Knowledge, experience and attitudes towards sharks: A case for species-specific environmental education

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Abstract

Sharks are under threat from human exploitation and their numbers are declining, which has ecosystem consequences. Furthermore, sharks have suffered from a negative public image that has worked to reduce their populations, rather than conserve them.

This research sought to determine people's knowledge, experience and attitudes towards sharks. It explored the link between people's knowledge and experience with sharks and the attitudes held toward them. Research has shown that attitudes regarding the marine environment and wildlife are shaped by several factors including formal education and personal experience, which have been found to influence the development of environmental attitudes and conservation behaviour.

In this research a questionnaire was used to gather data from a cross section of the Mount Maunganui community using a convenience sampling method. Sixty community members and one class of 25 primary students completed the questionnaire. The questionnaire asked participants about their knowledge and attitudes about sharks, their experience with sharks and their general environmental behaviours. Data were either statistically analysed for closed questions, or thematically analysed for open questions. Correlations between knowledge, attitudes and behaviour were explored, as it has previously been found that individuals with high levels of knowledge and positive attitudes towards animals such as sharks are more likely to support their conservation.

Findings indicate mostly fear-based attitudes in first thoughts about sharks, influenced often by exposure to entertainment and news media. However, responses to more considered attitude orientation questions tended to be largely positive, and naturalistic in nature. Findings further indicate that good levels of knowledge, experience and mostly positive attitudes towards sharks do not always translate to support for their conservation. Recommendations are made for possible ways to develop people's knowledge, experience and attitudes towards sharks through environmental education for conservation.

Quote

In the end,
We will conserve only what we love.
We will love only what we understand.
We will understand only what we are taught.

Baba Dioum

Acknowledgements

This is dedicated to my dear dad, who introduced me to the beauty and mystery of my first shark and the wonder of the marine environment.

To my mum and sisters, who have always supported my crazy love of sharks and my journey in life and learning.

To Dr Chris Eames, who has supported and inspired my learning in the area of environmental education and my work on this thesis.

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Chapter 1
Introduction

1.1 Chapter Overview

This chapter outlines the motivation for this research and the justification for it. It includes the research purpose, scope and significance. The limitations of this research are discussed, and the structure of the thesis is also outlined.

1.2 Motivation for the research

My interest in, and eventual love of, the marine environment and its inhabitants was developed from an early age by my parents, particularly my father who shared his love of the marine environment with me. He instilled in me a deep respect, and care for the ocean and everything that lived in it.

My interest in, and eventual love of, sharks began quite by accident, that is, when I accidently caught a juvenile hammerhead shark while fishing with my father as a child. The shark was the most strange and beautiful thing I had ever seen - I was in awe. Initially I had no idea what it was, but my father shared his knowledge with me, and I was hooked. He also insisted we return the shark to the ocean so it could grow and live its life there, where it belonged.

This experience has stayed with me all my life, it has inspired me to learn and develop my knowledge and connection with the marine environment, especially sharks. It has led me to work in aquaria, volunteer on marine conservation projects, work to protect the oceans' resources and study in the marine science and environmental education fields. Through my experiences I have come to understand that knowledge and experience can help develop positive attitudes and behaviours towards the marine environment, and specific species such as sharks.

I know my knowledge, experience and beliefs have influenced my attitudes towards sharks and the marine environment, which in turn has influenced my behaviours. I am acutely aware that my actions have an impact on the natural

world, and in turn on me. I am driven by this knowledge to understand how other people's knowledge and experiences influence their attitudes, particularly towards sharks and the marine environment.

I am motivated by the notion that if I feel the way I do about sharks, then surely others can, and do, too? I believe that through education and experience, attitudes towards sharks can be developed, which in turn can lead to behaviour that supports their conservation, and that of the world they live in.

As the quote at the beginning of this thesis states: *In the end we will only conserve what we love, we will only love what we understand, and we will only understand what we are taught.* This has certainly been the case for me; my hope is that this may be the case for others also.

1.3 Justification for the research

Sharks polarise people: love or hate them, most people seem to have an opinion. Some have a healthy respect for an important ocean predator, while others fear them, perhaps irrationally, as mindless man-eaters.

Shark numbers are declining, and this decline has ecosystem consequences as sharks play an important role in maintaining a healthy marine ecosystem (Simpfendorfer, Heupel, White & Dulvy, 2011). The role of some shark species as apex predators exerts top-down effects on ecosystems, and their loss may have important direct and indirect effects on populations, that can cascade through ecosystems (Stevens, Bonfil, Dulvy & Walker, 2000). It is believed that over time any loss of sharks will result in substantial changes to ecosystems that affect other organisms, and to the industries and human communities that rely on them (Simpfendorfer et al., 2011).

Historically, sharks have been much maligned and feared by humans (Pollard, Smith & Smith, 1996). They have suffered from a negative public image that has worked to reduce their populations, rather than conserve them (Thompson & Mintzes, 2002). As such, the attitude a person holds towards an animal, in this

case sharks, is important as it can affect their behaviour toward them (Thompson & Mintzes, 2002). Research has shown that attitudes in some way guide, influence, direct, shape, or predict a person's behaviour. It has been found that people with positive attitudes towards a specific species, such as sharks, are more likely to support legislation to protect and conserve them, donate time or money for their conservation, or simply refrain from harmful practices or activities involving them (Thompson & Mintzes, 2002). Furthermore, research has shown that attitudes regarding the marine environment and wildlife are shaped by several factors including formal education and personal experience, which have been found to influence the development of environmental attitudes and conservation behaviour (Dobson, 2007; Kellert, 1989; Seraphin, 2010).

By understanding the attitudes people hold towards sharks, and what shapes those attitudes, educators who are committed to conservation of the marine environment, and are concerned about preservation of species, such as sharks, which are potentially endangered by negative public attitudes, can use the information gained to inform curriculum and community education development (Thompson & Mintzes, 2002). It is for this reason that I undertook this research; I am ultimately interested in the potential for species-specific environmental education to create greater awareness of sharks and help develop attitudes towards them. Which, in turn, will hopefully inspire positive environmental behaviour towards them and potentially create greater care for the marine environment through this species.

This research is the first step in the process, as by understanding the attitudes people hold towards sharks, and how those attitudes are shaped, it may be possible to develop an environmental education programme or awareness campaign to develop attitudes, and in turn behaviours towards sharks.

1.4 Purpose of the research

This research sought to determine people's knowledge, experience and attitudes towards sharks in the Bay of Plenty region of New Zealand. It also explored their general environmental behaviours and the possible link between people's knowledge and experience with sharks and the attitudes held toward them.

1.5 Scope of the research

In this research a questionnaire was used to gather data from a cross section of the Mount Maunganui community using a convenience sampling method. Sixty community members and one class of 25 primary students completed the questionnaire. The questionnaire asked participants about their knowledge and attitudes about sharks, their experience with sharks and their general environmental behaviours. Data were either statistically analysed for closed questions, or thematically analysed for open questions. Correlations between knowledge, attitudes and behaviour were explored, as it has previously been found that individuals with high levels of knowledge and positive attitudes towards animals such as sharks are more likely to support their conservation.

1.6 Significance of the research

As mentioned above, by understanding the attitudes people hold towards sharks and what shapes those attitudes, educators who are committed to conservation of the marine environment and the preservation of species, such as sharks, that are potentially endangered by negative public attitudes, can use the information gained to inform curriculum and community education development. As such, it is my hope that this research will assist educators in developing such environmental education programmes, ultimately creating greater awareness of, and developing attitudes towards, sharks to improve their conservation and protection, and that of the environment they live in.

1.7 Research questions

This research was designed to explore what attitudes people hold towards sharks and the link, if any, between people's knowledge and experience with sharks and their attitudes. The research questions that guided the study were:

- What knowledge and experience do people have with sharks?
- Where do people obtain their information / knowledge about sharks?
- What attitudes do people hold towards sharks?
- Do knowledge and experience appear to influence attitudes towards sharks?

1.8 Thesis structure

Following this chapter, in chapter two a review of the literature relevant to this research is undertaken. In the first section sharks, their biology, life history, habits and specific species of the Bay of Plenty, New Zealand, are explored. This section further explores the threats facing sharks and their interactions with humans. The second section of the literature review focuses on the nature of attitudes and values, their structure and development. It specifically explores attitudes and values toward the natural world and sharks. In the final section of the literature review environmental education is explored by reviewing the goals of environmental education in schools, and in adult and community environmental education. The link between attitudes, values and environmental education are also explored in this section.

In chapter three the methodology used to undertake this research is outlined. The research questions, methodological framework, research methods, research design and participant selection are all presented. The research process including data analysis and validity and reliability are all reviewed.

In chapter four the findings of the research are presented in two sections, one for the community group and one for the school group. Each section presents the

group demographics and findings from each section of the questionnaire: general knowledge of sharks, attitudes and values towards sharks, experience with sharks and environmental behaviour.

Chapter five discusses the findings of this research as they relate to the main research questions. A section where conclusions are drawn from the findings follows this, and implications are outlined. In the final section recommendations are made, based on the findings, conclusions and implications.

Chapter 2
Literature Review

2.1 Chapter overview

This chapter presents literature relevant to this research, outlined in three main sections. In section one sharks, their biology, behaviour, role in the ecosystem and interactions with humans are explored. The second section outlines the nature of attitudes and values, including those specifically held towards animals and sharks. In the final section environmental education as a possible tool to create awareness of, and develop attitudes towards, sharks is explored. This chapter is concluded with a summary.

2.2 Sharks

Sharks comprise a group of cartilaginous fishes, which belong to the Class Chondrichthyes. The Class Chondrichthyes is a monophyletic group, which can be divided into two taxa, the Elasmobranchii and Holocephali (Grogan & Lund, 2004). The subclass Holocephali contains fishes known as chimaeras, ratfish, and ghost sharks, which live mostly in deep water. Sharks along with rays belong to the subclass Elasmobranchii. This subclass is divided into eight orders of sharks, and one order of rays. The orders of sharks include cow and frilled sharks (Hexanchiformes), dogfish sharks (Squaliformes), saw sharks (Pristiophoriformes), angel sharks (Squatinidae), bullhead sharks (Heterodontidae), carpet sharks (Orectolobiformes), ground sharks (Carcharhiniformes), and mackerel sharks (Lamniformes) (Cox and Francis, 1997).

Chondrichthyan fishes are the most successful of all fishes if success is measured in terms of historical endurance, based on being able to survive for the last 400 million years (Grogan & Lund, 2004). Elasmobranchs, specifically sharks on which this chapter focuses, vary widely in appearance, behaviour and life history from species to species.

2.2.1 Shark Biology

Sharks and all fishes belonging to the class Chondrichthyes are characterised by having a cartilaginous skeleton that is superficially mineralised by prismatic calcifications (tesserae) and by the modification, within males, of mixopterygia (claspers) for the purpose of internal fertilisation (Grogan & Lund, 2004).

Sharks are morphologically and biomechanically diverse, with body forms ranging from slender and flexible benthic shapes to much more stiff-bodied pelagic types (Shadwick & Goldbogen, 2012).

In comparing the morphology of shark species Thomson and Simaneck (1977) recognised four distinct patterns in relation to the caudal fin that could be linked to swimming styles: 1) large fast-swimming pelagic sharks (Lamnidae), 2) generalised swimmers such as Carcharhinidae, 3) slow-swimming demersal and benthic species such as Scyliorhinidae and 4) squalomorphs which are distinct in their absence of the anal fin.

The caudal fin is heterocercal in most species, meaning that the upper lobe is longer than the lower lobe (see Figure 2.1). This produces asymmetrical hydrodynamic forces that result in an up-ward directed lift force on the tail during forward swimming (Shadwick & Goldbogen, 2012), which in turn pushes the head down. This force is counteracted by the lift provided by the stiff, outward-thrusting pectoral fins (Fish & Shannahan, 2000).

The shark's body is enveloped in a thick sheath of muscle, which creates waves of contractions that help it move through water. The lateral muscle consists of two differently coloured muscles. A band of dark or red fibres lies just under the skin (except in Lamnids) while the remainder is much lighter or white. The red muscle is aerobic and designed for slow, continuous swimming, whereas the white muscle is generally anaerobic and suited for brief bursts of speed or fast-starts (Shadwick & Goldbogen, 2012).

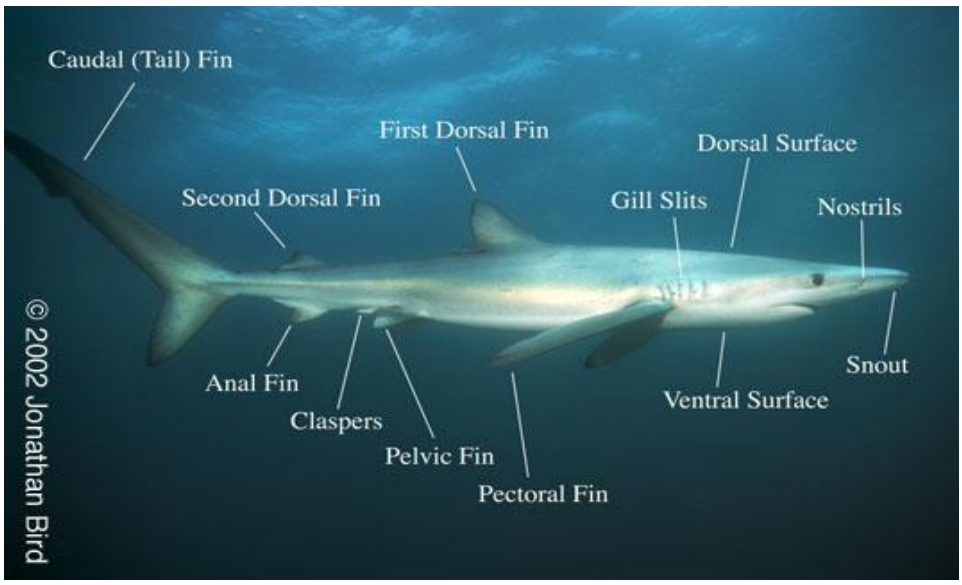

Figure 2.1: Generalised main body parts of a shark (Bird, 2002)

In the case of the Lamnidae which consists of five species, including the great white *(Carcharodon carcharias)*, porbeagle *(Lamna nasus)*, salmon shark *(Lamna ditropis)*, shortfin mako *(Isurus oxyrinchus)* and longfin mako *(Isurus paucus)* (longfin mako), aerobic red muscle is situated medially, deep in the body and in the tips of anterior-pointing cones of highly elongated myomeres. This positioning of the red muscle provides the basis for the 'stiff-body' swimming mode lamnids employ (Syme & Shadwick, 2011). These species are all highly active pelagic predators that must swim continuously to ventilate and that cover large geographical ranges.

Lamnids are distinguished by a thick streamlined body, highly tapered to a narrow caudal peduncle with a stiff crescent-shaped hydrofoil-like tail (see Figure 2.2). This is believed to generate thrust by forward-directed hydrodynamic lift. This body shape concentrates the bulk of the locomotor muscle centrally while reducing mass and maximising lateral motion in the posterior region (Shadwick & Goldbogen, 2012).

Figure 2.2: Shortfin mako *I. oxyrinchus* showing crescent shaped tail. (Elasmodiver, 2014)

All sharks have rough sandpaper-like skin due to the presence of thousands of tiny placoid scales that cover their bodies. These scales act as a defence against predation and parasitism by increasing the strength of the skin. They further increase the hydrodynamic efficiency as the shark swims (Perrine, 2005).

Unlike bony fishes, sharks have no swim bladder to assist with buoyancy control, however, they do have two other forms of buoyancy control. Their cartilaginous skeletons are lighter than bone and as such offer considerable weight savings. And their liver acts as a storage organ for oil, which is less dense than water and therefore provides significant amounts of buoyancy (Cox & Francis, 1997).

Like all fishes sharks 'breathe' by extracting oxygen from water with their gills. Water is taken in through the mouth, or in some cases through a modified gill opening known as a spiracle, and passed through five to seven gill slits, which are visible on each side of the body just behind the head (Perrine, 2005).

Most shark species are ectothermic (cold-blooded), however regional endothermy or heterothermy is employed by the lamnids. In these species vascular heat exchangers in the medial red muscle capture heat produced from contractions that

power continuous swimming. Muscle heat in outgoing venous blood warms the incoming arterial blood, thereby maintaining the temperature around the red muscle elevated relative to the ambient water (Bernal, Dickson, Shadwick, & Graham, 2001). These fishes have elevated aerobic metabolism compared with their ectothermic relatives, fuelled by enhanced capacity to deliver oxygen to muscle and heart tissues, and elevated metabolic enzyme activities in muscle and heart, large gill area and large thick-walled hearts (Bernal, Sepulveda, Mathieu-Costello & Graham, 2003).

Shark teeth vary greatly in size and shape among different species, from the powerful jaws of a great white shark which has rows of sharp, triangular teeth, to the small and flattened teeth of a rig shark. In all chondrichthyans a lost or broken tooth is replaced by another, which slowly shifts forward from the row behind (Cox & Francis, 1997)

2.2.2 Shark senses

Sharks have an impressive repertoire of senses for which they are well known. Some of this recognition is well deserved, while some is exaggerated. Shark sensory systems are used for detecting prey, avoiding predators and orienting in the ocean. Their sensory array provides information to a central nervous system that includes a relatively large brain (Hueter, Mann, Maruska, Sisneros & Demski, 2004).

Shark eyes are situated laterally on the head and are generally small in relation to body size. Their eyes oppose each other, which allow for nearly 360˚ visual field, and they have a dynamic iris that can increase the size of the pupil in dim light or decrease it in bright light. The size and shape of the pupil varies between species and environments they inhabit. All sharks have duplex retinas containing both rod and cone photoreceptors. Cones subserve photopic and colour vision and are responsible for higher visual acuity; rod subserve scotopic vision and are involved in setting the limits of visual sensitivity in the eye. Some sharks have a transparent eyelid, the nictitating membrane, which protects the eye during feeding and other

activities. Others use extraocular muscles to rotate the eye back into the orbit to protect it (Hueter et al., 2004).

The importance of vision in a shark's daily life is supported by the complexity of their anatomical and physiological visual adaptations, many of which are correlated with species behaviour and ecology (Hueter et al., 2004)

Hearing in sharks is of interest as sound in the ocean presents a directional signal that is capable of propagating over large distances. Research has found that sharks are attracted with low-frequency sounds (Hueter et al., 2004). Sharks have tiny openings on the top of their heads, which lead through canals to the inner ear; here sound signals are received by hair cells. The inner ear also contains three semi-circular canals at right angles to each other. Beneath the semi-circular canals are three otolith organs – together these two systems give the shark a very precise sense of balance, orientation and movement (Perrine, 2005).

Olfaction is an important, if not primary, means by which sharks find food. The olfactory organs of elasmobranchs are situated in laterally-placed cartilaginous capsules on the ventral aspect of the head, well in front of the mouth. The sac-like structures are divided by skin-covered flaps into a more lateral incurrent nostril (see Figure 2.3) and a more medial excurrent nostril. Water is channelled into the incurrent opening and flows over a formation of plates or lamellae each with secondary folds that contain the primary olfactory receptors. The synaptic (nerve) processing of olfactory information takes place in the olfactory bulb, a part of the brain that receives the output from the olfactory receptors (Hueter et al., 2004).

Research suggests that differences in reliance on smell for feeding and or social behaviour relate to the mass of the olfactory bulb relative to total brain mass. This differs between species, for example, the relative mass of the olfactory bulb in the white shark *C. carcharias* at 18% compared with 3% for shortfin mako *(I. oxyrinchus)* (Demski & Northcutt, 1996). The difference between these two closely related sharks can possibly be explained by the observation that while both species eat fish, the adult white shark preys heavily on marine mammals including pinnipeds, the colonies of which create considerable odoriferous material into the water (Long, Hanni, Pyle, Roletto, Jones & Bandar, 1996). There

is some evidence to suggest sharks also utilise their olfactory cues in social-sexual behaviour and in predator avoidance (Hueter et al., 2004).

Anatomical studies in sharks have identified receptors that closely resemble taste organs in other vertebrates. A few behavioural observations suggest gustation is important for the acceptance of food in sharks. While much research is still required in this area it seems reasonable to assume that gustatory apparatus in sharks functions primarily in the final determination of food vs. non-food (Hueter et al., 2004).

