filming a National Geographic documentary on NZ sharks, I have more shoots in the pipeline, and all are geared towards putting real science on TV, instead of reality TV dramatized BS. People need to reconnect with nature, it’s the lifeline of this planet and we need to respect that and protect that.
Caged

The ocean is everything. It is an immense and vast desert, surrounding and supporting human livelihood.

Perhaps no community in New Zealand relies on the ocean like Stewart Island does. Life on Stewart Island plays out in unison with the ebb and flow of the Southern Ocean. The ocean is their lifeblood. Salt water flows through their veins. For Stewart Islanders, the Southern ocean is everything.

On an island of just 400 the locals understand its importance in a small economy driven by its fisheries and eco-tourism. The roaring 40s and a complex flow of currents provides the island with highly productive waters. Most Stewart Islands are thrown into the sea before they can walk and are rowing dinghies before they can write.

The small, tranquil island has become home to an intense debate concerning the very ocean that surrounds it. A debate that seems to overshadow the Island’s low-key way of life. The controversy is not about the abundant Paua assemblages that inhabit the islands gelid waters, or the Titi Mutton bird, harvested annually by Rakiura Maori, but a far more emphatic species; the oceans most terrific, revered and fearsome predator: The great white shark.

Since 2008, cage diving has taken at Edwards Island, just 6km away from the islands main township, Oban. Stewart Islanders have reason to believe that shark cage diving has modified the behavior of the local great white population. Many now fear the waters that has for generations, created a life for Stewart Islanders.

For 400 million years great white sharks have been one of the oceans top predators. While they may be the most feared animal on this planet, humans know surprisingly little about these iconic hunters. As deep water, sparsely populated, migratory animals, great white sharks are extremely difficult to study.
They reside at the top of marine ecosystems as apex predators. They balance and control oceanic communities by preying upon other marine species. They are an evolutionary masterpiece, flawlessly designed and unchanged for hundreds of millions of years. While in the past, man has taken to the seas to hunt and kill great white sharks; we now understand their intrinsic value to the world’s oceans.

Occasionally great whites do prey upon humans. Scientists believe these attacks are the result of mistaken identity, rather than something more sinister. We are by no means an appropriate prey source for these sharks and in the vast majority of attacks, humans are only bitten once and no flesh is consumed. Because of this rare phenomenon, great white sharks have come to be popularly misunderstood as mythical, nightmarish denizens of the deep.

The Titi/Muttonbird islands to the North of Stewart Island are a hotspot for great white sharks. The Islands are home to a seasonal population estimated to be anywhere between 50 and 120 individuals. Like other aggregation sites in Mexico, South Africa and Australia, the Titi/Mutton Bird Islands is also home to large seal and sea lion colonies.

Satellite tagging studies carried out since the mid 2000’s has shown that the majority of this population migrates annually. Between June and December, individuals migrate northwest to the tropical Australian and Pacific waters. The re-arrival of the sharks at the Titi’s coincides with the seal pup-birthing season in late December.

Great white sharks were protected in New Zealand in 2007. At that stage the population status of Great whites in NZ was unclear. Because of low reproductive and growth rates and concerns surrounding the impacts of fishing mortality, the sharks were protected under the 1953 Wildlife Protection Act. It is now illegal to hunt, kill or harm Great whites in New Zealand waters.

Shark cage diving has taken place at the Titi Islands since 2008. Peter Scott, once a commercial fisherman turned his shark cage diving hobby into a commercial venture. He began taking pas-
sengers to dive with sharks at Edwards Island, a small, narrow island in the Titis chain. Nowadays, two shark cage diving businesses operate out of Bluff- Peter Scott’s Shark DiveNZ and Mike Haines’ Shark Experience. The cage diving season coincides with seasonal presence of great whites, running from December through to June.

The companies have operated like most cage diving ventures; the boats arrive at Edwards Island, throw burley; ground up fish, blood and oil into the water, wait for sharks to arrive, lower customers into the shark cage and keep the sharks interested by dragging a dead fish tied to a rope outside of the cage, known as a ‘thrown bait’. The operations became hugely popular with tourists and kiwis alike.

However, over time many Stewart Islanders began to voice their concerns about the cage diving operations. They began to report an increase in great white sightings and interest in human activity in the waters surrounding Stewart Island. The Islanders had reason to believe that the burley and throw baits offered to sharks by cage diving were beginning to behaviorally condition the Island’s local Great white population.

The concerns held by Stewart Island locals mirror concerns held at other cage diving jurisdictions around the world. Following professional surfer McFannings interaction with a shark during competition at J-Bay, the iconic and esteemed surfer Derek Hynd took to the waves. Afterwards, he explained his theory for McFannings run in, “the fisherman have noted extraordinary numbers of sharks underneath, more so than I think 20 years ago. And I blame shark cage diving, lock, stock and barrel”.

The theory of a training sharks held by those opposing cage diving reflects the psychological process of classic conditioning. It is a mechanism that occurs when two stimuli are consistently repeated, leading to basic learning.