The ability to detect water movements is essential to the lives of fishes. The mechanosensory lateral line system is stimulated by differential movement between the body and surrounding water and is used by sharks to detect both dipole sources (e.g. prey) and uniform flow field (e.g. currents) (Hueter et al., 2004). The lateral-line system is a network of pit organs and rows within canals that branch across the shark's head and run along the side of the body and the upper lobe of the tail. These mechanoreceptors and the hair cells within them send signals to the brain when the hairs are deflected by water displacement waves (Perrine, 2005). This sensory system functions to mediate behaviours such as rheotaxis (orientation to water currents), predator avoidance, hydrodynamic imaging to localise objects, prey detection, and social communication including schooling and mating (Hueter et al., 2004). The best-known behavioural use of the lateral line system is in prey detection. The concentration of mechanoreceptors on the cephalic (head) region of sharks, as well as the low frequency, close range of the system indicates an important role in detection, localisation and capture of prey (Hueter et al., 2004).

All sharks possess an elaborate ampullary electroreceptor system that is exquisitely sensitive to low frequency electric stimuli. This system consists of subdermal groups of electroreceptive units known as ampullae of Lorenzini, which detect weak electric stimuli at low intensities (Hueter et al., 2004). Scattered around the head and snout are numerous pores, which lead to the ampullae of Lorenzini: jelly-filled pores that are connected to nerves at their base (see Figure 2.3) (Perrine, 2005). The first demonstrated use of this elasmobranch electric sense was for the detection of bioelectric fields produced by prey

organisms (Kalmijn, 1971, as cited in Hueter et al., 2004). Another important function of this sense is for use in predator detection and avoidance. It is further known to mediate orientation to local inanimate electric fields and in theory is sensitive enough to function in geomagnetic navigation (Hueter et al., 2004).

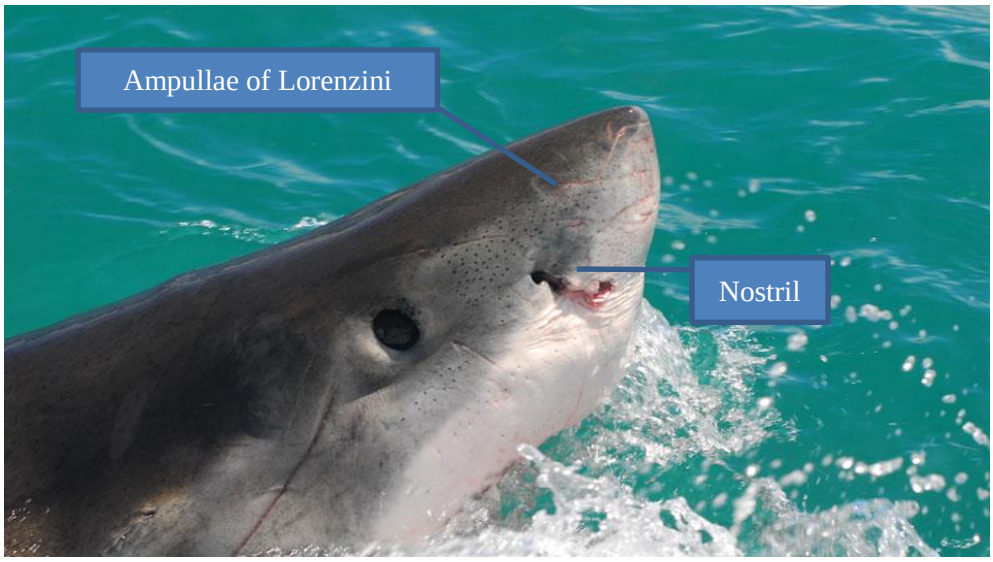

Figure 2.3: *C. carcharias* showing ampullae of Lorenzini and nostril. (Broadhead, 2008)

2.2.3 Shark Behaviour

2.2.3.1 Mating

Mating is one of the most basic and necessary behaviours of sharks, and although the practical function of mating is well understood, little is known about the timing and location of mating for many species (Heupel, 2010).

Shark mating behaviour typically involves the male grasping the female by one of her pectoral fins or biting her flank. The male uses this grasp as leverage for positioning himself to insert one of his claspers in her cloaca. All sharks reproduce via internal fertilisation so direct sperm transfer is required (Heupel, 2010).

Approximately 57 per cent of chondrichthyans are viviparous, meaning they incubate eggs within their bodies and young are born live (see Figure 2.4). The

gestation period may range from a few months to two years. The remaining 43 per cent of chondrichthyans are oviparous, meaning they lay eggs in tough leathery cases that are deposited on the seabed (see Figure 2.5). Embryonic development occurs and may take from two months to more than a year, after which the young shark breaks free and swims away (Cox & Francis, 1997).

Sharks are not thought to maintain a single mate, although mating choice is thought to occur in some instances. Studies of nurse sharks revealed that females often rebuffed mating attempts from smaller males but submitted to larger, more dominant males (Pratt & Carrier, 2001). It is thought that sharks have a generally defined reproductive season, which occurs annually and is controlled by hormone cycles. Individuals are thought to migrate to specific mating areas, although few of these areas have been identified for shark populations (Heupel, 2010). The lack of observational data limits the ability to fully understand the behavioural aspects of mating activities.

Figure 2.4: Lemon shark live birth (Perrine, 2014, both)

Figure 2.5: Shark egg case

2.2.3.2 Use of Nursery Areas

The early life history of many shark species is relatively unknown, however inshore species are thought to utilise nursery areas. These regions are suggested to have high prey abundance and low numbers of predators making them the ideal habitat for young sharks to survive their early life. Young inshore sharks are thought to remain within the protective nursery for the first few months or years of their lives (Heupel, 2010).

2.2.3.3 Movement and Migration

The complex neuromuscular systems in sharks underlie the ability of many species to perform efficient, high-performance locomotion. Sharks exhibit an extensive repertoire of swimming behaviours from long-distance migrations to acrobatic trajectories during predator and prey interactions. Such capacities allow sharks to play a major role in diverse ecosystems as apex predators at multiple trophic levels (Shadwick & Goldbogen, 2012).

Advances in tag technology have enabled the analysis of shark distribution and large-scale movement, and as such reveal new insights into the physiological ecology of habitat selection, migratory behaviour and life history. Satellite tag studies have revealed extensive migratory abilities in many shark species that exhibit a lamniform-like body shape. For example *C. carcharias, L. ditropis* and *Prionace glauca* (blue shark) are capable of trans-oceanic and trans-equatorial migrations that are often in excess of several thousand km (Shadwick & Goldbogen, 2012). The longest record to date belongs to a *C. carcharias* that undertook a round-trip excursion of >20,000 kilometres across the Indian Ocean (Bonfil, Meyer, Scholl, Johnson, O'Brien, Oosthuizen, Swanson, Kotze & Paterson, 2005).

Long-term data gathering from tagging has revealed philopatric behaviour patterns in several species. This involves the return of individuals to a habitat they have used previously. For example, young sharks in coastal habitats migrate out of these areas in winter, with some returning the next summer. Further, some species have been found to return to specific sites at predictable times of the year, such as white sharks returning to known areas. These results suggest some habitats are crucial to these populations for reasons such as feeding or mating (Heupel, 2010).

2.2.3.4 Feeding and Predator-Prey Relationships

Sharks feed on a diverse array of species from plankton and benthic invertebrates to marine mammals and other large vertebrates. Species also vary from batch-

feeding filter feeders and scavengers to active predators and from opportunists with catholic diets to highly specialised feeders (Heithaus, 2004).

Shark diet composition is a result of behavioural decisions associated with locating and capturing or rejecting potential prey items. It is thought that optimal diet theory may explain how elasmobranchs make decisions about prey. Optimal diet theory describes when a prey item should be accepted or rejected. If prey items vary in their net energy gain (energy content minus the energy expended in capture and handling), handling time, and encounter rate, then it is possible to make simple predictions about what prey should be eaten (Stephens & Krebs, 1986, as cited in Heithaus, 2004).

Sharks employ a variety of feeding strategies, which are influenced by aspects of their ecology, physiology and behaviour. This includes sensory systems, jaw mechanisms, feeding strategy (grasping vs. suction), and biological aspects such as feeding periodicity (Heupel, 2010).

How sharks approach and hunt their prey is not well understood, however it is thought that most elasmobranchs are opportunistic in what they prey on and how they acquire their prey (Motta, 2004).

When hunting by speculation, the shark searches an area it expects to have prey or follows another organism expecting that animal to flush prey out. For example, *C. carcharias* spend a lot of time patrolling near seal colonies off the South Farallon Islands, California. Most of the shark's movement is back and forth parallel and near to the shoreline as it intercepts seals and sea lions departing and returning to shore based rookeries. Prey capture is, however, infrequent compared to the time spent patrolling (Klimley, Leboeuf, Cantara, Richert, Davis, Van Sommeran & Kelly, 2001).

Ambushing involves the predator trying to conceal or advertise (aggressive mimicry) its presence while lying in wait for prey. By partially burying themselves in the soft substrate pacific angel sharks *(Squatina californica)*, ambush demersal fishes. These sharks appear to select ambush sites within localised areas adjacent to reefs (Fouts & Nelson, 1999, as cited in Motta, 2004).

In contrast to ambushing, the stalking or stealth predator approaches prey while concealed, then makes a sudden assault. An extreme example of stealth feeding behaviour is that of the cookie cutter shark *(Isistius brasiliensis)*. These small sharks approach large fish and mammals and bite a chunk of flesh out of their prey. These sneak attacks leave the prey with a melon-ball shaped, non-lethal wound (Heupel, 2010).

Most elasmobranchs will scavenge food when given the opportunity, for example *P. glauca* will scavenge on human refuse and dead or injured birds. They have also been observed stalking resting birds (Henderson, Flannery & Dunn, 2001).

Although most species of sharks forage solitarily, in some cases aggregations of sharks will come together to feed. For example, sevengill sharks *(Notorynchus cepedianus)* will circle a seal and prevent its escape. The circle is tightened and one shark initiates the attack that stimulates the others to begin feeding (Ebert, 1991, as cited in Motta, 2004). Some believe this behaviour is co-operative foraging, however it could also simply reflect aggregations of animals at prey (Motta, 2004).

2.2.3.5 Agonistic Displays

Despite their fearsome reputation, there is little scientific evidence relating to aggression in shark species. The most comprehensive study of shark aggression relates to the grey reef shark *(Carcharhinus menisorrah)* and involved divers who moved aggressively toward the sharks, which in turn elicited a repeated, predictable movement and postural behaviour by them. Threatened sharks swam with an exaggerated motion, rolling and tilting the body. They lifted their snout, dropped their pectoral fins, arched their back, and bent their body sharply toward their tails. Based on all of the information gathered, it was concluded that this display was most like a defensive threat posture and may be a precursor to attack (Johnson & Nelson, 1973, as cited in Heupel, 2010).

2.2.4 Sharks of New Zealand

New Zealand waters are home to 112 species of sharks, rays, skates and chimaeras. Of these 73 are sharks, 14 are chimaeras and 25 are skates and rays. Most sharks recorded in New Zealand waters are widespread species. Of these, thirteen sharks are endemic to New Zealand (Ministry of Fisheries, 2008).

Diversity in New Zealand waters is greatest over the continental slope (200-2500m depth). Fifteen species inhabit the outer shelf and upper slope, and 33 are only found below the shelf break (c. 200m depth). Only five species, rig (*Mustelus lenticulatus)*, school shark (*Galeorhinus galeus*), carpet shark (*Cephaloscyllium isabellum*), spotted spiny dogfish (*Squalus acanthias*) and the broadnose sevengill (*Notorhynchus cepedianuus*), can be considered primarily shelf or coastal species (Ministry of Fisheries, 2008).

In addition, there are a group of 11 coastal-pelagic sharks that tend to occur or aggregate seasonally in coastal habitats, either for breeding or feeding, and these are found in offshore and oceanic habitats at other times of the year. Sharks in this group include several species that can be considered as dangerous to humans, such as the great white shark (*C. carcharias*), tiger shark (*Galeocerdo cuvier*), bronze whaler (*Carcharhinus brachyurus*), hammerhead (*Sphyrna zygaena*), and the plankton-feeding basking shark (*Cetorhinus maximus*) (Ministry of Fisheries, 2008).

Eight shark species are primarily oceanic, most appearing to migrate seasonally to northern New Zealand during spring and summer. This group includes the shortfin mako (*I. oxyrinchus*), porbeagle (*L. nasus*) and blue shark (*P. glauca*), and less well-known species such as the oceanic whitetip (*Carcharhinus longimanus*), silky shark (*Carcharhinus falciformis*) and the giant whale shark (*Rhincodon typus*) (Ministry of Fisheries, 2008).

Typically it is the shelf and coastal species that are most frequently encountered by humans in New Zealand's marine environment, with some interaction between other species that aggregate in coastal areas seasonally.

2.2.4.1 Sharks of Mount Maunganui, Bay of Plenty

Mount Maunganui is located in coastal Bay of Plenty and stretches along kilometres of beaches, with a multitude of offshore islands such as Matakana, Motiti and Mayor (Tuhua) (see Figure 2.6). Mount Maunganui and the Bay of Plenty are home to an abundance of marine life, including several species of shark. The primarily shelf or coastal species are most frequently seen in this area.

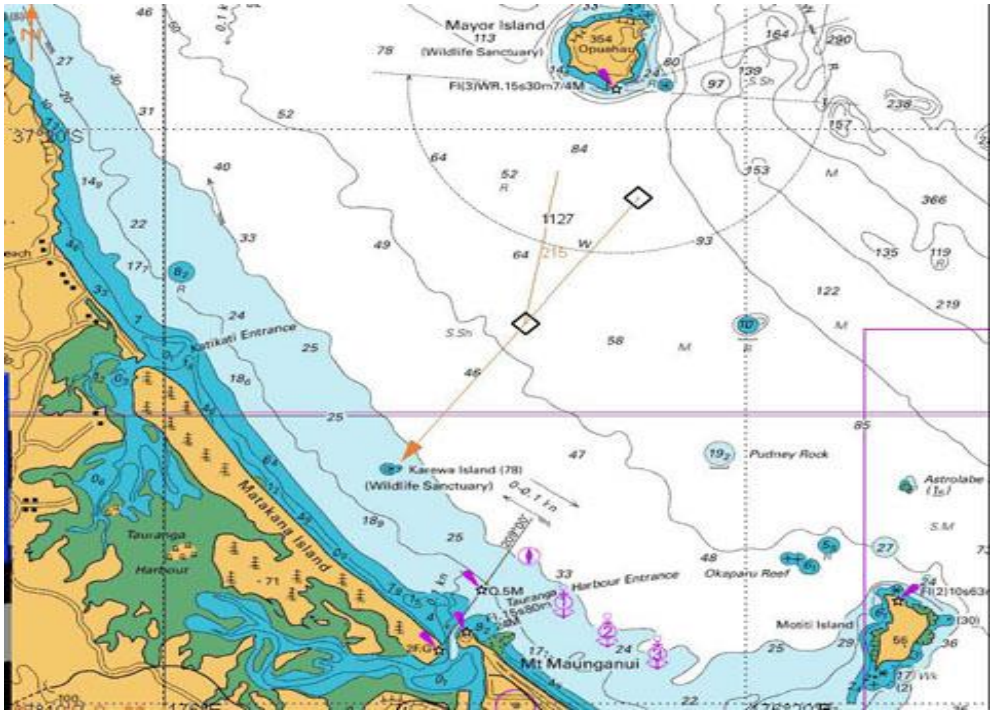

Figure 2.6: Marine chart of coastal Mount Maunganui and islands (Land Information New Zealand, 2014)

Rig (*Mustelus lenticulatus)*

Rig or Pioke (see Figure 2.7) are endemic to New Zealand. They are most abundant in shallow coastal waters especially in estuaries and harbours. They usually occur in small schools segregated by size and sex. Rig feed mainly on invertebrates that burrow in the mud or sand; they have small flat teeth for crushing. Females give birth to an average of eleven live young approximately 25-30cm long in shallow waters during spring. Males mature at 85cm long and 5-6 years old while females mature at 100cm long and 7-8 years (Francis, 2012).

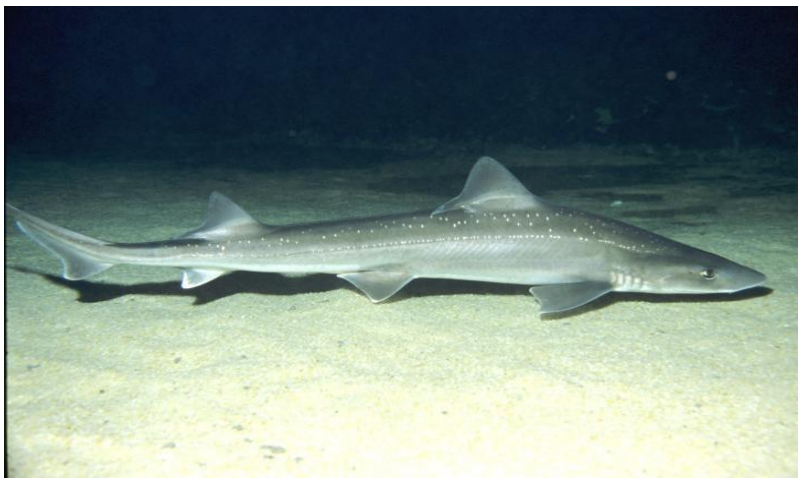

Figure 2.7: Rig Shark (NIWA, 2014)

School Shark (*Galeorhinus galeus*)

School shark or Tupere inhabit shallow coastal waters, including estuaries, harbours and surf beaches, as well as the continental shelf and slope. They also migrate across the open ocean, some travelling across the Tasman Sea to Australia. School sharks are abundant, mobile and rove in small schools. They move into shallow waters in spring, and females give birth to an average of 30 live young approximately 30cm long. Male school sharks mature at 125-140cm in length at 12-17 years old, and females at 135-140cm and 13-15 years old (Francis, 2012).

Bronze Whaler (*Carcharhinus brachyurus)*

Bronze whaler or Horopekapeka (see Figure 2.8) occupies all habitats in shallow coastal waters during summer – reefs, bays, estuaries and surf beaches. It is thought they are pelagic or offshore in winter. Bronze whalers are opportunistic predators, preferring mainly schooling fish and stingrays. However, they will eat any live or dead animal material, and they do rob fish from spearfishers, although they are not usually aggressive towards them. Maturity is reached at 220-250cm long, and females bear up to 23 young 60-70cm long after a gestation of one year (Francis, 2012).

Figure 2.8: Bronze Whaler Shark (NIWA, 2014)

Blue shark (*Prionace glauca)*

An oceanic visitor to the region; blue shark (see Figure 2.9) are a large, highly migratory, pelagic species and are found throughout the world's oceans. Blue sharks are slender, with a long pointed snout and pectoral fins, reaching a maximum of 3m in length. They feed opportunistically on a range of prey. Gestation in blue sharks lasts between 9-12 months and an average of 26-56 pups are born live (Ministry of Fisheries, 2010).

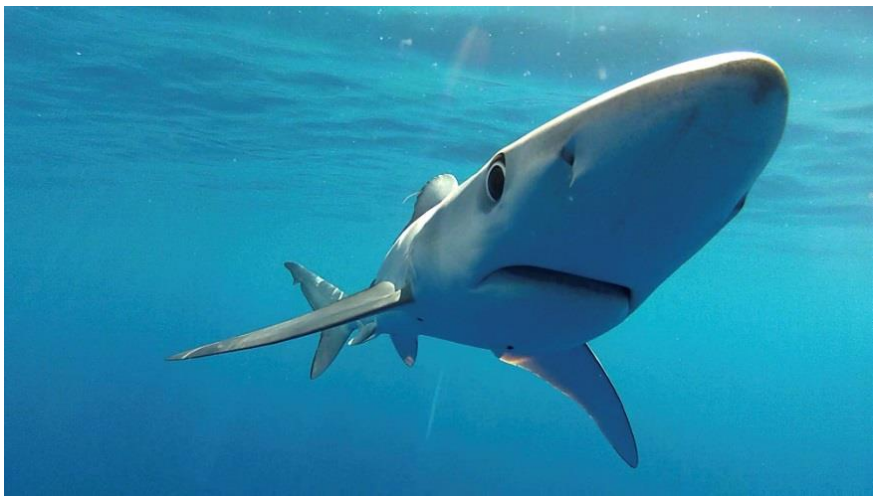

Figure 2.9: Blue Shark (Elliott, 2014)

As mentioned these species typically inhabit shallow coastal waters, including estuaries, harbours and surf beaches, both in spring and summer, and year round. These environments typify the Mount Maunganui coastal region and it is for this reason these species are the most frequently encountered in the local marine environment.

2.2.5 Sharks and Humans

2.2.5.1 Sharks in Decline

Shark populations in many parts of the world's oceans are in decline. These populations face a variety of threats mainly as a result of anthropogenic impacts, most notably from fishing, habitat degradation, pollution, and potentially from climate change (Simpfendorfer et al., 2011).

These declines are exacerbated by the shark's life history. Sharks' biological characteristics make them susceptible to over-utilisation, many are predators and top-level carnivores; as a result their abundance is low compared with species at lower trophic levels. Additional aspects of shark biology that make them susceptible to overfishing include late onset of maturity; slow growth rates; long life spans and low natural mortality rate; low fecundity; long reproductive cycle; and reproductive strategies such as giving birth to live young or laying a small number of eggs (Ministry of Fisheries, 2008).

One of the biggest threats facing shark species is commercial fishing, including finning. Most shark species are fished without knowledge of their sustainability or are over-fished. For example, in New Zealand the management of sharks by the Ministry of Primary Industries (formally the Ministry of Fisheries) is severely lacking. Of the 112 species found in New Zealand waters, only 11 are managed under the Quota Management System, the rest are managed under a complementary framework which leaves these species open to even greater exploitation, as under the *open access* and *limited access* management options there is no restriction on the number of sharks landed (Ministry of Fisheries, 2008).

There are currently 68 species of shark listed as critically endangered or endangered worldwide on the IUCN Red List and 113 are vulnerable to extinction (IUCN, 2014). Many of these species are found in New Zealand waters, including seven species which are already completely protected under the Wildlife Act (1953): these are the great white, basking, deep water nurse, spine-tailed devil ray, manta ray, whale shark, and oceanic whitetip shark (Davison, 2014).

2.2.5.2 Shark's role in the ecosystem

The decline of shark populations has ecosystem consequences as sharks play an important role in maintaining a healthy marine ecosystem. The role of some shark species as apex predators exerts top-down effects on ecosystems, and their loss or decline may have important direct and indirect effects on populations, that can cascade through ecosystems (Stevens, et al., 2000). Sharks help to keep the population of lower levels of the food chain in check, and contribute to the rain of organic debris that falls through the water column to the bottom-dwelling organisms below. The removal of top-level predators from an ecosystem leads to a cascading series of consequences known as tropic collapse, which can affect other fisheries. For example, research has found catches in the North Atlantic scallop fishery have all but disappeared due to an abundance of rays that feed on scallops; these rays were once kept in check by sharks (Elliott, 2013).

It is believed that over time the loss of sharks will result in substantial changes to ecosystems that affect other organisms, and to the industries and human communities that rely on them (Simpfendorfer et al., 2010). The loss of some shark populations from marine ecosystems may also have socioeconomic consequences. Sharks provide a source of protein, as well as a variety of other products (fins, cartilage, and liver oil), that are important to communities in both developing and developed nations (Bonfil, 1994, as cited in Simpfendorfer et al., 2010).

2.2.5.3 Shark Incidents aka “attacks”

Sharks have long been feared because of occasional incidents, often referred to as attacks, with humans in the marine environment. While shark incidents occur relatively infrequently, they often attract a high level of public and media attention.

In 2013, there were 72 recorded unprovoked incidents between sharks and humans worldwide; these incidents resulted in ten fatalities, caused by just a handful of species (Burgess, 2013). This number is less than the previous year, and the lowest since 2009. However, in general the number of worldwide unprovoked shark incidents has grown steadily since 1900. This steady increase is believed to be correlated to an increase in the number of people on Earth and the amount of time they spend in the marine environment (Burgess, 2013).

In New Zealand there have been a total of 49 reported incidents between sharks and humans since records began in 1852; of these 9 were fatal. The most recent fatality was in 2013; prior to this it was 1966 (Burgess, 2013).

Australia is arguably a hot spot for shark incidents with humans. Recent research into shark “attacks” in Australia suggests the rise from an average of 6.5 incidents per year in 1990-2000, to 15 incidents per year over the past decade, which could be seen to coincide with an increasing human population, more people visiting beaches, a rise in the popularity of water-based fitness activities and recreational activities and people accessing previously isolated coastal areas (West, 2011). There is no evidence of increasing shark numbers that would influence the rise of attacks in Australian waters, and the risk of fatality still remains low. In contrast, on average 87 people drown at Australian beaches each year, yet there has only been an average of 1.1 fatalities per year from shark attack over the past two decades (West, 2011).

Of the 11 species of shark that have been implicated in fatal incidents with humans, three species are considered responsible for 86% of recorded human fatalities: the white shark *(C. carcharias),* tiger shark *(G. cuvier),* and bull shark *(Carcharhinus leucas)* (ISAF, 2011). The Carcharhinidae family (whaler species

group) have also been found to represent a threat to humans (West, 2011). All of these species, except bull shark, are found in New Zealand waters where they have also been implicated in incidents with humans. As highlighted, although infrequent, shark attacks attract a high level of public and media interest, which no doubt has an impact on people's views of sharks.

2.2.6 Summary on sharks

Sharks comprise a diverse group of cartilaginous fishes belonging to the Class Chondrichthyes. Sharks have evolved over 400 million years and are equipped with an impressive repertoire of senses that make they perfectly adapted to their marine environment.

Sharks play a critical role in the health of the marine ecosystem. The role of some species as apex predators exerts top-down effects on ecosystems, and their loss or decline may have important effects on populations, that cascade through ecosystems. This may also have effects on the industries and human communities that rely on the species. In New Zealand there are 112 species of sharks, rays, skates and chimaeras, of these 73 are sharks. The Bay of Plenty is home to several species, such as: school, rig, bronze whaler and blue sharks. These are primarily shelf or coastal species, which use the shallow coastal waters and estuaries for feeding and mating, often during spring and summer.

Sharks are in decline, mainly as a result of anthropogenic impacts such as fishing, habitat degradation, pollution, and potentially from climate change. Add to this a negative public image and it is no surprise sharks are in trouble. Sharks have been long feared by humans because of occasional incidents, labelled attacks. Although shark incidents occur relatively infrequently, they often attract a high level of public and media attention.

Love or hate them, most people seem to have an opinion about sharks. While some have a healthy respect for an important ocean predator, others fear them, often irrationally, as mindless man-eaters. These feelings, whichever an individual holds, are based on attitudes and values; these are examined in the next section.

2.3 Attitudes and Values

This section outlines the nature of attitudes, attitude structure and formation. It further outlines values and their development. It explores attitudes and values towards the natural world, and specifically towards sharks.

2.3.1 The Nature of Attitudes

Human beings react to their environment in an evaluative manner, this involves covert and overt actions based on judgements about whether objects, events, oneself and others are favourable or unfavourable, likeable or unlikeable, good or bad (Albarracin, Johnson, Kumkale & Zanna, 2005).

Attitude is defined by Eagly and Chaiken (1993) as "a psychological tendency that is expressed by evaluating a particular object or entity with some degree of favour or disfavour" (p. 1). Based on this definition, an object or entity can be virtually any 'thing' in a person's internal or external social environment. As such people hold attitudes, or evaluations, toward an endless variety of objects (Chaiken, 2001).

While attitudes differ from person to person, they are always held in relation to a specific object. They may also be either stable or unstable; stability has become a theoretical and empirical issue, with stability, or persistence, dependent on factors such as attitudinal structure and people's exposure to new direct or indirect experience with attitude objects (Eagly & Chaiken, 1993).

Attitudes have two basic components at the level of abstract evaluation: direction (positive vs. negative) and intensity – for example, a person may be extremely positive or only moderately positive toward an object or entity (Chaiken, 2001).
Before considering the structure and formation of attitudes, it is important to differentiate attitudes from other, seemingly related individual constructs. Habits, opinions, beliefs and values have often been confused with attitudes. Habits refer more to regularities in behaviour, are considered relatively automatic, and do not necessarily imply evaluation. Opinions and beliefs are interchangeable in

contemporary usage, however, beliefs do imply evaluation, which is the hallmark of attitude; they are best viewed as likelihoods, or subjective probabilities. Beliefs may contribute to the formation of attitudes and are best viewed as part of an attitude structure (Chaiken, 2001). The influence of beliefs on attitudes is explored in more detail when discussing attitude formation below.

Finally, attitudes and values are typically distinguished, however, strictly speaking values are 'just' attitudes in the sense that they convey people's evaluations of 'objects', for example, one might value freedom. Researchers use both terms because the objects toward which we hold values are broader than the objects toward which we hold attitudes (Chaiken, 2001). The relationship between attitudes and values is discussed in more detail in the section on values.

2.3.1.1 Attitude Structure

Although the term *attitude structure* is ubiquitous in the literature, precise definitions are not common. The concept of structure begins with an individual's conceptualisation of attitude. For an attitude to exist, it makes sense to view the attitude as a type of knowledge structure stored in memory or created at the time of judgement (Fabrigar, MacDonald & Wegener, 2005). Some attitude theorists propose that attitudes be thought of as object-evaluation associations. That is, an attitude can be viewed as a simple two-node semantic network, with one node representing the object and the other node the global evaluation of the object, and the link between the two nodes the strength of the association (Fazio, 1989, 1995, as cited in Fabrigar et al., 2005).

Although attitudes can be characterised as simple object-evaluation associations, attitudes may also be parts of larger sets of knowledge structures (Eagly & Chaiken, 1993). For example, an individual might associate specific attributes with the representation of the object and each of these attributes might in turn be associated with an evaluation (Fishbein & Ajzen, 1975). Similarly, a person may associate specific emotional responses with an object and each of these affective states might be associated with an evaluation (Zanna & Rempel, 1988). From this

perspective the structure of an attitude can be represented as an object-evaluation association and the knowledge structures linked to it (Fabrigar et al., 2005).

Eagly & Chaiken (1998) distinguished between two general types of attitude structure. *Intra-attitudinal structure* refers to the structure of a single attitude and *Inter-attitudinal structure* refers to structures involving more than one attitude. As previously mentioned, an overall attitude toward an object might be influenced by evaluations of many specific attributes of the object or emotions associated with the object. As such, technically many situations could be referred to as involving inter-attitudinal structure even when only one object is considered (Fabrigar et al., 2005). Relating to this research, it may be of interest to examine the structures that underpin people's attitudes towards sharks.

While it is valuable to explore the nature and structure of attitudes to gain an understanding of this concept, of particular interest to this research is how attitudes are formed.

2.3.1.2 Attitude Formation

How are attitudes, that is, our abstract evaluations of objects in our environment, formed? Traditional accounts of attitude formation emphasise that attitudes are learned (Vaughan & Hogg, 2005). Early definitions of attitudes emphasised that they were 'learned' predispositions to respond favourably or unfavourably toward objects in the environment (Allport, 1935, as cited in Vaughan & Hogg, 2005). Indeed the notion that many, if not most, attitudes are learned is claimed to be theoretically and empirically uncontroversial (Chaiken, 2001).

Cognitive learning theories have been prominent in explaining how attitudes are formed (and modified). Fishbein and Ajzen (1975) proposed that people's evaluations of objects are based on beliefs that they form about these objects, whether through direct or indirect experience. In this expectancy-value approach, attitudes are viewed as the sum of the evaluative implications of a person's beliefs about the attitude object. Beliefs may be acquired directly, through first-hand experience with attitude objects, and also indirectly, via socialisation agents such

as parents, teachers, peers and the mass media. By these various means we form beliefs about, and therefore attitudes toward, a vast array of socially significant (and insignificant) objects in our environment (Chaiken, 2001).

While Fishbein and Ajzen's approach focuses on beliefs, or cognitions, as the foundation of attitudes, other models of attitude formation have emphasised *affective* experience as the foundation. Traditional affective approaches include both operant and classical conditioning (Chaiken, 2001).

Many of the attitudes people hold are products of direct experience with attitude objects. People encounter an attitude object and have either a positive or negative experience, which at least partly, shapes their attitude towards the object. Several explanations of the effect of personal experiences on attitude formation have been offered: mere exposure, classical conditioning, operant conditioning, and social learning theory (Vaughan & Hogg, 2005).

Mere exposure effect proposes that exposure to an object (the number of times one had encountered it) affects our evaluation of that object (Zajonc, 1968, as cited in Vaughan & Hogg, 2005). Mere exposure has the most impact when we lack information about an issue. For example, mere exposure effect can explain why standing MPs often have an advantage over other candidates in an election, as their names are more familiar (Vaughan & Hogg, 2005).

Classical conditioning explains that through repeated association a formerly neutral stimulus can elicit a reaction that was previously elicited only by another stimulus. For example, children may be initially indifferent to politics, but later vote as young adults for a party after years of exposure to a parent who has been an enthusiastic supporter – a classically conditioned response has become the basis of a political attitude. Classical conditioning can be a particularly powerful form of attitude learning (Vaughan & Hogg, 2005).

Instrumental (operant) conditioning responses that yield positive outcomes or eliminate negative ones, lead to attitudes that are strengthened. Behaviours that are followed by positive consequences are reinforced and are more likely to be repeated than behaviours that are followed by negative consequences. For

example, a child playing quietly and cooperatively is a social behaviour that can win praise, whereas fighting might lead to withholding of a reinforcer or even to the introduction of punishment (Vaughan & Hogg, 2005).

Other social psychologists view attitude formation as a social learning process, one that does not depend on direct reinforcers. Bandura (1973), as cited in Vaughan and Hogg (2005), studied social learning, in particular the process of modelling, where one person's behaviour is modelled on another's. Modelling is learning by observation: individuals learn new responses by observing the outcomes of others' responses (Vaughan and Hogg, 2005).

Important sources of people's attitudes are the actions of other people around them. For a child, parents are a powerful influence and many kinds of the learning mentioned previously (classical and instrumental conditioning, and observational learning) are involved. Further, the media are also major influences on the learning of attitudes (Vaughan and Hogg, 2005).

To summarise, attitudes are formed in an experiential way based on direct or indirect cognitive, affective or behavioural responding to an attitude object. This responding is represented in memory as attitude object-response associations. As evaluative meaning is abstracted from these associations, an attitude is formed as a generalisation from more elementary associations. In contrast to this intra-attitudinal mode of attitude formation, people may also form attitudes by creating linkages between an attitude object and other attitude objects. Such associations are represented in memory along with the target attitude itself. Often this inter-attitudinal mode of attitude formation involves an inference by which a new attitude (e.g. towards recycling) is deduced from a more abstract or general attitude that has already been formed (e.g. the value of 'a world of beauty').

2.3.2 The Nature of Values

As previously mentioned, values can be thought of as 'just' attitudes in the sense that they convey people's evaluations of 'objects'. The objects toward which we hold values are broader than the objects toward which we hold attitudes (Chaiken, 2001). As such, in relation to this research it is important to explore the concept of values as they relate to attitudes and vice versa.

In social psychology there was an early emphasis on the concept of values by Allport and Vernon (1931). They measured the relative importance to a person of six broad classes of value orientation, including: theoretical, economic, aesthetic, social, political and religious (cited in Vaughan & Hogg, 2005).

Later, Rokeach (1973) suggested that values should be conceived less in terms of interests or activities and more as preferred end-states. He differentiated between terminal (end state) values (e.g. equality and freedom) and instrumental (mode of conduct) values (e.g. honesty and ambition).

Based on his definition that "a *value* is an enduring belief that a specific mode of conduct or end-state of existence is personally or socially preferable to an opposite or converse mode of conduct or end-state existence" (Rokeach, 1973, p.5.), instrumental values refer to a behaviour that is desirable while terminal values represent goals in life. As such, both kinds of values are seen as a foundation around which attitudes can be arranged.

Rokeach did not go so far as to explain the relationship between his categories of terminal and instrumental values, although he assumed they represented two separate, but functionally interconnected systems (Rokeach, 1973). As such, his concept of values is purely descriptive as he did not create his own theory about the development of values, only to say "a value system is a learned organisation of principles and rules to help one choose between alternatives, resolve conflicts, and make decisions" (Rokeach, 1973, p.14).

Schwartz and Bilsky (1987) presented a definition of values that encompasses much of the work that came before them: "According to the literature, values are

(a) concepts or beliefs, (b) about desirable end states or behaviours, (c) that transcend specific situations, (d) guide selection or evaluation of behaviour and events, and (e) are ordered by relative importance" (p. 551). Schwartz and Bilsky went on to develop The Schwartz Value Survey, which has become the most commonly used measure of values. The survey contains 56 items that participants rate along a 9-point scale, indicating how important each stated value is as a guiding principle in their life.

Vaughan and Hogg (2005) define values as "a higher-order concept, which can play a guiding and organising role in relation to attitudes" (p. 127). Research dealing with values as a higher-order concept suggests that they can have strong links with more specific attitudes, and can help to predict people's attitudes (Feather, 1991).

Feather's later (1994) research found that values have the following properties: a) they are general beliefs about desirable behaviour and goals, b) they involve goodness and badness and have an 'oughtness' quality about them, c) they both transcend attitudes and influence the form these attitudes take, d) they provide standards for evaluating actions, justifying opinions and conduct, planning behaviour, deciding between different alternatives, engaging in social influence and presenting self to others, e) they are organised into hierarchies for any given person and their relative importance may alter across the life span, f) value systems vary across individuals, groups and cultures.

In is important to note that values do differ from attitudes in that *attitudes* are positive or negative evaluations of something quite specific (Dietz, Fitzgerald & Shwom, 2005). For example, one may value the marine environment, and as such oppose a proposal for oil exploration in a marine protected area. The former is more general and would be considered a value; the latter is more specific and considered an attitude.

The values of an individual or a collective are not sharply separated and independent units. Rather they are bound together, are interdependent, and form a system. When a new value is acquired or an old one is lost, when a value is weakening or strengthening, the whole system will be affected (Rezsohazy, 2001).

Values not only contain cognitive elements; they also involve strong affective components too. The more a value is deeply rooted, the more it takes a central place in the system and the more it is lived intensely, arouses emotions and mobilises vehement energies (Rezsohazy, 2001).

It seems clear that values influence attitudes and vice versa, and that they are complex systems influenced by our social environments. So how then are values developed, and by whom?

2.3.2.1 Value development

Rezsohazy (2001) explains that values are shaped and built in, receive their meaning, and are structured primarily by the process of socialisation, whose main agents are the family, the school, the peer-group and the media.

Typically speaking individuals live their lives with the values that are accessible to them. For example, people born of the same generation and having been socialised similarly are likely to share similar values (Rezsohazy, 2001).
Socialisation perspectives emphasise the unidirectional transmission of values from an older generation to a younger generation (Kuczynski, 2001). These perspectives focus on the parental role in socialisation, and in transmitting values to children. Bilateral and co-constructionist perspectives propose values are actively constructed, or interpreted, by the child from the parental and cultural environment rather than transmitted passively unchanged from one generation to the other (Kuczynski, 2001).

Social approval or disapproval reinforces values. Opinions and behaviour are socially controlled, and conformity with the predominant values is rewarded, while defiance is not (Rezsohazy, 2001). As such the direct social company of a person and their wider social orientation is seen as the strongest influence on values (Oyserman, 2001).

Rezsohazy (2001) further explains that values are not impersonal, everlasting principles existing since the beginning of time. Instead, historically situated

figures or institutions shape them. These figures are known as ‘value producers’ and ‘sense makers’. They are mostly moral personalities, prophets, philosophers, scientists, artists, and institutions such as churches, clubs, and universities. Their task consists of answering society’s existential questions, in elaborating systems of thought, in proposing new horizons. They provide society with ideas, objectives, ethical principles and critical judgements. The expansion of values is assumed by ‘value transmitters’, ‘opinion leaders’, ‘teachers’ and takes the usual channels of cultural communication such as newspapers, radio, television and other media, books, music, and schooling.

Furthermore, a value system is a ‘living concern’, which is regularly challenged by an evolving social environment. It responds by a slow, adaptive change, its main features persisting, but it can sometimes undergo more dramatic change. Change can mean several things, for example, some values are being upgraded or downgraded; some enter the value system, others exit, some gain intensity, others weaken (Rezsohazy, 2001).