Just like a dog learning to associate the sound of a bell with being fed, many Stewart Islanders believe that the sharks now associate the presence of boats and people in the water with food. As a result, many believe that is only a matter of time before a shark in the Island’s waters will kill a diver or swimmer.

There is an array of stories from the Island of sharks approaching and bumping fishing boats,
sharks repeatedly swimming uncomfortably close to Paua divers and sharks following boats back to shore. Richard ‘Squizzy’ Squires, a Stewart Island fisherman of 30 years, wrote to the Southland times last year explaining what he has observed since the outset of cage diving;

“This could be purely coincidental but up until they started luring these professional killers alongside boats feeding them and hence training them I had never seen a live great white in my life. There are now regular visitors and while it is always a somewhat nervous thrill to observe the sheer savage lethal beauty of a beast, the dangers they pose is very real”.

Squizzy goes onto to tell the story of a 20ft great white that followed his boat for 1.5 hours over a distance of 10 miles between islands outside of Stewart Island.

Of the most concerned are the region’s Paua divers. Each year around 90 tones of Paua with an export value of $5 million is harvested in the waters around Stewart Island. 14 registered boats work the Stewart Island Paua fishery and parts of that fishery overlap with the area used by the cage diving operations. As years have progressed, tensions have heightened and Southland Paua divers are those that are most actively pushing to ban cage diving at Stewart Island.

While no one has been bitten since cage diving began in the island’s waters, it is a fear that continues to plague the island community. Paua divers now avoid diving in waters close to Edwards Island and local parents are wary of their kids swimming at Halfmoon Bay wharf.

Peter Scott and Mike Haines have fervently denied allegations that cage diving is impacting on the natural behavior of great whites in the area. Both operators have outlined that they are not ‘feeding’ the sharks. They believe that the burley put into the water to attract sharks is not large enough for sharks to eat and the number of throw baits has never been a substantial meal for the sharks.

Contrary to popular belief, great whites are highly opportunistic feeders. Their diet is highly variable and they will often divulge in an easy meal where possible. They are naturally inquisitive and are known to approach foreign objects on the sea surface.
Both Scott and Haines argue that the sharks have for decades scavenged off of local fishing boats and were already used to getting fed. After a day on the water, fishing boats toss guts and fish frames overboard after cleaning fish. Peter Tait, a Stewart Island eco-tourism guide and ex-commercial fisherman offers an insightful anecdote on his website sailashore surrounding this idea:

“As a commercial fisherman I used to do a significant part of my cleaning in Braggs Bay, leaving a fair amount of cod frames on the bottom each evening. Next day they were always all gone. Add to this two sharks caught within Halfmoon Bay immediately after New Year around 20 years ago were both full of cod frames when opened up. Over a codding season I would estimate that I dumped in excess of 10 tonnes of fish offal into the tide between Ruapuke and Halfmoon Bay, as would most commercial fishermen, so the sharks could not be but aware at least of boats association with food.”

The controversy is one which is steeped, in scientific uncertainty. In the absence of evidence seeking to explain what effect, if any cage diving as had on shark behavior in the area, we are left with varying anecdotal accounts from parties both for and against cage diving.

Little was known about great white sharks in the area before cage diving commenced in Stewart Island waters. In a joint study, the National Institute of Water and Atmospheric Research (NIWA) and the Department of Conservation (DOC) began tagging in 2005 around Stewart Island to understand the movements and migrations of the islands sharks. Because there was no baseline study on the sharks behavior before cage diving, it is now effectively impossible for scientists to accurately determine if cage diving has had any affect on the sharks behavior.

Until 2014, the two businesses operated unregulated. This meant that they could use limitless amounts of burley and throw baits. Amidst growing tensions between cage divers and those against them, DOC stepped in to attempt to manage the controversy. In December 2014, DOC introduced a permitting system which according to DOC’s website, was introduced to set “strict conditions to protect sharks”. And in December 2015 DOC released an updated code of practice for shark cage operators.
Together, they limited what could be used to attract sharks whilst restricting cage diving activities to an area 300m within Edwards Island. Cage dive operators are permitted to use unlimited amounts of burley, which must be finely minced. Throw baits are not permitted to be consumed by sharks and if they are, no further throw baits are allowed to be used on that day.

Under further pressure, in late 2015, DOC set out to review the science surrounding shark cage diving. DOC commissioned Barry Bruce, a renowned Australian Great white scientist to research and collate scientific information on the topic. The review provides a thorough exploration of global shark cage diving activities, scientific research and management practices.

While the science on Great white response to cage diving is limited, Bruce concludes that, “overall, it would seem unlikely that white sharks exposed to cage diving activities are any more or less likely to present a risk to divers, swimmers or surfers in areas away from cage diving sites than any other shark”.

Politically, scientifically and ethically, the issue of cage diving at Stewart Island is a murky one. Anecdotal knowledge seems to both support and work against theories of behavioral conditioning associated with cage diving. It seems that the shark’s capacity to learn is at the crux of the argument. In July this year Dr. Daniel Burcher, a marine scientist at Lismore University, NSW, told me a story of a tiger shark that had learnt to associate a particular boat in Australia with being fed:

“There’s a good story from Heron Island where the garbage boat, would take the garbage out from a resort and a big Tiger shark used to wait outside the channel. And as soon as this boat went along it would follow it out and gobble up all the garbage. Well when the marine park came in and said “no more dumping of garbage in the channel”, they had to put it on the big barge and send it back to the mainland for landfill. So they took the motors of the garbage barge and put them on a dive boat. Sure enough, the shark followed the dive boat…I think there’s definitely some capacity to learn.”

The anecdote offered by Dr. Burcher suggests that this singular Tiger shark had been behaviorally conditioned. It suggests that Great whites could too be capable of learning to associate
boats with being fed. But does cage diving offer Great whites at Edwards Island a substantial amount of food to learn? Would a learned association last for a significant amount of time? Would it pose a danger to other human water-users? There are more questions than answers amidst the cage diving controversy at Stewart Island.

As long as cage diving continues at Edwards Island, the controversy will remain. Any conclusive information on the effect of cage diving on shark behavior doesn’t appear to be coming any time soon. For the most part, wider New Zealand has been fairly uninterested in the issue. Theoretically, if the controversy were taking place in Auckland harbor, it would capture the interest of our nation. But for now, no one has been attacked and for the rest of the country the controversy is out of sight and out of mind.

The reality of the situation is that wherever humans and large numbers of sharks share the same environment, an attack is likely to be inevitable. It could happen tomorrow, it could happen it 10 months or it could happen in 10 years. At that point it will be impossible to untangle the cause of the attack and the controversy will ignite societal debate in New Zealand. Stewart Islanders will demand retribution, cage dive operators will refuse that their businesses had any affect on Great white behaviour, and our government will have a legal mess to deal with. For now as we move into summer, cage diving will once again commence at Edwards Island.
Is Cage Driving at Stewart Island Actually Training Great Whites to Kill People?

_Shark expert Riley Elliot explores the science behind the controversy_

In the late 2000s a Discovery Channel inspired fisherman began actively searching for Great White sharks in the deep south of New Zealand. After locating the main haunt of the sharks, a small island 6km away from Stewart Island’s main township, he began cage diving. What started out as a hobby quickly turned into a business. In 2008, commercial cage diving kicked off in New Zealand.

Fast forward a few years and another commercial fisherman joined the party and started a cage diving business of his own. At the same time, Stewart Island locals began voicing their concerns on the effect of cage diving on Great White behavior. Commercial Paua divers and fishermen alike have reported a huge increase in Great White sightings and interactions with boats and divers in the water.

Those who excoriate cage diving believe that cage diving has trained sharks to associate boats and people in the water with being fed. While no one has been attacked in the area since cage diving began, they believe it is a matter of time before someone is killed as a result of the effect of cage diving.

Cage diving near Stewart Island is now a highly controversial issue. Cage dive operators dismiss the idea of training sharks as ludicrous. Many Stewart Islanders demand cage diving to be banned immediately. The Department of Conservation, the government department now responsible for managing cage diving has for long, been quiet on the issue.

Until 2014 cage diving operated unregulated. Operators were left to their own devices and could essentially attract sharks using as much burley and bait as they wanted. In 2014, DOC introduced cage diving permits. The permits outlined that operators could use unlimited amounts of burley (minced fish blood and guts) and just one throw bait (a piece of fish used to lure sharks towards the cages) each day.
However the controversy still persists. Has cage diving actually trained Great Whites to kill people? We talked to shark expert Riley Elliot.

**SFB:** You’ve cage dived at Stewart Island and written at length on the controversy in your book Shark Man, what kind of attitudes do Stewart Island locals hold towards cage diving?

**RE:** Local attitudes cannot be grouped into one common view, nor can views be judged as right or wrong without the proper information. And it is the lack of this information that has created conflict. In short, the loudest local view is that cage dive operators are conditioning Great White sharks to associate boats with food, and if this were the case, it can pose risks to recreational and commercial water users (primarily Paua/Abalone divers).

It’s important to consider that the surrounding ocean provides many of the locals with a livelihood. We do not experience the stresses or perceived risks the Stewart Islander’s do. They are not wrong for their opinions and I feel bad that they are in this position. It should be the government’s responsibility to address it through science.

**SFB:** Processes of classical conditioning seem simple enough. You feed an animal consistently enough and eventually it will learn to associate a stimulus with a reward. Are the conditioning processes surrounding Great White sharks and cage diving at Stewart Island really that straightforward?