A large range of causal factors can induce value changes, for example, from ecological alterations (such as pollution or overfishing). Technology can play an important role as television (and online media) has diminished or replaced other leisure activities. As such, a durable conditioning by either advertisement or propaganda may provoke value shifts. In all cases external pressure or influence initiate the process of value change (Rezsohazy, 2001).

Value and attitude development are important concepts relating to this research, as understanding how people have developed their attitudes and values towards sharks is of primary interest. Relating to this an understanding of environmental attitudes and values, and their development, is also required, and is discussed in the next section.

2.3.3 Attitudes and Values toward the natural world

An individual's primary interaction with the natural world is, as with other aspects of experience, through their senses. We form feelings and impressions that both shape and are shaped by basic cognitive structures and values. At deeper levels of processing, we form more explicit beliefs and attitudes. These cognitions, perceptions and attitudes affect our own wellbeing and that of the environment (Fischhoff, 2001).

As previously discussed, attitude is defined as a psychological tendency that is expressed by evaluating a particular object or entity with some degree of favour or disfavour (Eagly and Chaiken, 1993). In this context the object is the natural world. It is also important to remember that beliefs contribute to the formation of attitudes and are best viewed as part of an attitude structure (Chaiken, 2001).

An environmental belief system is an individual and cultural product; the environmental history of your country, your childhood, and adult experiences with the natural world, the beliefs of your parents and significant others. All these elements develop our environmental beliefs and as such our attitudes towards the environment (Corbett, 2006).

Belief systems concerning the natural world can be thought of as environmental ideologies, that is, ways of thinking about the natural world that a person uses to justify their actions toward it (Corbett, 2006). Environmental ideologies can be viewed along a spectrum with "anthropocentric" at one end and "ecocentric" at the other. All people could be seen to fall somewhere along this spectrum (Corbett, 2006).

For example, anthropocentric is known as "human-centered", and at this end of the spectrum humans view themselves as being superior to, and dominating, the rest of life. The natural world is ranked hierarchically with humans at the top, and natural resources exist only to serve human welfare. In this view, humans consider themselves separate from nature, if not alienated from it and fearful of it (Corbett, 2006). At the other end of the spectrum, ecocentric (or biocentric) is viewed as a non-hierarchical mix of interdependent relationships, or a web of life.

According to ecocentrism, no single species (for example, humans) rules, and humans are an interdependent, integral part of the biological world, but no more or less important than other parts of it. All living and non-living elements of nature – animals, fish, birds, insects, water, air, soil, tress and so on are intrinsically valuable and important (Corbett, 2006).

Along this spectrum *unrestrained instrumentalism* refers to the notion that the natural world and all its resources exist solely for human use, use that need not be restrained or limited in any way. *Conservationism* is thought of as 'wise use' and the 'greatest use (of natural resources) for the greatest number of people'. *Preservationism* refers to conserving resources for humans to use and enjoy for reasons other than their instrumental value, and can include scientific, ecological, aesthetic and religious value. *Ethics and values driven ideologies* are defined by nonhuman entities having 'intrinsic' value (value in and of its-self). Here humans have moral and ethical duties to (some) nonhuman entities, which have a 'right' to exist. These environmental ideologies are influenced by our beliefs and as such our attitudes towards the natural world (Corbett, 2006).

Environmental attitude has been defined as a psychological tendency expressed by evaluating the natural environment with some degree of favour or disfavour (Milfont, 2009).

Typically a three-component attitude model has been used by researchers to specify the structure of environmental attitudes. Therefore, environmental attitudes have cognitive, affective and behavioural components (Milfont & Duckitt, 2010). Following the most contemporary approach to attitude structure (Albarracin, Johnson & Zanna, 2005), environmental attitude is based on evaluative tendencies that can both be inferred from, and have an influence on, beliefs, affects, and behaviours regarding human-environmental relations (Milfont & Duckitt, 2010).

A large amount of psychological research on environmental attitudes has focussed on values, which are viewed as the underlying determinants of more specific attitudes, behaviours and beliefs (Olson & Zanna, 1993). There are several traditions of values research particularly applied to environmental issues, and

many studies have used Schwartz's model of human values. As previously discussed, Schwartz (1987) developed a broad model for classifying the dimensions of values, with 56 value items representing 10 universal value types. Since then cross-cultural research has revealed that the 10 value types can be reduced to 4 value categories: openness to change, conservatism, self-transcendence and self-enhancement. Openness to change is described by values of self-direction, stimulation and hedonism. Conservatism is defined by values of tradition, conformity and security. Self-transcendence is characterised by values of universalism and benevolence. Finally, self-enhancement is defined by values of power and achievement (Schultz, Gouveia, Cameron, Tankha, Schmuck, & Franek, 2005).

Stern and Dietz (1994) and Stern, Dietz and Kalof (1993) suggest that there is at least three value bases for environmental concern: self-interest, humanistic altruism, and biospheric altruism. The self-interest basis of environmental concern comes from caring about the environment because it influences us, and our loved ones. Secondly, we care about the environment because of an altruism directed towards humans; this is altruism in the sense that our concern is broadened from self and family to the wider community, even humanity. The final basis for care is altruism toward other species, or the state of the ecosystems themselves, beyond the benefits to humans; this is known as *biospheric altruism*. The first two approaches are anthropocentric and assign only instrumental values to other species or the environment, while biospheric altruism is an extension of concern beyond humans. It acknowledges intrinsic value, whereas self-interest and humanistic altruism do not.

Most discussions of values suggest that they influence our thinking about, and behaviour toward the environment by indicating which preferences are given priority. Values help us decide how to think about a choice and what to do. However, values are complex and do not act alone, but in tandem with other factors in shaping decisions (Dietz et al., 2005).

The *values-beliefs-norms* theory of environmental concern and behaviour emphasises the indirect links between values and decisions about the environment. The theory suggests that values influence our worldview (general beliefs) about

the environment, which in turn influences our beliefs about the consequences of environmental change on the things we value, which in turn influence our perception of our ability to reduce threats to the things we value. This in turn influences our norms (our 'ought to' statements) about taking action. It is important to note that action can take more than one form, for example: political activism, and non-activist behaviours such as voting and making consumer choices (Dietz et al., 2005).

The *values-beliefs-norms* theory assumes that in some sense self-interest, humanistic altruism and biospheric altruism are the most fundamental determinants of environment concern. They are fundamental in that they are viewed as the most stable determinants of environmentalism across the life course, and that they are hypothesised as influences on worldviews and specific beliefs (Dietz, et al, 2005).

With regard to this research, the theory of *value-bases* for environmental concern and the theory of *values-norms-beliefs* are both relevant and viewed as interconnected. Both theories provide a foundation for possibly understanding people's attitudes towards sharks through this research. It is acknowledged that there must be some value base, such as self-interest, humanistic altruism or biospheric altruism, to develop environmental concern leading to more specific beliefs, attitudes and behaviours towards the natural environment, and in particular sharks. Furthermore, this research used Kellert's (1983) attitude categories, or orientations towards animals, discussed in the next section, to interpret people's attitudes towards sharks.

It seems clear that our attitudes and beliefs towards the natural world are strongly influenced by our values, which are, as Rezsohazy (2001) explained, shaped, built in, and structured primarily by the process of socialisation whose main agents are the family, the school, the peer-group and the media. As such the values we hold will likely influence our attitudes and beliefs towards a specific species, in this case, sharks. Therefore socialisation agents such as the school and media must have an influence on the development of these values and attitudes. The next section explores how attitudes and values are developed towards wildlife, and specifically sharks.

2.3.4 Attitudes towards Sharks

Historically, sharks have been much maligned and feared by humans. They have suffered from a negative 'public image' which has worked to reduce their populations, rather than conserve them. But why is this? To understand our relationship with sharks, we must first understand our relationship with animals in general.

Although we might like to understand animals at a deeper level, we can only understand them in terms of our own experiences, languages, emotions, interpreted within our social, historical, and cultural contexts (Corbett, 2006). For many people their experience with sharks is limited to what they are exposed to via the media and other socialisation agents, such as educators.

According to Kellert (1983), animals represent a metaphorical device for people to express basic perceptions and feelings about the nonhuman world. He explains that as the most sentient and evident characteristic of the natural world, animals often function as a symbolic barometer of people's fundamental beliefs and valuations of nature. Animals are important to us, but why?

Corbett (2006) explains that it may be as simple as our need for "the other", the need for some creature that is counter to human culture, something beyond the domain of our own activities, things and lives. Perhaps we need a sense of wonder or admiration that our own culture cannot provide?

There are some animals, however, that have historically not evoked our admiration. For example wolves (*Canis lupus)*, which have suffered poor treatment at the hands of humans, much based on the notion that they harm humans (Corbett, 2006). The same could be said for sharks. In most cases, it may simply be the idea of a predator that is terrifying, an idea not warranted by the observed habits of the animals. For example, research of wild North American wolves strongly suggests that they simply do not attack humans, even when provoked (Klinghammer, 1989, as cited in Corbett, 2006).

The way people feel about animals is a subjective evaluation, one that often bears little relation to actual contact or experience (Corbett, 2006). We like dolphins, but dislike sharks, though we've never "met" them. These feelings are important though, as Kellert (1983) explains, the future of many animals will depend on people's subjective feelings towards particular species.

In his 1983 research, Kellert identified the most common ways we feel about animals, and how they differ by demographics. Table 2.1 presents the attitude categories he developed in order of prevalence in his work. Kellert reported that the most prevalent attitude orientations towards animals were the first four: humanistic, neutralistic/negativistic, moralistic and utilitarian.

Table 2.1: Attitude orientations towards animals. Adapted from Kellert (1983).

1. Humanistic	Interest and strong affection for individual animals, especially pets.
2. Neutralistic/ Negativistic	Passive avoidance of animals due to indifference, or active avoidance due to dislike or fear.
3. Moralistic	Concern for right/wrong treatment, oppose cruelty and exploitation.
4. Utilitarian	Practical and material value of animals or animal's habitat.
5. Naturalistic	Interest and affection for wildlife and nature
6. Ecologistic	Concern for environmental systems, interrelationships between wildlife and nature.
7. Dominionistic	Interest in mastery, control of wildlife.
8. Scientistic	Interest in physical attributes and biological functioning of animals.

In this research, Kellert (1983) found there was a relative disinterest and lack of affection for animals among the least educated. Furthermore, he found those who rated in the naturalistic, ecologistic and moralistic attitude orientations had a college education or beyond, and were under 35 years old. Those identifying with the humanistic attitude were under 25 years old and included more females (Kellert, 1983). These are interesting points to note with regard to this research

and the role of age, gender and education in creating awareness of specific species, such as sharks.

In his later research, Kellert (1989) found that the most favoured wild animal amongst Americans was the elephant. The least favoured were insects such as cockroaches and mosquito's. Interestingly, sharks were rated a mean score (based on a 7 point scale, with 1=most liked and 7=least liked) of 4.82 compared with the cockroaches' 6.45.

A variety of factors that may influence public preference for certain species has been discovered, some of which relate to an animal's perceived physical similarity with humans. Some of the factors for liking or disliking animals include: size (larger animals are preferred), aesthetics (considered attractive), intelligence (capacity to reason and for feeling, emotion), danger or competition to humans (dislike), mode of locomotion (prefer one similar to humans), predatory tendencies and evolutionary closeness to humans (Kellert, 1983). According to these factors, sharks would not fare well.

Historically, sharks have been perceived as dangerous and have had a reputation as being 'monsters' due to their fierce appearance (Pollard et al., 1996), evoking strongly negative, utilitarian and moralistic public attitudes (Thompson & Mintzes, 2002). These negative attitudes towards so-called 'dangerous' wildlife have been shown to affect the status of species populations, and the effectiveness of conservation programmes (Newhouse, 1990). Historically, this has certainly been the case for sharks.

Interestingly, the film *Jaws* was released in 1975, the impact of which was unprecedented as 'shark attack' hysteria gripped the film-going world. In the wake of the film, a shark killing frenzy, motivated by irrational fear, was ultimately responsible for decimating great white shark populations in the USA, Australia and South Africa (Peschak & Scholl, 2006). More recently, in 2010 and 2011, shark bite incidents led to shark hunts (or long-line culling) in Egypt, Russia, the Seychelles, and Mexico (Eliperin, 2011 as cited in Neff & Yang, 2013). In Western Australia shark hunts began in 2011 and 2012 following a fatal shark incident (Neff & Yang, 2013).

Much of this fear comes from an erroneous notion that sharks prey on humans, however, as previously mentioned, shark incidents with humans are rare. As previously discussed the number of unprovoked incidents between sharks and humans worldwide is relatively low and is caused by just a handful of species (Burgess, 2013). For example, in New Zealand there have been a total of 49 reported incidents between sharks and humans since records began in 1852, of these 9 were fatal (Burgess, 2013).

Only 11 species of shark have been implicated in fatal attacks on humans, three of which, the great white shark, tiger shark, and bull shark, are considered responsible for the majority (International Shark Attack File, 2011). All of these species, except the bull shark, are found in New Zealand waters, none of these species are known to be found in the Bay of Plenty.

Despite the rarity of incidents between sharks and humans, public engagement and support for their conservation is limited. The image of sharks as fearsome predators, representation in movies such as *Jaws*, and sensationalist media reports of shark incidents may contribute to frame sharks negatively in the public image. Furthermore, the physical and behavioural characteristics of some sharks, and their predatory behaviour may influence attitudes towards them (Friedrich, Jefferson & Glegg, 2014).

In recent research of public perceptions about New Zealand's environment, the importance and symbolism of different animal species was explored. In this research sharks were not mentioned, however, the importance and symbolism of Hector's and Maui's dolphins was ranked as being very important to New Zealanders (Hughey, Kerr & Cullen, 2013).

Unlike dolphins, sharks are not usually thought of in terms of their importance or symbolism. Indeed the symbolism usually associated with sharks is one of razor sharp teeth and blood stained water. This negative public image is one product of popular culture driven by the mass media, which tends to reinforce stereotypes and potentially damaging public misunderstandings (Thompson & Mintzes, 2002). News and entertainment media are widely credited for perpetuating negative portrayals of sharks and for amplifying public fear through stories and

documentaries with sensationalist headlines and imagery (Philpott, 2002 & Peschak, 2006, cited in Muter, Gore, Gledhill, Lamont & Huveneers, 2012).

In their research Muter et al., (2012) investigated the portrayal of sharks in 20 major Australian and American newspapers covering a 10-year period. Shark attacks were the emphasis in over half of the articles (52%). Stories relating to conservation were emphasised far less (11%). They further found that local shark events received international coverage, for example, shark incidents in South Africa made headlines in Australia and America. While no similar research is available in New Zealand, anecdotally these themes are echoed.

Despite finding that the majority of articles highlighted risks from sharks, Muter et al., (2012) identified small changes in shark related coverage over time. They found a small, but significant, decrease in articles that discussed negative effects and an increase in articles that discussed positive effects of sharks. Further, Whatmough, Van Putten and Chin (2011) found that by 1984 the dominant values and perceptions being reported by divers had changed from 'fear and danger' to that of 'excitement', 'wonderment and respect' and the idea that sharks were 'harmless creatures'.

As early as 1996, Pollard et al., (1996) described how attitudes towards the grey nurse shark had changed over time. In the 1960's spearfishers contributed to the shark's decline, but by 1984 they were contributing to its protection. More recently, a survey of spearfishers found that most placed a high value on seeing sharks, and expressed concern about the status of shark populations. Positive attitudes towards sharks have also been identified for other user groups such as recreational fishers (Lynch, Sutton & Simpfendorfer, 2010). The common theme among these changes in attitude is that they all involve positive direct experience with sharks in the natural environment.

This sea change in attitudes toward sharks has also been echoed in New Zealand. Last year, sharks made the headlines, this time with a call for their protection and a review of the National Plan of Action for sharks. The 2013 review received 45,000 public submissions, with a strong call to ban shark finning and protect shark species. The Minister for Conservation, Dr Smith, explained "The

submissions show that New Zealanders have matured in their attitude to the oceans a great deal from the 'Jaws' days when the only good shark was a dead shark" (Davison, 2014).

Shark finning has now been banned in New Zealand and comes into effect between 2014 and 2016. Dr Smith further explained "Sharks may not be as cute and cuddly as our kiwi and our kakapo but we have 112 species of shark in our waters, a significant number of them are endangered and this additional protection will ensure their survival" (Davison, 2014). Seven species of shark are already completely protected under the Wildlife Act in New Zealand, they are: the great white, basking shark, deep water nurse shark, spine-tailed devil ray, manta ray, whale shark, and oceanic whitetip shark (Davison, 2014).

The reasons for this change in perception are poorly understood, but are likely contributed to by a better understanding of sharks and the oceans. This is largely due to the work of scientists who have provided evidence of the sophisticated nature of sharks; their importance to ecosystems and the effect humans have had on many populations. For some, this change in perceptions has led to shift in value from direct consumptive values, towards indirect values of existence of the species (Simpfendorfer et al., 2011).

Research on public perceptions of marine wildlife has found that individuals with high levels of knowledge and positive attitudes towards animals such as sharks are more likely to support their conservation (Thompson & Mintzes, 2002). Furthermore, attitudes regarding the marine environment and wildlife have been found to be shaped by several factors, including an individual's interest, values and preconceptions, the physical and behavioural characteristics of an animal, formal education exposure, as well as socioeconomic and demographic variables (Kellert, 1996; Thompson & Mintzes, 2002). Personal experience has also been found to have an important influence on environmental attitudes, and motivation for personal engagement and conservation behaviour (Miller, 2005; Bogeholz, 2006), this is discussed more in the following section.

Although there are many variables that affect attitudes towards the natural environment, and wildlife, the most powerful force in shaping perceptions of

nature and biodiversity is education (Kellert, 1996). The next section explores the area of environmental education and its effect on shaping attitudes.

2.3.5 Summary on attitudes and values

This section explored the nature of attitudes, values and how these are developed in relation to animals, specifically sharks.

Attitude is described as a psychological tendency expressed by evaluating an object or entity with some degree of favour or disfavour. Attitudes are formed in an experiential way based on direct or indirect cognitive, affective or behavioural responding to an attitude object.

Values are described as 'just' attitudes in the sense that they convey people's evaluations of 'objects'. The objects towards which we hold values are broader than the objects towards which we hold attitudes. Values are shaped, built in, receive their meaning, and are structured primarily by the process of socialisation, whose main agents are the family, the school, the peer group and the media.

It is suggested there are three value bases for environmental concern: self-interest, humanistic altruism, and biospheric altruism. The *values-beliefs-norms* theory of environmental concern and behaviour emphasises the indirect links between values and decisions about the environment. With regard to this research it is believed that both theories are interconnected and may help to understand people's values and attitudes towards sharks as identified through this research.

When it comes to animals the way people feel is a subjective evaluation, one that often bears little relation to actual contact or experience. Research suggests the most prevalent attitude orientations towards animals are: humanistic, neutralistic/negativistic, moralistic and utilitarian. Differences in feelings vary dependent on age, gender, income and ethnicity. These attitude orientations were used to help determine people's attitude orientations towards sharks in this research.

Attitudes regarding the marine environment and wildlife are shaped by several factors, including an individual's interest, values and preconceptions, the physical and behavioural characteristics of an animal, formal education exposure, as well as socioeconomic and demographic variables. Personal experience is also another important influence on environmental attitudes and motivation for personal engagement and conservation behaviour.

While there are many variables that affect attitudes towards the natural environment, and wildlife, it is believed the most powerful force in shaping perceptions of nature and biodiversity is education. Environmental education as a tool to develop attitudes towards sharks is explored in the next section.

2.4 Environmental Education

This section discusses environmental education, which is seen as a tool for creating awareness of and developing attitudes towards sharks. It covers environmental education's history, goals and key dimensions. It focuses on environmental education in New Zealand schools, and in community adult education. It highlights the affective nature of environmental education and touches on nature experience as a tool for developing the affective and cognitive realms.

2.4.1 Goals of Environmental Education

The first internationally accepted definition of environmental education was proposed in 1970 by the International Union for the Conservation of Nature (IUCN). It stated:

> Environmental education is a process of recognising values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness of man, his culture and his biophysical surroundings. Environmental education also involves practice in decision-making and self-formulation of a code of behaviour about issues concerning environmental quality (IUCN, 1970, cited by Fien, 1993).