**RE:** In simple terms, yes. Such conditioning is possible through cage dive operations if the amount of food given to sharks is enough to positively habituate sharks to boats. But there’s further variables like quantity, timing, comparison with other available rewards/food in this case. In context to the Stewart Island location (Edwards Island) where there is no large seal colony but a very obvious aggregation site for Great White sharks, it becomes more complex.

Explained hypothetically, if the sharks aggregate there for other reasons, say social, then 'free food' of quantity and quality less than naturally hunted sources, it could still act a catalyst for positive association with the Cage diving boats, like bar snacks in a pub. It’s not why you are there, but you have them anyway.
**SFB:** The cage diving debate at Stewart Island isn’t a new one. Cage diving has been controversial in just about every place it operates in. What science, if any has been carried out to explore the effect of cage diving on Great White behavior?

**RE:** Cage diving was introduced in the Neptune Islands, Australia in the 1970’s, and in South Africa in 1989. Recent studies in these two locations show that Great Whites expressed diminishing association with cage boats through time, even after several rewards (Laroche et al. 2007), and although residency increased in the cage dive areas (Bruce & Bradford 2013), it was site specific to the cage dive area.

Given these two findings, and the fact that Great Whites already aggregated at Edwards Island before cage diving existed, scientific evidence to date suggests there should be minimal impact to their behavior and if any, it should be restricted only to the cage diving area.

**SFB:** The Department of Conservation has been pretty heavily criticized for their management of cage diving at Stewart Island. How do you think cage diving should be managed?

**RE:** Given food is the catalyst for potential behavior change, restricting the amount of food whilst still enabling the function of operators, should alleviate public concern based on scientific understanding. The control of food provided, along with other permit-controlled conditions like location and other means of attraction, has been achieved elsewhere around the world, like South Australia and South Africa.

At the end of the day, Edward’s Island is a natural aggregation site that occurred well before cage diving and likely well before man. We should respect that and protect it. It does not make sense to allow gill netting there, nor does it to encourage Paua divers to dive there.

It makes sense to limit cage diving to just that location, and for that industry and government, to fund science that is communicated with the people who live in the surrounding area. That’s what should happen in Stewart Island, for the sharks, and for the people who call it home.
Leave Sharks Alone

As a contender for perhaps the worst tagline in recent memory- ‘*Not just another day at the beach*’, *The Shallows* was dripping with Hollywood mediocrity well before it hit the cinemas. With the films premise scientists and conservationists were all thinking the same thing… ‘are you serious?’ The announcement of the film in April offered what seemed to combine the lonesome, isolated life and death struggle on a rocky outcrop, akin to the film *127 hours*, with the ever relevant hot-chick-who-surfs best known in *Blue Crush*, with the timeless narrative of *Jaws*; a ravenous shark hell bent on devouring hapless swimmers and surfers.

36 years had passed since Steven Spielberg’s masterpiece forever immortalized sharks as man-eaters. As science has patiently reiterated to the public the idea that humans aren’t on the menu, a sequel was going to need a little more than a lurking 2-note soundtrack and a handful of appearances by our sharky villain. *The Shallows*, sporting a color palette dominated by azure blue and crimson red was on the way.

The film is essentially *Jaws* without the foreplay. The film tells the story of a bikini-clad heroine attempting to overcome a monster intent on killing her. Like it’s pre-cursor *Jaws*, *The Shallows* tells the story of a ‘rogue’ shark- one that has acquired a taste for human flesh. The shark spends a day or so circling and hunting our ill-fated protagonist. While terrestrial ‘rogue’ animals such as the Champawat Tiger and the Leopard of Panar are well understood, no such animal has even been understood to exist in the world’s oceans.

The rogue shark theory was born in 1962 by Sydney physician Sydney Coppelson. Coppleson made a very convincing case for the ‘rogue’ shark theory in his book *Shark Attacks* and since, the best evidence we have for the existence of such a shark is the film *Jaws* itself. The idea of a rogue shark is a scientific fallacy and disappointingly, the grossly inaccurate depiction of shark behavior in *The Shallows* echo’s the hugely influential message communicated by *Jaws*: sharks are out to get us.

Audiences frenzied to the film in the same way mainstream journalists frenzy around shark ‘attacks’. Lets take the esteemed Mick Fanning at Jefferey’s Bay last year. Fanning encountered a curious Great White, who appeared to became entangled in his leg rope, panicked, and thrashed before quickly swimming away. The story was more important than… well anything. Conflict
in the Middle East, Max Key’s newest banger, and road death statistics were briefly swept aside for a few days. News outlets swamped their audiences with every possibly angle on the heroics of the competitive surfer who fought a shark live on TV and won. Fanning became a household name and was elevated to demigod status among the realms of mortal men.

The encounter was erroneously described by journo’s world wide as an ‘attack’. Words like these shape the reality we experience. The word ‘attack’ connotes malice and intentionality. Neither of these words could be used to describe the shark’s behavior. Words associated with ‘shark attack’ often include ‘lurking’, ‘stalking’ and ‘prowling’. Sharks don’t do these sorts of things- rapists and pedophiles do. And what do we do when evasive criminals are at large? We hunt them and deliver justice upon them. These definitions communicate the idea of a problem that needs to be solved.

From shark culls to shark hunts, these kind of government responses to shark bites are as underwhelming as The Shallows itself. They are miscarriages of science carried out by governments with the intention of calming public hysteria. As apex predators, sharks play a fundamental role in maintaining the ‘balance’ of the marine eco-system. In short, we need sharks.

I won’t write a statistical analogy explaining shark related deaths to attempt to justify why we need to protect sharks. Sure, freak orgys kill more people each year than sharks do. Just about anything does. While pertinent, these kinds of figures don’t work to ease fear of sharks. Shark bites are extremely rare and highly traumatic. As humans, the fear overrides our ability to rationally evaluate the risk of shark bite and act accordingly.

Sharks seem to be treated like the terrorists of the seas. Their ‘attacks’ are portrayed as violent and provoke panicked, emotional response. The mass media continues to remind us of the danger they pose and governments continue to implement placebo policies, whether it is banning Burqas in France or the targeted killing of sharks in Australia.

We are ill-equipped as animals to survive in the ocean. At the jaws of a shark we cannot run, we cannot hide, we cannot reason. The novelty of shark stories will never wear thin. They are inherently fascinating. They are innately frightening. We cannot expect the reporting of shark attacks to slow. But we can demand a little more journalistic integrity, a little more accuracy, and a little more impartiality. We need to condemn the media’s miscommunication of shark
behavior. It’s time for Hollywood and the mainstream media to leave sharks alone.
Dancing with Fear

The sun had fallen behind the Saint Clair hill, bringing with it the flares of red and orange that only moments before had the sky ablaze. I was alone, sitting on my board, 30m off of Saint Kilda beach. The darkness was setting in. My mind was possessed with thoughts of imminent death. I sat, chanting, attempting to bring calm, like a child willing themselves to forget about the boogyman hiding underneath their bed.

“spokey dokey, spokey dokey, spokey dokey, spookey dookey”.

The ocean had become an eerie black desert. My eyes were wide and my heart erratic. 10m to my left a shadow darted past.

I exhaled. It was only wind chop spilling out onto the oceans surface. In those twilight hours before darkness, my mind seemed to have shifted into a primal state of self defense. I resisted giving in to the urges pleading me to lie on my board, cock my feet out of the water and sprint paddle back to the beach.

I battled to calm the wave of fear that was washing over my mind. I reassured myself I would be fine. I recalled a few of the statistical analogies that had become ingrained in my mind over the last year. I laughed manically.

I thought of Leslie Jordan and William Black taken by Great Whites in 1964 and 1967 on the very stretch of beach I was surfing. I imagined them watching over from the night sky above. The final haze of purple was slipping away over the edge of the sea. I breathed deep and waited. A wave finally stood up. I turned, paddled and rode it to shore.

In the words of Hunter S. Thompson, our civilization does indeed end at the waterline. The ocean is the last stronghold of the wild. Our civilization ends at the water line. Those who enter the ocean, enter a vast, untamed and ever-changing body of immense power. And sharks, of everything man may encounter on the world’s oceans, truly spur the primal mind. There seems to be no fear more deep-seeded than our fear of being hunted.
For the past year and a half, dealing with fear has become my life. I have studied the way humans react to shark attacks; the catalyst being, perhaps unsurprisingly, the most documented shark encounter of all time: professional surfer Mick Fanning’s and a Great White during a competition in South Africa.

Footage of the Fanning encounter was totally unprecedented. Before then, there was the odd 90’s zoomed-in and grainy swimmer gets bitten video, the occasional Gopro spear-fisherman fiends of shark clip and then, of course, Speilberg’s 1975 blockbuster Jaws.

The Fanning incident superseded everything. Four camera angles captured Fanning’s eye to eye, in-water tussle with the ocean’s most revered predator- the Great White shark.

The world stopped momentarily to process what seemed to be an unthinkable, unimaginable series of events. No story in 2015 carried as much novelty as the professional surfer who fought off a shark, live on television. News rooms worldwide had a field day. Everything else was forgotten.

I can vividly recall hearing about the incident. It was a typical, gelid Dunedin winter’s morning. I woke and stumbled into the kitchen half-asleep. My flatmate, who had stayed up watching the competition until the early hours, was making breakfast.

“Who won J-Bay”, I asked him?

“No one”, he replied casually, “Mick Fanning got attacked by a shark”.

I recall that moment feeling like an eternity as my stomach fell to oblivion. Adrenalin devoured blood. I spluttered out the only words my delirious mind could muster.

“Is he alright?”

I arrived at university a few hours later still trying to make sense of it all. I was dumbfounded. The footage of Fanning flailing and punching at the water only seemed to resemble a drama-
tized Shark Week reenactment. It didn’t seem real. I trawled through the Internet seeking more information.