Following a number international environmental education summits in the late 1970's, the primary purpose of environmental education was defined as being:

> To help students develop values, lifestyle choices, and skills for social participation which support the protection and improvement of the environment (Fien, 1993).

One of the goals of environmental education to emerge during this time was:

(b) To provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment (UNESCO, 1978).

In New Zealand, environmental education has been described as a multi-disciplinary approach to learning that develops the knowledge, awareness, attitudes, values and skills that will enable individuals and the community to contribute towards maintaining and improving the quality of the environment (Ministry for the Environment, 2014).

It seems clear that one of the primary goals of environmental education is to provide students (of all ages) with opportunities to acquire knowledge, values, and attitudes toward the environment, and further to develop commitment and skills in order to protect and improve the environment. As such, it is seen as a powerful tool for helping to develop knowledge, values and attitudes towards sharks for their improved protection and conservation.

The development of environmental education policy in New Zealand was influenced by the aforementioned international summits and other declarations of the environment, including the 1992 Earth Summit and the International Convention of Global Diversity (Ministry of Education, 1999). It has further been influenced by changes to New Zealand's environmental policies, such as the Resource Management Act (2000) and obligations under the Treaty of Waitangi (Eames & Cowie, 2004).

2.4.2 Environmental Education in New Zealand schools

Despite these strong influences, environmental education does not hold a formal place in the New Zealand curriculum (Ministry of Education, 2007). However, the curriculum framework does state 'ecological sustainability', which includes care for the environment, as a value to be encouraged, modelled and explored. It further states a 'future focus' on sustainability as being an important curriculum principle.

The Ministry of Education has provided direction for schools with its *Guidelines for Environmental Education in New Zealand Schools* (Ministry of Education, 1999). The guidelines recognise a place for environmental education within the curriculum framework and highlight the importance of environmental education, along with legislation, sustainable management, and responsible actions by individuals and communities, as being an important component for protecting and managing the environment.

The Ministry of Education (1999) states that a balanced environmental education programme should involve the integration of three *key dimensions*, that is: education *in* the environment, education *about* the environment and education *for* the environment.

This integrated approach has historical roots, beginning with Lucas (1979), who described education *about* the environment as being aimed at producing a knowledgeable individual, and education *for* the environment as being intended to enhance or maintain the environment. By contrast he described education *in* the environment as a teaching technique rather than a goal (Lucas, 1979, as cited by Barker & Rogers, 2004).

Later, Tilbury (1995) highlighted this three-fold approach as the basis of environmental education for sustainability. She stated that education *about* the environment is concerned with developing awareness, knowledge and understanding about human-environment interactions. Education *in* the environment favours student-centred and activity-based learning, usually in an outdoor setting. It is concerned with the 'heart' and has a strong experiential orientation, developing environmental awareness and concern by encouraging personal growth through contact with nature. Finally, Tilbury (1995) stated education *for* the environment focuses on environmental improvement as an actual goal. It aims to develop a sense of responsibility and active participation in the resolution of environmental problems. It is this three-fold approach that is seen as a possible vehicle for developing attitudes towards sharks for their improved protection.

Echoing these sentiments, the Ministry for Education (1999) describes education *in, about* and *for* the environment as the key dimensions of environmental education in New Zealand. They are defined as:

- Education *in* the environment relates to experiences beyond the classroom in both natural and built environments that not only provide opportunities for students to gain first-hand experience in the environment but also enhance classroom based work.

- Education *about* the environment focuses on knowing about and understanding the natural and built environments and appreciating the key social, political, ecological and economic factors that influence decision making on local, national and global issues.

- Education *for* the environment is intrinsically linked to the 'affective' aspects of environmental education as it deals with people's emotions and their willingness to make choices that help maintain and improve the quality of the environment. Education *for* the environment is based on students' knowledge and understanding *about* the environment and their practical experiences *in* the environment. All three aspects are interdependent.

Education *for* the environment is known as the action component of environmental education, providing students with opportunities to make decisions and work towards the resolution of environmental issues (Jensen & Schnack, 1997). It is considered by many to be the only true environmental education because of its emphasis on action (McLean, 2003).

The successful implementation of education *for* the environment results in improving the environment and in changing behaviours, attitudes and values (McLean, 2003). As this research focuses on people's attitudes and values towards sharks, it is worth exploring education *for* the environment as a possible tool for developing these attitudes and values in the future.

2.4.3 Adult and Community Environmental Education

Adult and community education was an important focus of early international conferences aimed at promoting environmental education. The Tbilisi Declaration (UNESCO, 1978, as cited in Bolstad 2003) framed some important ideas about environmental education. For example, it maintained that environmental education should be provided for people of *all* ages, at *all* levels, and in both *formal* and *non-formal* education. It presented a vision of environmental education as a lifelong, holistic, interdisciplinary form of education.

Community environmental education is underpinned by an environmental education framework aimed at educating communities and empowering them with the skills, values, knowledge and awareness to critically assess and take action over local environmental issues (Maser & Kirk, 1996, as cited in Blair, 2008).
There are a number of principles and practices, which provide a framework for developing, implementing and facilitating community environmental education programmes. They include environmental adult education, public participation and environmental communication (Blair, 2008).

Environmental adult education promotes a holistic view of the environment and is aimed at educating adults within an ecological framework (Clover, Jayme, Hall & Follen, 2013). Collaboration in the initial development process and the development of a community environmental education framework enables the wider community to be involved in carrying out what has been learnt through policy changes and communication and education strategies (Maser & Kirk, 1996, as cited in Blair, 2008).

Communication strategies form an important part of the process by helping to increase public awareness and knowledge of local environmental issues, helping to foster effective public participation and promoting environmental action (Maser & Kirk, 1996, as cited in Blair, 2008). Environmental communication is critical to any community environmental education programme as it can provide people with the skills, knowledge, awareness and attitudes to effectively bring about sustainable community development (Blair, 2008).

This type of community environmental education is demonstrated in New Zealand through a variety of initiatives. One such initiative is the Coast Care Bay of Plenty Programme, which was established in response to public and local government concern about coastal dune erosion (Jenks & O'Neil, 2004, cited in Blair, 2008).

There are now 25 community groups of Coast Care volunteers throughout the Bay of Plenty. These are made up of community members who care about their coastal environment and want to be involved in protecting and managing that environment. The groups advise Council which work they regard as priority and get together to plant and protect the dunes at their beach (Bay of Plenty Regional Council, 2015). The council appointed Coast Care Coordinator and Coast Care contractors offer advice on reducing and repairing dune damage, help facilitate activities, and supply the volunteers with free resources (Bay of Plenty Regional Council, 2015). These coordinators consult with volunteers on restoration ideas and plans, and implement the programme using a variety of participatory approaches to teaching and learning reflective of the principles and practices of environmental adult education (Blair, 2008).

Community environmental education is powerful, in part because it is adults who are the dominant decision-makers and it is their decisions and actions that affect the environment on a daily basis (Clover, 1996, as cited in Blair 2008). As the Coast Care programme has shown, educating communities within an ecological framework can generate active environmental citizenry (Blair, 2008). It is possible this sort of community environmental education could help create greater awareness of, and develop attitudes towards, the marine environment in general, and more specifically, sharks.

Another possibility for community, and indeed student, environmental education is one facilitated through visits to zoos and aquariums. According to the World Association of Zoos and Aquariums (2005), these institutions should embrace Environmental Education and Nature Conservation values, already deeply rooted in their background philosophies and missions, whilst offering visitors unique educational experiences and contexts (cited in Correia das Neves & Rocha Monteiro, 2014). This strategy allows visitors close contact with species, like sharks, and access to information available for immediate interpretation or

complementing formal education. As such, zoos and aquariums are well placed to contribute to an increase in social conservation awareness, that is, the possible overall increase in social knowledge with nature and its conservation (Packer & Ballantyne, 2010).

Environmental education, whether delivered through a whole school approach, by integration into the school curriculum, through adult community education, or through visits to zoos and aquaria can be used as a powerful tool to create awareness of, and help develop attitudes towards, specific species such as sharks.

2.4.4 Attitudes, Values and Environmental Education

Environmental education can help learners achieve environmental literacy, which has both attitude and behaviour components, in addition to a knowledge component (NAAEE, 1999).

It has been said that environmental education is an affective and values-rich learning area. Indeed, one of the Ministry of Education's aims of environmental education as expressed in the *Guidelines* is for students to develop *attitudes and values* that reflect feelings of concern for the environment (Ministry of Education, 1999). Implicit in that is the idea that students will develop the capacity to critically analyse situations to make decisions by applying their own values and beliefs in conjunction with their knowledge (Noble, 2009).

Environmental education is not limited to teaching *about* values, but also extends to the teaching *of* values required for sustainable living (Tilbury, 1995). In the past teaching values in education has been based on the assumption that adequate knowledge and concern create appropriate values. But, research into the links between environmental knowledge and values indicates this may not always be the case (Tilbury, 1995).

Tilbury (1995) further explains that our values determine our decisions and actions and are therefore of great consequence to environmental education. As such, environmental education (for sustainability) recognises that the decision to

participate in environmental improvement is not necessarily stimulated by the cognitive realm, but is dependent on personal motivation and a sense of responsibility which results from the development of a personal environmental ethic (Tilbury, 1995). Central to the success of environmental education (for sustainability) is the promotion of an environmental ethic that has sustainable living at its core (UNESCO, 1992 as cited in Tilbury, 1995). This environmental ethic consists of developing values of social responsibility, concern for others and harmony with nature. It highlights the importance of valuing the interrelated-ness of the web of life and promotes the principle value of concern for all life forms (Tilbury, 1995). It also promotes socially desirable values and requires individuals to commit to working with and for others in the interests of equality, equity and sustainability.

However, knowledge, values and attitudes alone do not help or harm the environment, but human behaviours do. Behaviours are, of course, supported by knowledge and attitudes, but there is not a direct cause and effect progression from knowledge to attitude to behaviour (Day, 1999). Indeed, what shapes pro-environmental behaviour is complex and there are many factors that influence, positively or negatively, on pro-environmental behaviour. For example, demographic factors, and external factors such as, economic, social and cultural influences, and internal factors such as, motivation, awareness, values, attitudes, emotion, and locus of control (Kolmuss and Agyeman, 2002).

As such, environmental education attempts to teach students “how to think”, and not “what to think”. Rather than directing learners in a specific course of behaviour, environmental education helps learners form the capacity to collect and analyse information, make informed decisions, and participate fully in life (Monroe, Day and Grieser, 2000). Furthermore, a function of environmental education is to enable students to become critically aware of how they perceive the world with a view to fostering citizen engagement with social and environmental issues and participation in decision-making processes (Jickling and Wals, 2008).

Therefore, environmental education must attempt to instil in learners knowledge about the environment, positive attitudes towards the environment, competency in

action skills, and a sense of empowerment (Disinger & Monroe, 1994). Or, as Kollmuss and Agyeman (2002) describe, a combination of environmental knowledge, values, and attitudes, together with emotional involvement to make up a complex called 'pro-environmental consciousness'.

But how is this done? There is much research to suggest that cognitive and affective factors should be considered holistically in the teaching-learning process (Iozzi, 1989). In early research Eiss and Harbeck (1969) recognised the relationship between the cognitive, affective and psychomotor domains. They developed a model that illustrates these relationships as shown in Figure 2.10.

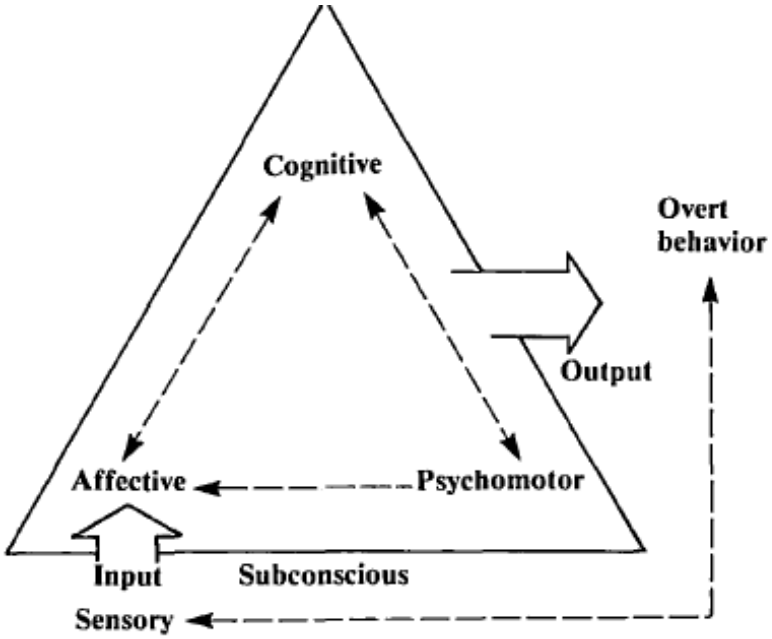

Figure 2.10: The relationship among the cognitive, affective and psychomotor domains (Eiss & Harbeck, 1969, cited in Iozzi, 1989)

According to Eiss and Harbeck (1969) as cited in Iozzi (1989), the affective domain is central to every part of the learning and evaluating process. Their model illustrates how all sensory input may enter the subconscious, interact with the affective, cognitive and psychomotor domains, and exit as overt behaviour that then leads back into the total system. This model also shows that the 'gateway' to the learning process is the affective domain (Iozzi, 1989). Research has recognised that focussing on the affective domain is extremely important if

environmental education programmes are to be effective in teaching positive environmental attitudes and values (Iozzi, 1989).

While knowing how to improve environmental quality is important, possessing such knowledge does not guarantee that one will be motivated to take action. An individual's 'motivation' and 'value system' are instrumental in determining whether positive or negative action, or indeed any action at all, is taken with respect to environmental matters (Iozzi, 1989).

There is much research to suggest that it is what people feel and believe about the environment that determines their attitudes towards it (Iozzi, 1989; Pooley & O'Connor, 2000; Seraphin, 2010; and Thompson & Mintzes, 2002). However, as previously discussed, there are many variables that affect the attitudes people hold towards the environment including age, gender, ethnicity and participation in wildlife activities, however, knowledge is the factor found most likely to change people's attitudes and perceptions (Kellert, 1996).

In their research, Thompson and Mintzes (2002) looked at the effects of education level and gender on knowledge and attitudes towards sharks. They found that knowledge increased with age, and that older students ranked higher in the scientific, and naturalistic categories (see Figure 2.1). Thompson and Mintzes (2002) also showed that there was a moderately strong relationship between knowledge and the types of attitudes people held towards sharks.

However, attitudes are not only shaped by knowledge, but also by experience. Dobson (2007) found that prior to direct experience with sharks in the natural environment most people had negative attitudes towards them. His research showed that direct experience with sharks helped to break down the 'Jaws'-like stereotypes and create more positive attitudes towards them (Dobson, 2004, 2007). Furthermore, he found that attitudinal changes occurred despite there being what was considered to be poor educational content on the dive trips undertaken by the respondents.

Further, Seraphin (2010) found that students' misconceptions about sharks were corrected through education *in* the environment and direct exposure to a variety of

sharks. Students' negative attitudes were improved through direct experience with sharks in the marine environment.

Direct experiences with nature have been recognised as an important variable for developing pro-environmental values (Miller, 2005; Bogeholz, 2006). Much theoretical and empirical research has suggested an important role of nature experience for the development of environmental values and attitudes, as well as in influencing pro-environmental behaviours (Bogeholz, 2006). As such, education *in* the environment is seen as an important part of environmental education relating to sharks.

The attitude a person holds towards sharks, or any animal, is important as their attitude affects their behaviour toward that animal (Thompson & Mintzes, 2002). As previously discussed, attitudes in some way guide, influence, direct, shape, or predict a person's behaviour (Kraus, 1995). As such, people with a positive attitude towards a specific species, such as sharks, are more likely to support legislation to protect and conserve them, donate time or money for their conservation, or simply refrain from harmful practices or activities involving them (Thompson & Mintzes, 2002).

By understanding what attitudes people hold towards sharks, and what shapes those attitudes, educators who are committed to conservation of the marine environment, and are concerned about preservation of species that are potentially endangered by negative public attitudes, such as sharks, can use the information gained to inform curriculum and community education development (Thompson & Mintzes, 2002).

2.4.5 Summary on Environmental Education

One of the goals of environmental education is to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment. As such, it is seen as a powerful tool to develop knowledge, attitudes and pro-environmental behaviour for sharks.

Environmental education has knowledge, attitude and behaviour components. It attempts to instil in learners knowledge about the environment, positive attitudes towards the environment, competency in action skills, and a sense of empowerment to act. It seeks to teach students *how to think*, and not *what to think*, to help learners form the capacity to collect and analyse information, make informed decisions, and participate fully in life.

Research has recognised that focussing on the affective domain is extremely important if environmental education programmes are to be effective in teaching positive environmental attitudes and values. Research has also found that through direct experience with sharks *in* the environment students' negative attitudes were improved, and stereotypes about sharks were broken down. As such, education *in* the environment is seen as an important part of environmental education relating to sharks.

Regarding this research, it is hoped that by understanding what attitudes people hold towards sharks and what shapes those attitudes, educators who are concerned about preservation of species that are potentially endangered by negative public attitudes, such as sharks, can use the information gained to inform curriculum and community education development.

2.5 Chapter Summary

This literature review covered three main sections. The first section explored sharks, their biology, life history, threats and relationship with humans. The second section outlined the nature of attitudes and values, including those specifically held towards animals, particularly sharks. In the final section environmental education as a possible tool to create awareness of and develop attitudes towards sharks was explored.

Sharks play a critical role in the health of the marine ecosystem, and their loss or decline may have important effects on marine ecosystems. This may also have effects on the industries and human communities that rely on the species. Sharks are in decline, mainly as a result of anthropogenic impacts such as fishing, habitat degradation, pollution, and potentially from climate change. Add to this a negative public image and it is no surprise sharks are in trouble. Most people have an opinion about sharks, while some have a healthy respect for an important ocean predator; others fear them, often irrationally, as mindless man-eaters. These feelings are shaped by values and attitudes.

Attitude is described as a psychological tendency expressed by evaluating an object or entity with some degree of favour or disfavour. Attitudes are formed in an experiential way based on direct or indirect cognitive, affective or behavioural responding to an attitude object. Values are described as 'just' attitudes in the sense that they convey people's evaluations of 'objects'. Values are shaped, built in, receive their meaning, and are structured primarily by the process of socialisation, whose main agents are the family, the school, the peer group and the media. When it comes to animals the way people feel is a subjective evaluation, one that often bears little relation to actual contact or experience.

Research suggests the most prevalent attitude orientations towards animals are: humanistic, neutralistic/negativistic, moralistic and utilitarian. These attitude orientations will be used to help determine people's attitude orientations towards sharks in this research. Attitudes regarding wildlife are shaped by several factors, for example, personal interest, values, formal education exposure and personal experience. While there are many variables that affect attitudes towards the

natural environment, and wildlife, it is believed the one of the most powerful forces in shaping perceptions of nature and biodiversity is education.

Environmental education is seen as a tool to help create greater awareness of, and develop attitudes towards sharks. One of the goals of environmental education is to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment.

Environmental education seeks to teach students *how to think,* not *what to think;* to develop knowledge and positive attitudes towards the environment, competency in action skills, and a sense of empowerment to act. Furthermore, education *in* the natural environment, with sharks, has been found to change negative attitudes; therefore, this is seen as an important part of any environmental education programme relating to sharks.

By understanding what attitudes people hold towards sharks and what shapes those attitudes, educators who are concerned about preservation of species that are potentially endangered by negative public attitudes, such as sharks, can use the information gained to inform curriculum and community education development. It is for this reason I undertake this research.

Chapter 3
Methodology

3.1 Chapter Overview

This chapter outlines the methodology used in this research. Section 3.2 introduces the research questions, and section 3.3 explores the methodological framework that has been used to guide this research. In section 3.4 the research methods used are outlined; this is followed by the research design in section 3.5. Validity and reliability of the research are discussed in section 3.6 and the final section provides a summary of the whole chapter.

3.2 Research Questions

Research questions are the vital first steps in any research; they guide the researcher towards the kinds of information they need and the ways it should be collected. As such, the formulation of research questions serve important purposes, that is to crystallise the focus of the investigation, to set the parameters of the research, to inform the design and the methods for gathering and analysing evidence and to steer the whole course of the study (Menter, Elliot, Hulme, Lewin & Lowden, 2012).