Beneath the all caps headlines, a dismayed minority of conservationists and scientists attempted to re-frame Fanning’s encounter. They argued that what was quickly becoming the most famous shark attack of all time, wasn’t a shark attack at all. They depicted a curious Great White who got tangled in Fanning’s leg rope and panicked. Journalists world wide had got it wrong. News media had erroneously characterized the encounter as an ‘ATTACK’.

I quietly and naively waited for the news to correct itself. I waited for the hysteria to die down. I waited for the concurrent, worldwide sigh of disappointment. I waited for everyone to move on.

But it never happened. The ‘ATTACK’ remained an ‘ATTACK’ and the outspoken scientists were left in the corner like a group of ostracized nerds. The media is a voracious beast indeed.

There seemed to be an infinite number of angles to the story. The selfless, heroic actions of Julian Wilson, the other surfer in the final who sprint paddled towards Mick Fanning. Choking back tears an hour later, Wilson told a pack of journalists that he thought Fanning was “gone”.

There was the story of in-water photographer Kelly Cestari who was left to swim back to shore after telling a jet-ski driver to collect Wilson first. There was the story of Derek Hynd, an old 80’s surfing icon, who paddled out just a few hours later and surfed empty, perfect J-Bay alone.

And then of course there was Fanning, the man who fought off a shark and won. It was a story of David and Goliath, a battle of man and beast. Just minutes later he emerged onto one of the competition boats, full of adrenalin and stoically recounted the events, “I was getting dragged under by my leg [rope], and then I felt like it kicked me off, but it was still there, and I was still attached to my board. I felt like it was dragging me under water, and then my leg rope broke, and I started swimming and screaming.”

The media’s insatiable hunger didn’t slow for weeks. Fanning became a household name
worldwide. He went from an innocuous professional surfer to a demigod walking the realms of mortal men. Amidst it all, I realized that no newspaper was ever going to correct its headline. It wasn’t about rectifying the public’s perception of the incident or science communication, it was about ratings.

I stumbled into a small field of research that examined the way people responded to shark attacks. From the media’s communication of sharks and shark attacks to patterns of government responses to shark attacks to public perceptions and attitudes towards sharks, I serendipitously fell into a thesis topic that was both exciting and inherently fascinating.

My science communication masters thesis investigates public and political responses to shark attacks. In 2015, NSW’s North Coast experienced an unprecedented spate of shark attacks. The State of NSW experienced 14 shark attacks, 8 of which occurred on the North Coast.

I’ve spent the vast majority of my life trying not to think about sharks. They are the boogiemen of the sea, the great manifestation of all evil lurking below. Most surfers avoid talking and thinking about sharks because fear is pandemic. It only plagues the mind.

“So have you always loved sharks?” people ask me when I tell them about my topic. “Not really… it was just the whole Mick Fanning thing”.

My initial literature review conjured some straight forward findings- our fear of sharks is “irrational”, *Jaws* was seminal for public perception of sharks worldwide, shark attacks are understood by scientists to likely be the result of mistaken identity, the media has for long sensationalized shark attacks and depicted sharks as man-eaters, an anxiety ridden public’s demand for law following shark attacks often sees the pro-active killing of sharks by governments and finally, as apex predators, the ocean badly needs sharks.

I pulled together concepts from risk management, environmental communications, media studies and ecology, and wove them together to tell the story of human responses to shark attacks. It was all vastly theoretical. And typically so. It was un-emotive, robotic academia.
My mindset and attitude towards sharks mirrored that of my research. I too, was un-emotive and robotic.

My study at that point had little real world grounding as I rattled off facts and concepts to my surfing buddies. In the ocean I laughed away the idea of a shark attack. I was an invincible fortress of unquestionable academia.

But as I entered my background chapter, it started to become personal. The chapter was a wider scoped real world exploration of shark attacks and human’s perception of them. My personal relationship with the topic wasn’t some sort of epiphany, but a creeping realization that as a surfer, I was deeply connected to it.

The vast majority of academic research doesn’t involve the researcher. They are passive, uninvolved and unbiased. They are the hidden puppeteer of it all. They are not part of the study, they facilitate it. That was how it went for my thesis.

I’m not insinuating that as a surfer my background was beginning seep into my work and influence my results (while we’re here, the concept of the dis-attached, unbiased researcher is philosophically flawed. It’s impossible. The researcher will always hold some kind of influence on everything, no matter how minute). But rather it prompted me to experience and re-examine the theory associated with the topic on a personal level.

When it came to working on my thesis, I would become un-emotive and critical. My academic mind would kick into gear and I would work through the literature and my study robotically, but there were other times- on the ocean, lying in bed, walking to uni that my mind would wander. I would imagine the aftermath of my own or friend’s shark attacks. I would imagine the mental and emotional toll. I imagined living in a community shaken up by shark attacks.

As I moved through the study the shark attack ‘victims’ became real people. The nameless, faceless subjects of the academia were given an identity and a story.
9am, January 10, 2015. Japanese expat, Tadashi Nakahara paddled out at Ballina’s Shelly Beach in NSW. It was a beautiful day. The water was warm and crystal blue as light beamed off of the white sand seafloor. 3ft peelers were rolling into the beach. It was the kind of idyllic, inviting day that surfers daydream about.

Nakahara was well known in the Ballina surf community. He worked as a surfboard distributor at Webber surfboards, a local surf shop. He was known in Ballina as a gentle, relaxed and friendly soul.

Nakahara was sitting on his board 50m off shore. There were 10 other surfers in the water. Nakahara was seized and dragged underwater by what is believed to be a 3.5-4m Great White. The shark took Nakahara from behind, simultaneously biting both of his legs and his surfboard. The shark thrashed for 10 seconds before releasing it’s grip on Nakahara.

Three surfers swam Nakahara into the beach and brought him up onto the sand. Nakahara has lost both legs just below his hips. Two surfers attempted to tie their leg ropes as tourniquets around the top of his legs, the other administered CPR.

Sirens wailed in the background. The men worked fiercely to try and save Tadashi. The blood loss was too much. Tadashi passed in the arms of the men who paddled him in and worked with valour to save his life.

Tadashi’s story was told to me in person by David Wright, the mayor of Ballina. I met with Wright at a small cafe next door to the Ballina Shire council in July, 2016.

His eyes exhibited emotional fatigue. His skin was worn and pink, bearing the scars of his battles with skin cancer. He spoke from his heart in sincerity with honest conviction.

Before the interview I wrote a few pages of questions in my notebook. In my study Wright was the mayor of a small NSW town, who, shaken up by an unprecedented shark attack, pleaded with the state government to fund more drone and helicopter surveys along with the installation
of a shark barrier. He was a far away, innocuous politician that dealt with media.

But in person, he was the mayor of a small town he loved with a close-knit community that had been rocked and traumatized.

For an hour and a half I didn’t bother to open my notebook. He hardly stopped talking. Perhaps grateful that I wasn’t a journalist interrogating him about the latest attack, he opened up and talked in great length and detail.

At times his voice shook when he spoke of Tadashi. Honoring Tadashi was extremely important for Wright. He told me of his memorial service and personally funding Tadashi’s monument at Shelly Beach. “I just wanted something…”.

He spoke of the traumatic effects on one of Tadashi’s rescuers- the man who gave him CPR. He spoke of buying him a shark deterrent and trying to help him to enjoy the ocean again.

He spoke of the relentless media attention. In every attack in Ballina Wright was often one of the first on the scene, ready to deal with media, “I must of done about 800, 900 interviews…”.

Everything was all so poignant. Wright has for long been a councilman in Ballina. His life before 2015 in Ballina was quiet and steady. He worked passionately for the town, and worked to build tourism in the area. The shark attacks changed everything.

Still, Wright remains optimistic.

“We’ve had a lot of good things happen out of it. Last year was one of those hiccups, but aside from the people getting hurt or killed, I think we’ll end up better out of it”.

July 26, 2016. Curran See and Harris Lake were surfing by themselves at Sharpes Beach, just a few hundred meters north of the spot Tadashi was taken. It was 12.30pm and the conditions were idyllic. “It was like a drawing, perfect barrels, full of dolphins… so sunny”, Curran ex-
Almost exactly a year after the Mick Fanning incident, the two 18 year olds experienced an uncannily similar encounter. “I felt this thing tow through me, underneath me. And then suddenly this thing actually pulls me down a bit… it got stuck in my leg rope. I reckon it went for my leg and just by chance, by balancing on my board, I just kicked it out of the way”.

The Great White snapped Curran’s leg rope before swimming over and emerging out of the water next to Harris. “I watched it’s big mouth flash by, open and then something hit me, I get pulled underwater, I look at it for a while, it turned around and I just kicked into gear I guess”.

Curran and Harris managed to get to their boards, yelling at each other to get away before sprint paddling to the beach. They managed to paddle into a tiny wave on the way end which carried them almost all the way to the beach.

I met the surfers just two weeks later. We laughed through the interview, as Curran and Harris explained the nervous paddle back in, falling off a wave just before the shoreline, thinking about dying and falling onto the beach and kissing the sand.

At the end of the interview I asked them if they’d surfed since. Their answer was no and probably not for a few weeks. I talked to Curran and Harris about the NSW government’s management of sharks on the North Coast and perhaps inevitably we ended up talking about shark culling. While the pair didn’t believe in outright culling, Curran expressed his frustration at hearing non-surfer opinions on the topic.

“It’s so conflicting, to try and believe that surfing is going to be bad for you. You know what I mean? It’s such a fun thing to do and it’s freeing and you feel one with the ocean… and when you raise the argument of culling, people are like ‘nah it’s their space’… yeah fair enough… but we don’t want to die. It’s just so fun. You don’t understand surfing until you surf”.