This research was designed to explore what attitudes people hold towards sharks and the link, if any, between people's knowledge and experience with sharks and their attitudes. The research questions were:

- What knowledge and experience do people have with sharks?
- Where do people obtain their information / knowledge about sharks?
- What attitudes do people hold towards sharks?
- Do knowledge and experience appear to influence attitudes towards sharks?

These research questions guided the research design and the methods for gathering and analysing the data in order to provide the answers to the questions.

3.3 Methodological Framework

The use of the term ‘paradigm’ was inspired by Thomas Kuhn who suggested that a paradigm was the entire constellation of beliefs, values and techniques shared by members of a given community (Markula & Silk, 2011).

Regarding research methods for education, Denzin and Lincoln (2011) further explain that a paradigm encompasses axiology (questions of ethics within the social world), ontology (the nature of reality and the nature of the human being in the world), epistemology (how one knows the world and the relationship between the knower and the known) and methodology (the best means or practices for gaining knowledge about the world).

Simply put a paradigm is an overarching set of beliefs that provides the parameters – how researchers understand reality and the nature of truth, how they understand what is knowledge, how they act and the role they undertake, how they understand participants and how they disseminate knowledge – of a given research project (Markula & Silk, 2011).

There are a number of paradigmatic approaches associated with research, as such it is not a matter of what paradigm is ‘best’ but rather what paradigmatic logic best works with the research purpose (Markula & Silk, 2011). It is important that researchers locate themselves in a paradigm. As this research sought to determine people’s knowledge, experience and attitudes towards sharks, I outline here interpretivism (also known as constructivism) being the paradigm this research is primarily located in.

The interpretivism (constructivism) paradigm is based on individual and collective reconstructions of knowledge. It assumes a relativist ontology (individuals construct multiple meanings of reality), subjectivists epistemology

(interactive researchers/participant knowledge-making process) and hermeneutic methodology (mutual construction of research products) (Markula & Silk, 2011).

This paradigm is based primarily on qualitative methods, but may also use quantitative methods, both of which were used and added value to this study. For example, in determining people's attitudes towards sharks qualitative methods were used allowing for deeper, more open responses from participants. However, in determining participants knowledge about sharks, quantitative methods were used to ask specific general knowledge questions in an effort to elicit yes, no or don't know responses.

As mentioned above, qualitative methods were used for collecting some of the rich data in this research as using a qualitative perspective allows for understanding individuals' perceptions of the world (Bell, 2010), which was an important part of this study. Qualitative methods exhibit a preference for seeing things 'in context' and for stressing the importance of multiple interrelationships between a wide range of factors at any one time (Denscombe, 2010). Quantitative data was also collected to determine the spread of data across participants. It was used to explore specific themes such as general knowledge, and responses to attitude orientation statements. Quantitative data is used to collect information and to study the relationship between one set of information and another (Bell, 2010). It is associated with the production of numerical data that are 'objective' in the sense that they exist independently of the researcher (Denscombe, 2010).

3.4 Research Methods

Methods are described as a range of approaches used in educational research to gather data that are to be used as a basis for inference and interpretation, for explanation and prediction (Cohen, Manion & Morrison, 2011). There are several methods that could have been used in gathering data for this research, such as interviews and observations. Interviews have been described as being illuminative and able to go beyond the descriptive in order to help understand why people think or act in a certain way (Menter et al., 2012). While interviews would have helped determine peoples' attitudes towards sharks they were not used due to their

time-consuming nature at both the interview and analysis stage. Observation could also have been used for this research due to its focus on observing behaviour in a specific context. However, relating to this research on attitudes towards sharks, observation would have been impractical as opportunities to observe people with sharks are very rare. For the purposes of this research, a questionnaire was deemed most suitable to gather data.

3.4.1 Questionnaires

Questionnaires are one of the most frequently used methods in educational research and are often used as part of a survey. Surveys are commonly used to collect quantitative information about people in a population and many involve administering questions to individuals (Menter et al, 2012). For example, a self-administered survey where the respondent completes questions; such as the one used for this research. A questionnaire can also be used to gather qualitative data; qualitative or open-ended questions are used to ask respondents about their opinions, ideas and preferences in a narrative or descriptive form, they are then analysed thematically, as was the case in this research.

Questionnaires are ideal for scanning a wide field of issues and populations (Cohen et al, 2011) and can be used to collect large amounts of data in a relatively short period of time (Menter et al., 2012). In most cases a survey questionnaire will aim to obtain information from a representative selection of the population and from that sample present the findings as being representative of the population as a whole (Bell, 2010).

Questionnaires are flexible and can be used to study a wide variety of topics such as attitudes, values, beliefs and past behaviours, as in this research. They are easy to administer through the use of mail or Internet, and statistical techniques can be used to determine validity, reliability and statistical significance (Menter et al., 2012).

This research used a questionnaire to explore people's attitudes towards sharks, and the possible link between knowledge and experience with sharks and the attitudes held toward them. It was self-administered by participants and included both closed and open questions. Closed questions allow respondents to choose from pre-determined categories, for example, dichotomous questions, multiple-choice questions and those based on a level of measurement. Open questions allow respondents to answer in their own way and with their own words (Menter et al., 2012).

This questionnaire was separated into four sections (see Appendix A). The first section collected demographic information about the participants involved in the research. The second section asked participants general knowledge questions about sharks using a *true, false,* or *don't know* range. The third section explored respondents' attitudes and values towards sharks through the use of open-ended questions, and through specific attitude orientation questions using a strongly agree to strongly disagree Likert scale. In the fourth section respondents were asked about their experience with sharks through the use of open-ended questions. In this section participants were also asked about where they obtained their information about sharks and their environmental behaviour, through the use of *yes / no* questions.

3.5 Research Design

The term 'research design' has been used to encompass all the decisions involved in planning and executing a research project – from identifying the problem through to reporting and publishing the results (Punch & Oancea, 2014). This section explores the research design, including choosing the sample, the process for conducting the research including the pilot study, procedures for administering the questionnaire and data analysis.

3.5.1 Sample of participants

All research involves sampling, as no study can include everything. Sampling in education research usually means ‘people sampling’ and includes the *population,* being the total target group who would, in the ideal world, be the subject of the research and about whom the researcher is trying to say something; and the *sample,* being the actual group who are included in the study and from whom the data are collected. Sampling allows the researcher to analyse the data collected from the sample and make statements about the whole target population, from which the sample was drawn (Punch & Oancea, 2014).

This research used convenience sampling whereby it took advantage of an accessible situation that fitted with the research context and purposes. This situation was by way of being located in different areas within the community, for example, a popular beach access, local café and supermarket; there I approached members of the public at random. Further, I set up a static display at a local company and staff completed surveys at random. As I collected completed questionnaires I tracked the sample demographics and filled any gaps by targeting participants within the community to fit with the population demographic. With regard to the school group I used a school and teacher that were known to me for convenience, and a class with a cross section of students, also representative of the local community.

3.5.2 Research Process

3.5.2.1 Pilot study

All data-gathering instruments should be piloted to test how long it takes respondents to complete, to check that all the questions and instructions are clear and to enable any items to be removed that do not provide usable data. Further, piloting helps to assess validity of the questions to ensure the questions elicit the type of responses sought. The main purpose of a pilot is to ensure there are no issues with the instrument so that respondents in the main study will experience no difficulty in completing it. It also allows for preliminary analysis to see

whether the wording and format of questions will present any difficulties when the main data are analysed (Bell, 2010).

Ideally, the pilot should be carried out on a group similar to the one that will form the population of your study (Bell, 2010). This was the case in the pilot for this research, which was conducted with a small convenience sample of eight people of varying ages and genders. The pilot study resulted in no major changes to the questionnaire; one small change to the answer scale for the last two general knowledge questions was determined.

3.5.2.2 Procedures

Bell (2010) explains there are distinct advantages in distributing questionnaires to respondents personally. In this way the researcher is able to explain the purpose of the study and questionnaires can be completed on the spot. Better cooperation is also likely if you can establish personal contact. This approach was taken for this research.

With regard to the school group initial contact was made with the classroom teacher, already known to me, who was eager to involve her students. Permission was gained from the principal and the students' parents who were provided with a statement outlining the purpose and nature of the research and what their child's participation would involve (see Appendix B). Once the informed consent letters were returned, a date and time for the researcher to administer the questionnaire to the class was scheduled.

With regards to the community group, initial contact was made by way of personal introduction in the field, followed by an explanation of the purpose and nature of the research and what their participation would involve. This was also provided in written form should participants wish to read it (see Appendix C). For the community group a static display with poster explaining the research, questionnaire forms and secure box to deposit forms into was also used. This display also provided an introduction and explanation of the research and what their participation would involve, by way of written materials on the display.

3.5.2.3 Questionnaire process

For the school group the questionnaire was administered at a pre-scheduled date and time with the class. I personally introduced myself to the class and explained the purpose for my visit and the nature of the research and what their participation would involve. I distributed the questionnaire and explained that the students should respond to the questionnaire on their own, and return it to the box at the front of the class when done.

For the community group I positioned myself in a variety of different areas in the local community, for example, a popular beach access, local café and supermarket. I approached members of the community by introducing myself and then introducing the purpose and nature of the research I was undertaking. I asked for their participation and provided them with the research statement to read and a questionnaire to complete.

I also made contact with a local company who employ a diversity of people from the local community and introduced my research to the team. I explained the purpose and nature of the research and asked for their participation. I set up a static display in their staff room, with research statement to read, clipboards with questionnaires and a secure box to place questionnaires in once completed. I left the materials for several days, clearing the box each day.

3.5.3 Data analysis

Data analysis is a critical stage of research where raw data taken from questionnaires needs to be recorded, analysed and interpreted. Hundreds of pieces of information will mean nothing to the researcher or reader unless they have been categorised and interpreted (Bell, 2010). Ultimately, it is about finding answers to your research questions.

Data preparation is the initial stage of data analysis and involves comprehensive record keeping, data checking for accuracy, constructing a data base, data cleansing and transforming the data (Menter et al., 2012).

As the student group completed their questionnaires first I worked with this data initially, ensuring it was kept separate from any questionnaires coming in from the community group. All aspects of data analysis as described below apply to both the student group and community group.

As the questionnaires were completed and data collected I ensured comprehensive recordkeeping. The school group and community group questionnaires were kept separate and archived for analysis. They were stored securely should I require them at a later time.

Data checking for accuracy was undertaken with each questionnaire as it was collected. This was completed to check the quality of responses to ensure they were easily readable and that no questions had been inadvertently omitted (participants were free to choose not to respond to any question they did not wish to).

Two separate databases were constructed using Microsoft Excel, one for the student group and one for the community group. The student database was completed with all of the data from the questionnaires at once, as they were completed all together. For the community group, the questionnaire data was entered into the database as it was received in. Each item from the questionnaire was entered under headings for each section in the database. For specific questions, numerical codes were allocated in order to analyse them in quantitative terms. Data cleansing was undertaken after each questionnaire was entered; this was done using a careful 'sweep' of the entries compared with the questionnaire to ensure there were no inaccuracies in data entry.

Once all questionnaires were received in and entered into the database, transformation of the data was undertaken. For each section of the questionnaire primary analysis was completed; for the closed questions, graphs and charts were created for each question for both the student group and the community group separately. As the participant numbers were relatively small I used descriptive statistics to show the characteristics of data collected. For the open ended, qualitative questions, categories were determined from participants' responses and these questions were analysed thematically based on the themes that emerged

from participant responses, for example, fear, neutral and empathy themes emerged in response to opened-ended questions about first thoughts of sharks. These themes were peer-reviewed for their representation of the data. The themed responses were then placed in graphs and tables to present the data. For the attitude orientation statements responses were coded for analysis, and in secondary analysis mean and standard deviations were determined for this data.

Denscombe (2010) explains that once a description of the profile data is produced the next stage is to look for patterns and relationships in the data, this involves looking for connections. Looking for connections involves looking at data in tables or charts to see what links are evident; as such I undertook secondary analysis of the data to determine any correlations, particularly between respondents' knowledge and experience with sharks and their attitudes towards them. Data was presented in graphs and tables for all questions on the questionnaire.

3.5.4 Limitations of the research

With regards to the student group this research surveyed only one class of students. As this was a small group, obtaining statistically significant data was not possible. While the themes that came through were of interest, they can be viewed as indicative only and cannot be generalised. Ideally, a larger sample of two or three classes with a variety of ages and student backgrounds may have provided a better representation of children in the community.

In the community group section only two children were included, as initially both the school group and community group were to be combined for data analysis. As the data for each group was collected in very different ways it was decided to analyse them separately. Ideally, a greater number of children would have been included in the community section, as this would have provided a more representative sample of the community as a whole. In this case the community group is representative of the adult community in the area, based on information from the 2013 Census data (Statistics New Zealand, 2013).

3.6 Quality of Research

3.6.1 Validity and Reliability

Any data collection method should be examined critically to assess to what extent it is likely to be valid and reliable (Bell, 2010).

Validity is concerned with describing whether an item or instrument measures or describes what it is supposed to (Bell, 2011). Furthermore, validity refers to the accuracy and precision of the data and the appropriateness of the data in terms of the research question being asked (Denscombe, 2010). There are considered to be two main types of validity, internal and external.

According to Cohen et al. (2011), with internal validity the research findings are supported by the data. However, it is possible for participants to create inconsistencies because they do not respond to all questions, can lie, or respond in a way they think the researcher wants them to. In interpretive research this idea is thought of as credibility, as such, to enhance the credibility of data collection in this research several of the questions were paired as a cross check, and questions not responded to were excluded. For example, in the attitude orientation statements, *I believe sharks hunt humans*, was paired with *I don't think sharks intend to harm humans,* these statements aligned whereby the majority of responses were the same for both statements.

External validity refers to the degree to which the results can be generalised to the wider population (Cohen et al., 2011). As this research involved a representative sample of the community, generalisability was considered to be achievable within the community group. Further, an adequate sample of the population was obtained and as such adequate data was collected to generalise. The use of both closed and open-ended questions in the questionnaire provided depth to the data and the findings are presented in support of this. However, in the case of the student group generalisability was not possible due to the small sample size, and limitation of only one age group. While the research findings are supported by the data collected from this group, the findings are indicative only. In interpretive research this is a case of transferability, and in this research there is a limit to how

transferable this data would be in other contexts, and would depend on the context. With regard to the community group, being a representative sample of the local community enhanced its transferability to within a similar context.

Reliability in quantitative research can also be described as dependability, consistency and replicability over time, over instruments and over groups of respondents. It is concerned with precision and accuracy. For research to be reliable it should demonstrate that if it were to be carried out on a similar group of respondents in a similar context, then similar results would be found (Cohen et al., 2011).

Bell (2010) explains there several ways to check reliability in tests and scales, for example, a 'test-retest' whereby the same test is administered after the first. She states it is more likely that the test of reliability will come at the point of wording questions and piloting as was the case in this research, as previously described above. This was certainly the case in comparing the pilot responses with the main survey responses, indicating that this may be the case if this research were to be replicated in its entirety. However, it was not within the scope of this study to replicate the data collection with another group of participants, as such, this could be seen as a limitation of this study.

3.6.2 Ethical Issues

Ethical considerations for researchers are a critical element in undertaking any research. Decisions regarding ethics must be made at the design phase of research, as it is carried out and as it is analysed and reported (Menter et al., 2012).

The starting point is with a supervisor and ethics committee whereby approval is sought for research to be undertaken. Once approval is received the next step is to obtain informed consent from respondents who should be provided with a statement that outlines the purpose and nature of the research and what their participation involves. Part of this statement (or consent form) should include a commitment from the researcher regarding confidentiality and anonymity;

however, this should not be taken lightly and needs to be realistic based on the specific research being undertaken (Menter et al., 2012).

The process described above was followed for this research. Approval from the University of Waikato ethics committee was obtained before proceeding with data collection. Informed consent was obtained from respondents who were provided with a statement outlining the purpose and nature of the research and what their participation involved. A signed copy was obtained from the school principal, classroom teacher and from the parents of the students involved in the research. In the case of the community group, the statement was shown to each participant before they completed the questionnaire. Participants from the community group who completed a questionnaire gave their consent by virtue of completing it. Participants voluntarily chose their participation in this research.

Researchers should ensure that the interests of participants are protected and that no harm could come to them as a result of being involved in the research (Denscombe, 2010). With questionnaires it is important to ensure the safe and secure storage of raw data and to make certain individuals could not be identified through their responses. All data gathered in this research was done so anonymously and stored securely and only able to be accessed by the researcher.

3.7 Chapter Summary

This chapter has outlined the methodology of this research. This chapter began by outlining the research questions, which guided the research. It explored the methodological framework of interpretivism that this research is grounded in.

For this research a questionnaire using both quantitative and qualitative questioning was used to collect data that sought to determine people's knowledge, experience and attitudes towards sharks. It was administered to a representative sample of the local community and a school student group. The research design section further outlined the processes and methods for selecting the sample, pilot study, procedures and processes of the research. Data analysis, being a critical

stage of the research, was undertaken by recording, analysing and interpreting the data collected. The findings of which are outlined in the following section.

Chapter 4
Findings

4.1 Chapter Overview

The research findings are presented in two groups: the community group and the primary school group. The group findings are each represented in three main sections. The first section for each group provides demographic information of the participants involved in the research. The second section presents findings in relation to participants' general knowledge of sharks, attitudes and values held towards sharks, experience with sharks, and finally, environmental behaviour. Correlations between knowledge, experience and attitudes are examined throughout the findings. The third section for each group is a summary of the findings. This chapter is concluded with a chapter summary.

4.2 Community Group Findings

4.2.1 Demographic of Community Group Participants

Sixty respondents from the local community participated by completing a survey questionnaire. Table 4.1 represents the demographics of this group.

Table 4.1: Community Group Demographics

Age	Male	Female	Total
<15	1	1	2
16-25	7	1	8
26-40	4	10	14
41-55	6	14	20
56-70	8	8	16
Total	**26**	**34**	

The demographics of this group are representative of the local community based on information from the 2013 Census. The median age in the area is 41 years old and there are more adults in the 40 – 59 year age range than any other. There are

more females (60,000) than males (54,000) in the area (Statistics New Zealand, 2013)

4.2.2 General Knowledge of Sharks

Participants responded to a number of questions regarding their general knowledge of sharks. The majority (77%) rated their own knowledge as poor to average (see Figure 4.1)

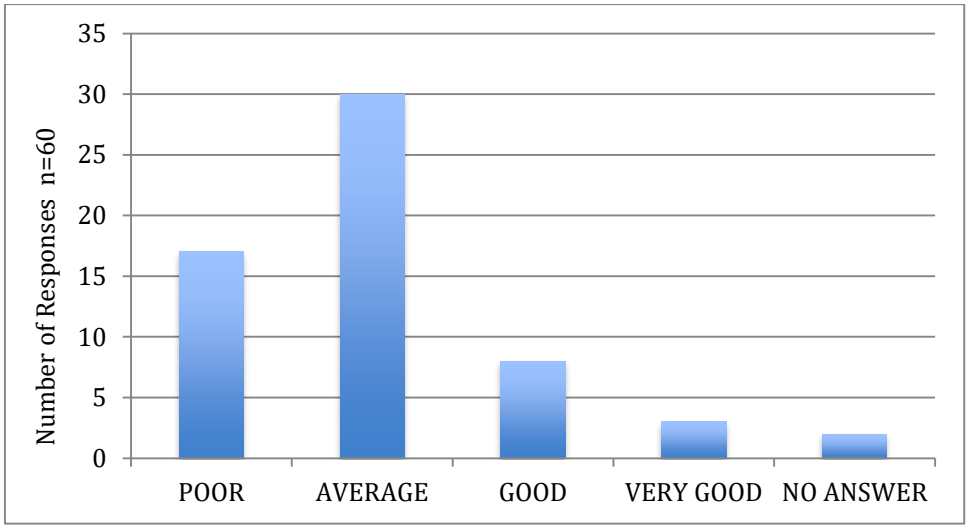

Figure 4.1: How would you rate your knowledge of sharks?

However, based on their responses to the specific knowledge questions about sharks, the majority (over 50%) of respondents gave scientifically accepted responses in all but three of the nine questions. Table 4.2 below shows the findings to these questions, with the scientifically accepted response in bold italics along with the number of responses and the percentage.

Table 4.2: Responses to Knowledge Questions about sharks

Question	#Response	Percentage
2: Sharks are a type of fish?	**n=59**	
TRUE	***53***	***90***
FALSE	4	7
DON'T KNOW	2	3
3: Sharks breed quickly & produce many young?	**n=58**	
TRUE	5	9
FALSE	***31***	***53***
DON'T KNOW	22	38
4: Sharks are not essential to the health of oceans?	**n=58**	
TRUE	3	5
FALSE	***49***	***85***
DON'T KNOW	6	10
5: The number of sharks in the ocean is declining?	**n=60**	
TRUE	***50***	***83***
FALSE	1	2
DON'T KNOW	9	15
6: The sale of shark fin in NZ is legal?	**n=60**	
TRUE	***21***	***35***
FALSE	30	50
DON'T KNOW	9	15
7: Shark meat is sold to be eaten in NZ?	**n=60**	
TRUE	***40***	***67***
FALSE	14	23
DON'T KNOW	6	10
8: All shark species are a threat to people?	**n=60**	
TRUE	4	7
FALSE	***55***	***92***
DON'T KNOW	1	1
9: The number of shark species in NZ ?	**n=60**	
(0-5)	2	3
(6-20)	11	18
(21-40)	4	7
(41-80)	2	3
(81-120)	***4***	***7***
DON'T KNOW	37	62
10: Total number of fatal shark attacks in NZ ?	**n=60**	
(0-5)	22	37
(6-10)	***12***	***20***
(11-15)	2	3
(16-20)	0	0
DON'T KNOW	24	40

A large majority of respondents (90%) indicated they understood sharks were a type of fish. This is perhaps not surprising given a possible association by respondents regarding the ocean habitat sharks share with other fish, and common features such as fins and gills. However, fewer respondents (53%) were sure of their knowledge concerning shark reproduction. This is something that respondents are likely to have less association with due to it being harder to observe.

The majority of respondents (85%) indicated their understanding of sharks' importance to ocean health. Similarly, the majority (83%) indicated their understanding that shark numbers are declining. This awareness is possibly due to recent media coverage about shark finning which highlighted the importance of sharks to ocean health and their decline due to the practice of finning. This increase in media coverage came in response to organisations such as Greenpeace, Forest & Bird and NZ Shark Alliance calling for finning to be banned in New Zealand (NZ) during a review of the NPOA (National Plan of Action) for sharks in 2013 (Ministry of Primary Industries, 2014).

The large majority (92%) responded *false* to question 8: about whether they thought - *all sharks are a threat to people.* From this response it seems likely that people have an understanding that there are many different species of sharks, as also indicated by the response to question 9 below, and that only a small number of them are a threat to people. It is likely this is as a result of media coverage of shark incidents that usually only focus on one or two species being responsible for incidents with people.

The first of three questions to which many respondents gave less scientifically accepted answers was question 6: *the sale of shark fin is legal in NZ.* The sale of shark fin is legal in NZ, which 30% of respondents answered correctly. The majority (50%) of respondents answered false, believing the sale of shark fin to be illegal in NZ. Recent media coverage, also mentioned above, relating to the banning of shark finning in NZ waters and the requirement to land the whole shark may have led to some confusion when respondents answered this question. While it is now illegal to fin sharks at sea and land only the fins, it is not illegal to sell shark fin in NZ (Ministry of Primary Industries, 2014).

In contrast to question 6, question 7: *shark meat is sold to be eaten in NZ,* was answered by the majority of respondents (67%) correctly. Shark meat is sold to be eaten in NZ and is often sold as lemon fish in supermarkets and takeaway shops. It is perhaps not surprising then that the majority of respondents answered this question correctly given respondents possible association with these places.

The second of the three questions that many respondents answered incorrectly was question 9: *the number of shark species in NZ is?* The correct answer was in the range *81-120 species,* which 7% of respondents answered correctly. The majority (62%) answered *don't know* to this question. This response is perhaps not surprising given the majority of people would have only be exposed to a small number of sharks in their experience, through the media, movies etc. while possibly having an understanding that there may be many more species they do not know about.

The final question that was answered incorrectly was question 10: *the total number of fatal shark attacks in NZ is?* The correct answer was in the range *6-10 fatal attacks,* which 20% of respondents answered correctly. The majority (40%) answered *don't know* to this question. This response may reflect that exposure to this type of information would probably be through the news media, which reports both NZ and international news; as such this may have caused some doubt in respondents' minds as to the correct numbers. Interestingly, the *don't know* response of 40% was closely followed by the *0-5 fatal attacks* response of 37% which is close to the correct answer.

Despite the majority of respondents rating their knowledge as poor to average the respondents actually demonstrated knowledge on many of the questions posed. The questions where the majority answered with the less scientifically accepted answer would perhaps be considered more specific or scientific questions relating to sharks and as such may not be considered general knowledge. However, knowledge of this type is valuable if a greater overall understanding of sharks could help to develop positive attitudes and values towards them.

4.2.3 Attitudes and Values towards Sharks

In this section participants responded to open-ended questions regarding their thoughts and feelings about sharks. In question one they were asked: *When you hear the word "shark" what is your first thought*? And *why is this your first thought?* Participants' responses were categorised based on their answers to both questions, and the emerging themes were: fear, empathy and a neutral stance which included responses that were based more on knowledge of sharks, as opposed to feelings. Figure 4.2 shows the spread of data for this question.

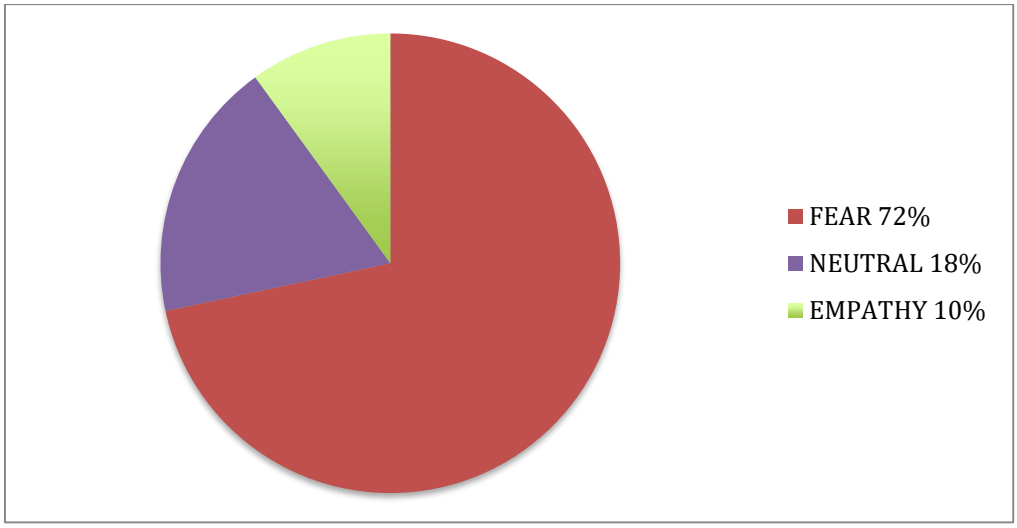

Figure 4.2: Themed responses to question: when you hear the word shark what is your first thought and why? (n=60)

The large majority (72%) responded to this question in ways that were categorised as fear. Many of the responses in the fear theme indicated that movies such as *Jaws*, negative imagery and publicity in the media were influential in their responses to this question. Only 18% of respondents fitted into the neutral stance theme, which was generally indicated by more scientific and knowledge-based responses, as opposed those based on feelings. Finally, ten percent of respondents were placed into the empathy theme, whereby respondents indicated concern for sharks and the threats they face such as over-fishing and finning. Table 4.3 below provides a selection of participants' responses to question one, and the reasons for their responses.

Table 4.3: Selection of responses to question one, and the reasons for response

Theme	When you hear the word shark what is your first thought?	Why?
Fear	Panic Scream	I have a slight fear
	Sharp teeth	They scare me
	Horror movies	General image of sharks
	Attack	Movies
	Jaws	Watched it growing up
	Maneater	Seen it on TV and in magazines
Neutral	Big	They are a large predator
	King of the ocean	Because I have dived with sharks
	Streamlined	Perfection of shape
	Ocean	They belong in the ocean
Empathy	Shark finning	It's a barbaric practice that needs to be outlawed
	Don't be cruel to them	A lot of media about culling them
	Nature protection	Where they belong and what they need

Those placed in the fear theme generally indicated negative views of sharks that seemed to have little to do with actual experience and more to do with perceptions based on exposure to sharks through the media, movies and general negative imagery of sharks. Those in the neutral theme indicated more scientific or fact-based responses to the questions, possibly based more on experience, and there was little subjective emotion such as that seen in the fear-based theme. In the empathy theme, respondents indicated care and concern for sharks, along with an awareness of the threats to sharks from finning and culls.

For those in the fear category 44% (n=60) mentioned the *Jaws* movie, in response to the *why* question, showing that this movie had influenced some people's thoughts and feelings towards sharks. The *Jaws* movie, considered a cult classic for 40 years, was first released in 1975 and became the highest-grossing film of its time. The movie has spanned generations and was followed by three sequels released in 1978, 1983 and 1987 (Wikipedia, 2015). The *Jaws*-related responses from this question came from a broad section of the age demographic, some within the 16-25, 26-40 age ranges (for whom the movie first appeared before they were born) and the majority coming in the 41-55 ranges. Many of these

responses indicated an irrational fear and misunderstanding based on misconceptions presented in *Jaws* and its sequels. Some examples of participant responses can be seen in Table 4.4 below.

Table 4.4: Examples of responses by those who mentioned *Jaws* in question one

Fear Theme	When you hear the word shark what is your first thought?	Why?
	Jaws	*Jaws* is how I perceive sharks to be
	Jaws	Movie *Jaws*
	Menacing, powerful, deadly	Ever since I watched *Jaws*
	Music from *Jaws*	I was affected by the movie
	Jaws	Watched it growing up
	Daaa..Dum (theme music from *Jaws* movie)	*Jaws* movie when I was young

Participants responded to a second question in this section: *when you think of sharks, what type of shark comes to mind first? Why do you think this shark comes to mind?* Figure 4.3 shows the different species of sharks indicated by respondents in this question.

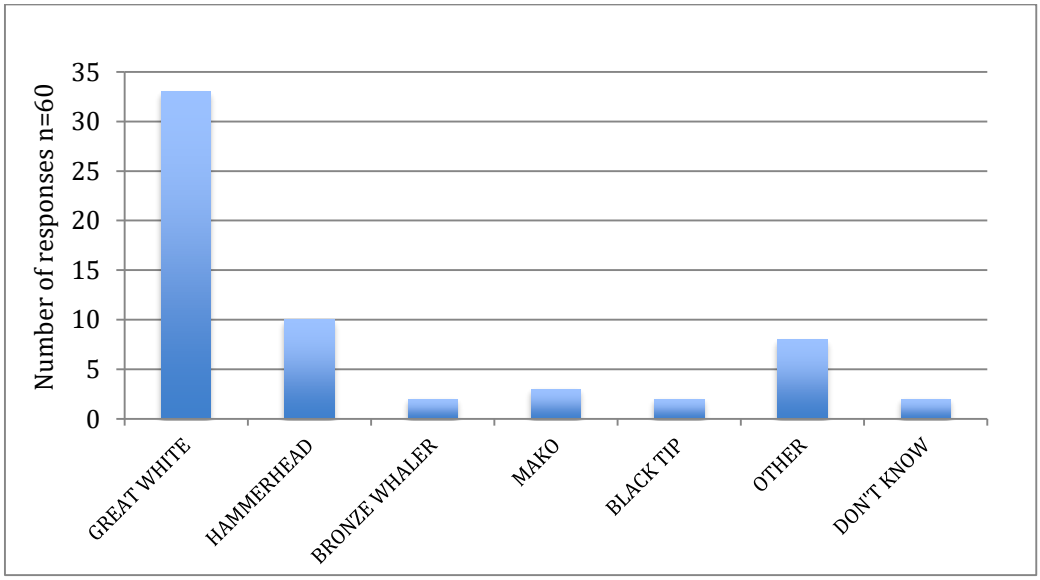

Figure 4.3: When you think of sharks what type comes to mind first?

The majority (55%) of participants named the great white shark as the first shark that came to mind, followed by the hammerhead (17%). The "other" shark category included single species such as mud shark, gummy shark and dogfish, as well as those described as Jaws and big-ones. Great white sharks are not common in NZ waters, however despite this they rated very high in this question. Of those who name the great white, 64% mentioned the media / news as the reason they thought of great white first, and 24% mentioned the movie *Jaws*. Table 4.5 shows some examples of these responses below.

Table 4.5: Examples of responses to why respondents first thought of great whites

When you think of sharks what type comes to mind first?	**Why?**
Great White	Media have led us to believe great white are a threat
Great White	Always in the news, attacks
Great White	Childhood memories of *Jaws* movie, media blames attacks in great whites
Great White	*Jaws* was the first shark movie I saw
Great White	Mainly movies and mentioned on the news when attacks happen
Great White	The film *Jaws*
Great White	Because of public image / perception of sharks
Great White	They are the most reported on
Great White	Seen in movies and in news
Great White	Always the type of shark talked about in the media (attacks)
Great White	Publicised the most

The third question in this section presented a list of 16 attitude orientation statements towards sharks. A scale, including: *strongly agree, agree, unsure, disagree to strongly disagree* was used to determine each participant's level of agreement with each statement. Table 4.6 shows the complete list of statements and participant responses as a percentage of the total number of responses (also indicated), and a mean and standard deviation for each statement. As indicated in Table 4.6 each possible response was allocated a numerical value in order to determine the mean and standard deviation of all responses to a particular statement. *Strongly agree* response =1, through to *strongly disagree* =5.

Table 4.6: Attitude orientation statements and responses shown as a percentage, with mean and standard deviation

Question	Strongly Agree (1)	Agree (2)	Unsure (3)	Disagree (4)	Strongly Disagree (5)	Mean	SD
1: I believe sharks hunt humans n=60	3	3	7	49	38	4.15	0.93
2: Eating sharkfin has no nutritional value n=60	7	25	48	15	5	2.87	0.93
3: I am afraid of sharks n=59	20	39	15	22	4	2.49	1.15
4: I like to learn about sharks n=60	12	68	8	12	0	2.2	0.80
5: Sharks should be protected n=60	30	45	22	3	0	1.98	0.81
6: I worry about sharks when I go in the ocean n=60	15	38	10	25	12	2.8	1.3
7: I would eat shark n=60	8	38	10	15	29	3.17	1.42
8: I would like to see a shark in the ocean n=60	33	35	17	8	7	2.2	1.19
9: I don't think sharks intend to harm humans n=59	42	53	2	0	3	1.7	0.81
10: People are unlikely to see a shark in the wild n=60	5	30	22	35	8	3.12	1.09
11: I would never eat shark n=60	18	18	12	44	8	3.05	1.3
12: Sharks are essential to the health of the ocean n=60	46	42	12	0	0	1.65	0.68
13: I think the only good shark is a dead shark n=60	3	0	5	30	62	4.47	0.87
14: I believe sharks avoid human contact n=58	16	43	28	10	3	2.43	0.99
15: I don't care if sharks are killed n=59	0	6	12	41	41	4.15	0.89
16: I like sharks n=59	14	37	37	12	0	2.47	0.87

Several of the statements were paired as a reliability check. For example, in statement 1: *I believe sharks hunt humans,* 49% disagreed and 38% strongly disagreed with this statement, with a mean of 4.15 and a standard deviation of 0.93. When this is compared with the similar but oppositely orientated statement 9: *I don't think sharks intend to harm humans,* it can be seen that 42% strongly agreed and 53% agreed with this statement, with a mean of 1.7 and a standard deviation of 0.81. These responses are relatively consistent and were answered in very similar ways; therefore they are considered reliable. They also indicate that the majority of respondents do not believe sharks intentionally harm or hunt people. However, despite this, 59% of respondents indicated they were afraid of sharks, and 53% indicated they worried about sharks when they go in the ocean.

Similarly, in statement 7: *I would eat shark,* 46 % of respondents strongly agreed or agreed with this statement, while 44% disagreed or strongly disagreed, and this statement has a mean of 3.17 and a standard deviation of 1.42. When this is compared with the similar but oppositely orientated statement 11: *I would never eat shark,* 36% of respondents strongly agreed or agreed, and 52% disagreed or strongly disagreed, and this statement has a mean of 3.05 and a standard deviation of 1.3. These responses are somewhat consistent, although there is some variability, which may be due to the use of the word "never" or the fact that respondents did not know if they had eaten shark before, as it is often sold under a different name. These findings do show that respondents' attitudes towards this statement are split, with a slight preference being towards eating shark. This response may be linked to knowledge about having previously eaten shark labelled as lemon fish.

The 16-attitude orientation statements shown in Table 4.7 link to specific attitude categories as defined by Kellert (1983). Specifically, they link to three categories: *utilitarian/negativistic, naturalistic and scientistic*. Table 4.7 below shows the attitude statements as they were seen to respond to Kellerts' attitude categories in this study.

Table 4.7: Attitude statements and their corresponding attitude categories

	Statement
1	I believe sharks hunt humans
3	I am afraid of sharks
6	I worry about sharks when I go in the ocean
7	I would eat shark
13	The only good shark is a dead shark
15	I don't care if sharks are killed
4	I like to learn about sharks
5	Sharks should be protected
8	I would like to see a shark in the ocean
11	I would never eat shark
16	I like sharks
2	Eating sharkfin has no nutritional value
9	I don't think sharks intend to harm humans
10	People are unlikely to see a shark in the wild
12	Sharks are essential to the health of the ocean
14	I believe sharks avoid human contact

Utilitarian / Negativistic
Naturalistic
Scientistic

Participants' responses to the attitude statements from Table 4.6 were further analysed and grouped based on the attitude categories in Table 4.7. This was done to further determine the participants' attitude orientations towards sharks.

Table 4.8 below is separated into three sections, one for each attitudinal category: *utilitarian / negativistic, naturalistic and scientistic.* Within each of these sections the attitude statements are presented for each age group, along with participants' responses, shown as the number of responses to each statement. As in Table 4.6, numerical values were assigned to each response: *strongly agree* (1), *agree* (2), *unsure* (3), *disagree* (4) *to strongly disagree* (5), to determine the mean and standard deviation for each statement.

Table 4.8: Responses to attitude statements separated into attitude categories by age group, showing mean and standard deviation.