“Fucked” was the one word almost every surfer on the North Coast used to describe the shark attacks in 2015. Surfers are a stoic bunch. They don’t often talk about danger and if they do, they downplay it. Many of the surfers I talked to on the North Coast didn’t really knew what to
say about the 2015 attacks and seemingly unexplainable spike in shark sightings.

They were hesitant to come to any kind of definitive conclusions. In some ways, surfers were the outspoken characters in the story of shark attacks on the North Coast in 2015. At times the media blamed surfers for the attacks. ‘If they didn’t go in the ocean, they wouldn’t get attacked’, journos would write. Most surfers in the region were quick to point out that the ocean is not their territory.

There was an array of unsympathetic opinions that surfaced in the media, typically from non-surfers. ‘If you’re scared give up surfing, take up lawn bowls’… ‘surf in Queensland where there are shark nets’… ‘buy a shark deterrent, problem solved’. At times the comments were even scathing.

And then of course the “you’re more likely to…” formulations were rife. They tend to favor the outrageous and the visual. Too often, they’re a wildly inaccurate analogy of risk and a sweeping over-simplification all together. A surfer in Ballina isn’t more likely to get killed by a coconut falling on his head because there are no coconut trees in the Ballina. There’s a high chance that you’re not “more likely to get killed by a bee sting…” , because only a tiny modicum of the population are allergic to bee stings.

These kinds of analogies are pertinent for non-surfers or people who don’t live near the ocean. They’re blunt and informative. They suggest that being scared of sharks is ridiculous and anyone who is has two options: to toughen up and keep surfing or simply quit all together.

An hour after interviewing Curran and Harris I surfed Lennox Head, just a short drive away from Sharpes beach. It was overcast, blowing onshore and late in the afternoon. There were 15 other surfers out.

I hugged the rocks, sitting inside the other surfers near the point. I knew Great Whites frequented the point. A simple study of the NSW government’s SharkSmart twitter page (the location of tagged sharks and sharks spotted by helicopter and drone surveillance is regularly updated on the page) before I left New Zealand had taught me this.
Erratic sets were washing through. We scrambled up the point, paddling wide to dodge the bigger waves breaking far out. The water was murky. Sitting on my board, I could hardly see my feet. I wondered if the other surfers were thinking about sharks.

After writing my literature review, my seemingly invincible mental fortress of academia began to crumble. I began reading more detailed accounts of shark attacks. I listened to narratives of those who fought off sharks and the agonizing swim to the beach leaving a crimson wake behind.

I read about the trauma experienced by many after being attacked. Medical journals and books presented candidly brutal photos of shark attack victims. The graphic aftermath of shark attacks will forever be inscribed in my mind.

Humans aren’t robots. We’re emotive, primal beings. We can’t simply shake of the fear of a harmful risk because statistics tell us that it’s unlikely to occur. I’m well aware of the minuscule risk of sharks, and probably more so than the average surfer. Yet at the worst of times, after sunset on my own, I can’t shake the feeling of being attacked. And that’s in Dunedin, hardly a place notorious for shark attacks.

There’s an omnipresent feeling of unease on the North Coast. They’ve experienced a mysterious ecological shift that has seen the distribution of baitfish and sharks move far closer to the coast. I was told by a surfer of 40 years on the North Coast that in the last 3 years he’s seen more sharks than he had in 37 years.

At times when I surfed on the North Coast, the ocean would erupt with life. Whales would explode out of the water, sending cascades of white water soaring to the sky. Dense, tornadic schools of baitfish drifted beachwards. Pods of dolphins surfaced and cruised through the lineup. And sharks, the stories antagonists, were somewhere below.

There are no answers. No one knows why there is such a concentrated distribution of marine life close to the coast. No one knows why shark sightings have escalated so rapidly in the last 2 or 3 years. No one knows when the phenomenon will slow, or even if it will.
Before going to the North Coast, I felt uneasy about distancing myself from the subjects and environment of my study. In some ways, I felt naive. Treating the subjects of my study as ‘tragic victims’ or statistical frequencies was at times unsettling. My own fears only strengthened the empathetic connection I hold with the far away subjects of my research.

I saw apprehensiveness, uneasiness, emotional fatigue, anger and fear in the eyes of the people I talked to on the North Coast. I spoke with people who actively supported killing sharks and others who described it as “pathetic”. I spoke to people who refused to surf around Ballina and others who refused to be deterred by fear.

Experiencing fear makes us human. So too does empathy.

This story has been a voice for the experiences of those who have been impacted by the spate of shark attacks and sightings on the North Coast. It's been an exploration; on a personal level of the way humans react to shark attacks.

There are many stories I could have written after the conclusion of my thesis study. I’ve encountered a vast array of opinions, ideas and controversies in my time writing this thesis. I feel that as a surfer, who is inextricably tied to the research, it would be an injustice not to write about the ideas this story explores. Perhaps the best way to bring my study home is to explore its personal impact. This story has not been the distanced, passive voice of a researcher, but my own.