#	Statement / Category	<15 (n=2)					16-25 (n=8)					26-40 (n=14)					41-55 (n=20)					56-70 (n=16)						Mean	SD
	Utilitarian	SA	A	UN	D	SD	SA	A	UN	D	SD	SA	A	UN	D	SD	SA	A	UN	D	SD	SA	A	UN	D	SD			
1	I believe sharks hunt humans			1		1			1	5	2				6	8		1	1	10	8	2	1	1	8	4		4.15	0.93
3	I am afraid of sharks	1	1				1	3	2	2		1	5	2	4	2	4	8	5	3		5	6		4		*n=15*	2.49	1.15
6	I worry about sharks when I go in the ocean	1		1			1	4		2	1		5	2	3	4	2	9	2	6	1	5	5	1	4	1		2.8	1.3
7	I would eat shark					2	2	2		3	1		5	2	1	6	2	9	2	2	5	1	7	2	3	3		3.17	1.42
13	The only good shark is a dead shark				2				1	1	6				2	12			1	7	12	2		1	6	7		4.47	0.87
15	I don't care if sharks are killed			2			0	3	1		4			1	4	9			2	11	6	*n=19*	1	1	9	5		4.15	0.89

#	Statement / Category	<15 (n=2)					16-25 (n=8)					26-40 (n=14)					41-55 (n=20)					56-70 (n=16)						Mean	SD
	Naturalistic	SA	A	UN	D	SD	SA	A	UN	D	SD	SA	A	UN	D	SD	SA	A	UN	D	SD	SA	A	UN	D	SD			
4	I like to learn about sharks		2				1	5		2		2	11	1			1	15	3	1		3	8	1	4			2.2	0.8
5	Sharks should be protected		1	1			2	2	4			7	5	2			4	11	5			5	8	1	2			1.98	0.81
8	I would like to see a shark in the ocean	1			1		3	4		1		7	3	1	2	1	4	8	5	1	2	5	6	4		1		2.2	1.19
11	I would never eat shark	2					1	3		3	1	4	1	3	5	1	3	4	2	9	2	1	3	2	9	1		3.05	1.3
16	I like sharks		2				2	3	1	2		3	5	4	2		2	5	11	1		*n=19*	1	7	6	2		2.47	0.87

#	Statement / Category	<15 (n=2)					16-25 (n=8)					26-40 (n=14)					41-55 (n=20)					56-70 (n=16)						Mean	SD
	Scientistic	SA	A	UN	D	SD	SA	A	UN	D	SD	SA	A	UN	D	SD	SA	A	UN	D	SD	SA	A	UN	D	SD			
2	Eating shark fin has no nutritional value			2				1	6	1		1	3	7	1	2		2	5	8	4	1	1	6	6	3		2.87	0.93
9	I don't think sharks intend to harm humans	1	1				3	3	1		1	7	6				*n=13*	7	13				7	8			1	1.7	0.81
10	People are unlikely to see a shark in the wild		1	1				2	2	4			3	3	5	3		2	6	4	6	2	1	6	3	6			3.12	1.09
12	Sharks are essential for the health of the ocean		1	1			5	2	1			9	4	1				9	9	2			5	9	2			1.65	0.68
14	I believe sharks avoid human contact		1	1			2	5	1			3	6	2	1	1	*n=13*	2	8	6	3	*n=19*	2	5	6	2	1		2.43	0.99

In the utilitarian (negativistic) category, respondents exhibited a general disagreement with utilitarian thinking in their responses. For example in statement 1: *I believe sharks hunt humans,* the mean response was at the strongly disagree end of the scale. Only one age group (56-70) indicated any agreement with this statement. In statement 15: *I don't care if sharks are killed,* the mean response was again at the strongly disagree end of the scale. In one of the age groups (16-25) almost half the respondents agreed with this statement, although the numbers are low. In statement 13: *The only good shark is a dead shark,* the mean response was also at the strongly disagree end of the scale. Again, only in one age group (56-70) was there agreement with this statement.

However, in two of the statements in the utilitarian section respondents exhibited agreement with utilitarian (or negativistic) thinking in their responses. In statement 3: *I am afraid of sharks,* the mean response was at the agree end of the scale. Similarly, in statement 6: *I worry about sharks when I go in the ocean,* the mean response was also at the agree end of the scale, as such indicating a more negativistic attitude towards sharks. Yet, as previously mentioned, these responses appear to conflict with the majority view that sharks do not intentionally harm or hunt people. This can also be correlated with the general knowledge question of: *all shark species are a potential threat to humans*?, to which 92% of respondents answered false. So, despite respondents having knowledge that not all sharks are a threat, and an attitude or belief that they do not intentionally harm or hunt people, many respondents still have a fear of sharks.

Interestingly, in statement 7 of the utilitarian category: *I would eat shark,* the mean response was 3.17 (SD 1.42). Respondents across age groups were split in their responses to this statement. Those at the agree end of the scale indicating they would eat shark, which may be considered a more utilitarian attitude, and those at the disagree end of the scale, possibly indicating a more naturalistic attitude.

In the naturalistic category participants overwhelmingly indicated agreement with naturalistic thinking in their responses. For example, in statement 5: *sharks should be protected,* the mean response was at the strongly agree end of the scale, indicating a naturalistic attitude towards sharks. The one exception in this section

was with statement 11: *I would never eat shark,* the mean response was 3.05 (SD 1.3), however, across all age groups the majority (52%) disagreed with this statement, indicating that they would eat shark. In relation to this specific statement a more utilitarian attitude is possibly seen. Interestingly, in the naturalistic category, statement 4: *I like to learn about sharks,* the mean response was 2.2 (SD 0.8) at the agree end of the scale, this is encouraging to note when considering opportunities for using environmental education to create greater awareness of and increased protection for sharks.

Within the scientistic category respondents exhibited a general agreement with scientistic thinking in their responses. For example, in statement 9: *I don't think sharks intend to harm humans,* the mean response was at the agree end of the scale. Further, in statement 12: *sharks are essential to the health of the ocean,* the mean response was also at the agree end of the scale. Responses to both statements possibly indicate a more scientistic attitude towards sharks in this section.

Overall, there is no clear indication that age has an influence in terms of attitudes towards sharks through this study. Very broadly the older participants (41-55 and 56 -70) have slightly less naturalistic attitudes towards sharks than the younger participants in the study. As age does not seem to have a significant influence on attitudes towards sharks in this study, it is possible attitudes are mainly influenced by people's knowledge and experience with sharks.

The large majority of respondents' feelings towards sharks were of fear, however those in the fear theme generally indicated negative views of sharks that seemed to have little to do with actual experience and more to do with perceptions based on exposure to sharks through the media, movies and general negative imagery of sharks. This was also highlighted by the majority of these respondents selecting the great white as the first species that comes to mind, again due to the association with sharks in movies such as *Jaws* and media coverage. This highlights the possibly important role of education in creating greater awareness and understanding of sharks to develop attitudes towards them, and also to dispel the misconceptions held about sharks, which have possibly been developed through exposure to media and movies. Despite a largely fear-based attitude in response to

early questions in this section responses to the attitude orientation questions tended to be more naturalistic and scientistic in nature. This shows that despite an initial “gut” reaction of fear towards sharks, when more thoughtful consideration is given, attitudes are more neutral. This potentially opens the way for developing attitudes and values towards sharks through species-specific environmental education, which could lead to greater protection for them.

4.2.4 Experience with sharks

Participants responded to open-ended questions about their experience with sharks. In question one they were asked: *have you ever seen a shark in an aquarium? If yes, how did this make you feel?* The findings are shown in Figure 4.4 below for the first part of the question.

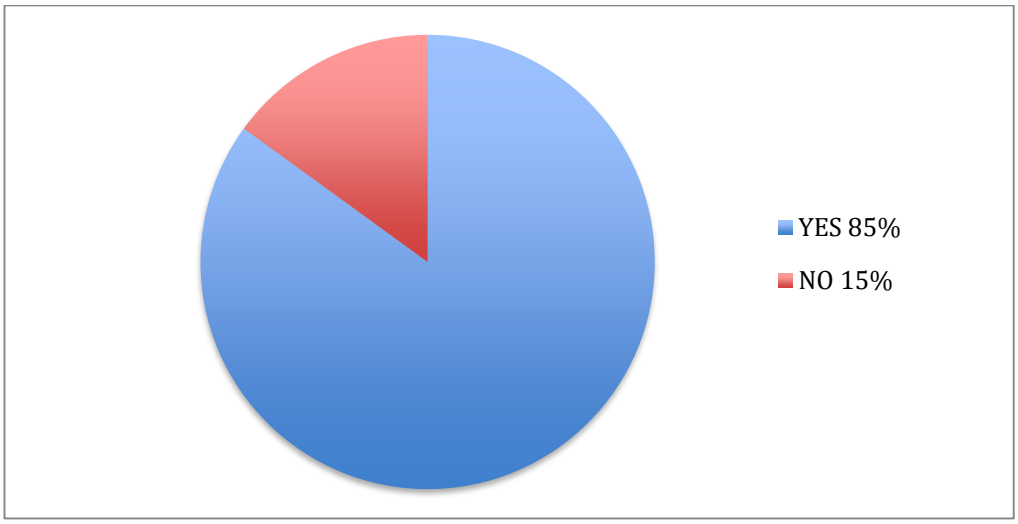

Figure 4.4: Have you ever seen a shark in an aquarium? n=60.

The majority (85%) of participants responded that they had seen a shark in an aquarium, while 15% had not. Although there is no aquarium in the Bay of Plenty, it is possible that this number of people have visited and seen sharks in aquaria in other parts of the country, or possibly the world.

In the second part of question one, participants' responses were categorised based on their answer to the question: *how did this make you feel?* The themes that emerged were: positive, empathy, neutral stance (which includes responses that were based more on knowledge of sharks, as opposed to feelings), and fear. Figure 4.5 shows the spread of responses for this question.

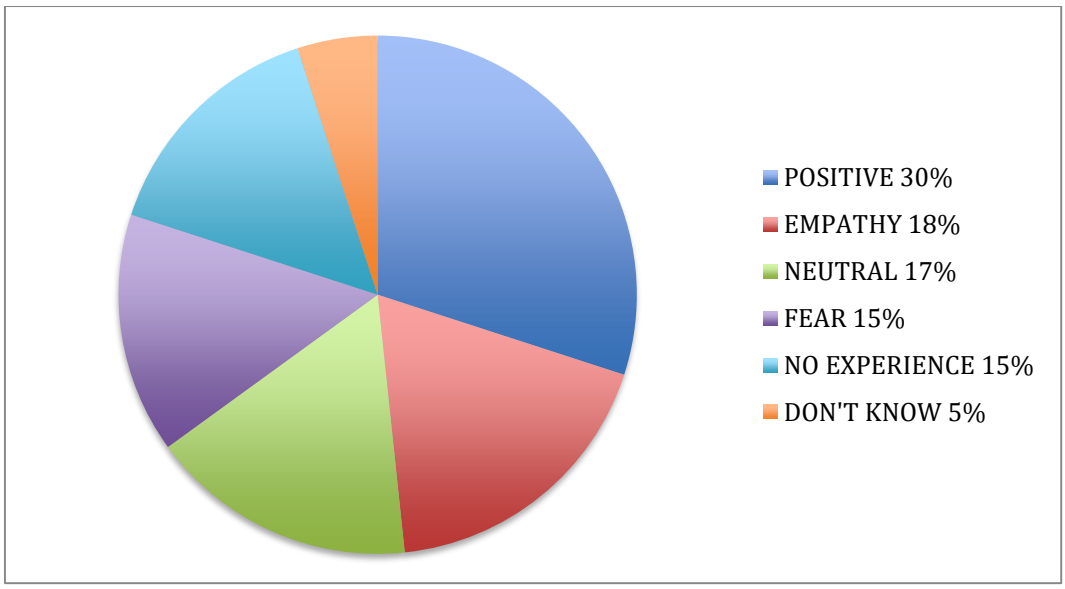

Figure 4.5: How did seeing a shark in an aquarium make you feel? n=60.

The themes shown in Figure 4.4 were based on participants' responses to the question *how did this make you feel?* and were largely positive or empathetic in response to seeing a shark in an aquarium. A selection of responses to this question can be seen below in Table 4.9.

Table 4.9: Selection of responses to question one: how did this make you feel?

Category	How did this make you feel? (to see a shark in an aquarium)
Positive	In awe, marvelling at them, size, design, speed, God's creature
	Amazement
	Excited, awestruck
	Excited, I enjoy watching something I may not get to see in the wild
Empathy	Sad because they are not in their natural habitat
	Sorry for it
	I don't agree with large fish aquariums, fish travel miles
	Awful
Neutral	They looked quite small and not so scary
	Okay as treated well and a good knowledge tool
	Fine, was behind the glass
	Totally relaxed in a controlled situation
Fear	Scared
	Like it was massive and scary, awesome (I was a child)
	Pleased it was on the other side of the glass
	Wow, but glad it was in there and I wasn't

Nearly a third of participants (30%) felt positive about their experience seeing a shark in an aquarium, possibly due to the fact that they were in a controlled environment where they could view the shark without any fear of harm.

The next greatest response (18%) was empathy, typified by respondents feeling sad, or sorry for the shark not being in its natural environment. The neutral theme (17%) was indicated by more knowledge-based responses or a calm response to seeing sharks in an aquarium. In the fear theme, 15 percent still felt scared or worried about sharks even though they were on the other side of glass.

In the second question participants were asked: *have you ever seen a shark in the ocean? If yes, how did this make you feel?* As figure 4.6 shows the majority (58%) of participants reported they had seen a shark in the ocean. This is more than half, which may be attributed to the coastal nature of the Bay of Plenty and participants' involvement in recreation related to the ocean. This is explored in a later question.

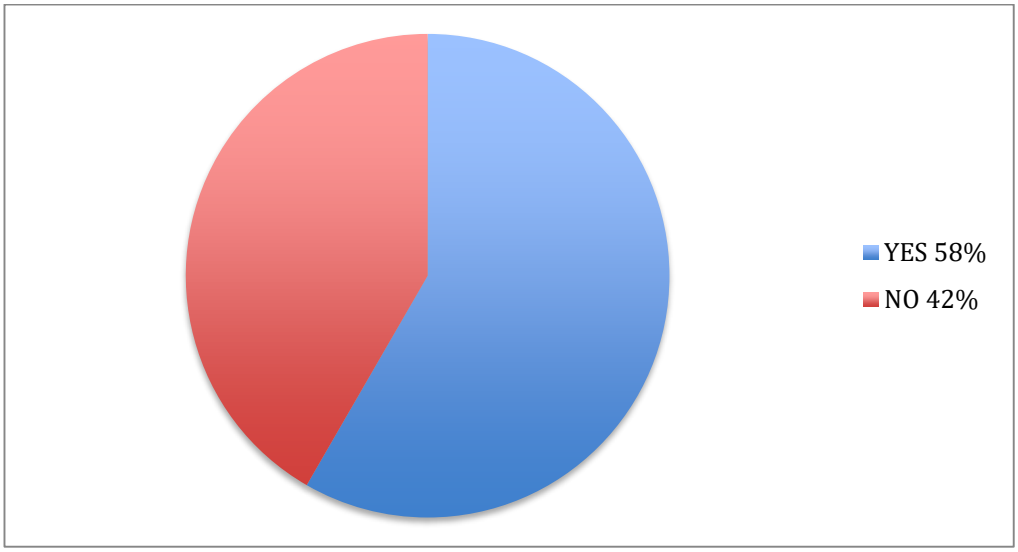

Figure 4.6: Have you ever seen a shark in the ocean? n=60.

Participants' feelings of having seen a shark in the ocean were categorised as: positive, fear, neutral and mixed (this included those that felt both fear and positive responses to the experience). Of those who had seen a shark in the ocean (n=35) almost half (43%) felt positive about this experience, with almost a third (29%) expressing fear, and with neutral and mixed responses each accounting for 14% of responses. Figure 4.7 shows the findings for this part of the question.

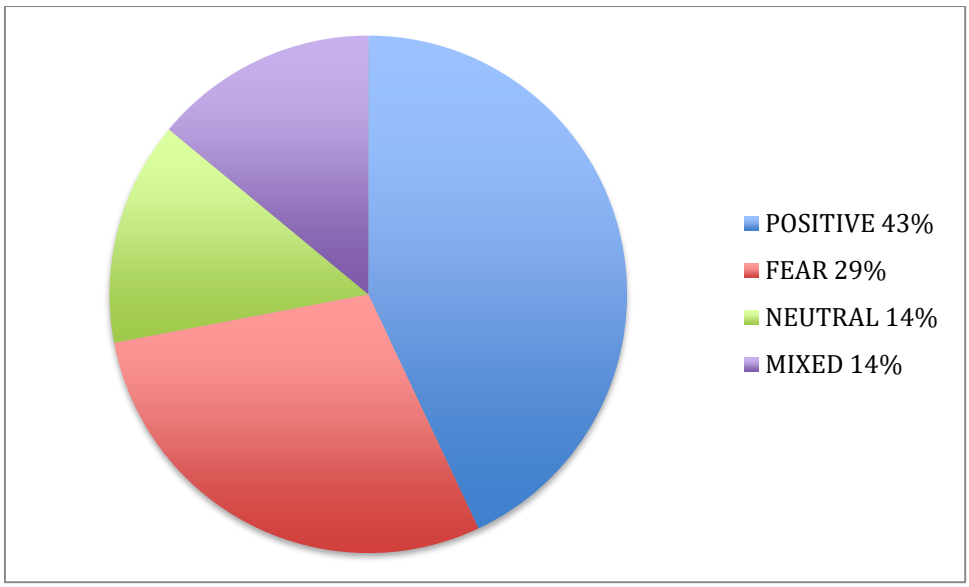

Figure 4.7: How did it make you feel to see a shark in the ocean, n=35

The majority (43%) of participants who had seen a shark in the ocean felt positive about the experience. Based on some of the responses to this question, it is possible the experience of seeing a shark in its natural habitat may have helped to create greater understanding and awareness of the nature of the shark, as opposed to the nature portrayed in movies and in the media, as such helping to alleviate any possible fear. Of those who had seen a shark in the ocean 29% did feel fear, based on their responses their fear seemed to have little to do with the actual experience and more to do with perceptions based on prior exposure to sharks through the media, movies and general negative imagery of sharks.

While the mixed responses to this question accounted for only a small percentage (14%) of the total, it is interesting to note these responses as they seem to represent a paradox between participants' feelings about seeing a shark in the ocean (excitement, fascination, happiness) and their prior knowledge of sharks (fear, scared). Table 4.10 provides a selection of the responses that participants gave to this question.

Table 4.10: Selection of responses to question two; how did this make you feel?

Theme	How did this make you feel? (to see a shark in the ocean)
Positive	Excited, awestruck
	Interested and curious
	It's how nature is supposed to be
	What an awesome sight
	I wanted a better view as it was an unknown animal
Fear	Scared because of the way they are portrayed as human eaters
	Little bit scared
	Wary of making sure to keep distance
	EEK!
Neutral	It's how nature's supposed to be
	I see them regularly, depending on what species I will either ignore them or get out of the water
	Curious as to what they were doing
	Just another fish
Mixed	Respect and amazement, but fear when a bronze whaler
	Fascinated, but scared
	A little concerned and excited at the same time
	Excited and happy, but a little fearful

The third question in this section asked participants about their use of the ocean for recreation. The majority (95%) answered yes to the question: *do you use the ocean for recreation.* These respondents were asked to explain how they used the ocean for recreation and the responses are shown in Figure 4.8.

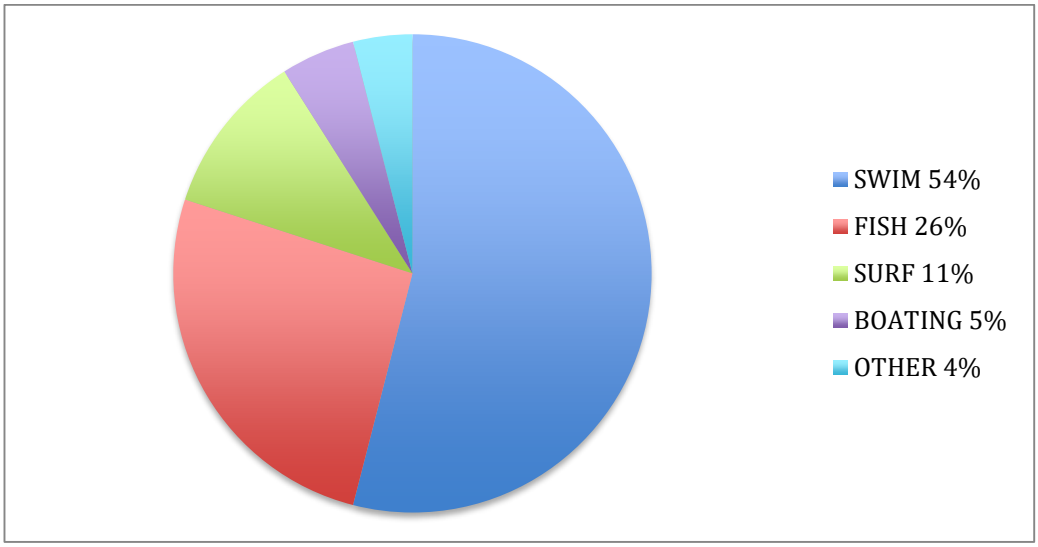

Figure 4.8: How do you use the ocean for recreation, n=57

In response to *how* respondents use the ocean for recreation, the majority (54%) indicated they used it for swimming, followed by 26% for fishing, 11% for surfing, 5% for boating and 4% other which included responses such as walking at the beach and diving. While all of these recreational activities have the potential to bring people into contact with sharks, it is most likely that people would come into contact with sharks through fishing and boating activities. This is due to the fact that we usually have to work quite hard to see a shark in the water by doing something actively to attract them (Duffy, 2013). Fishing and spearfishing activities can attract sharks as these tend to spill blood in the water and cause electromagnetic vibrations from struggling fish, and sharks are attracted to this and will come into the area to feed (Duffy, 2013). It may also be argued that swimming and surfing could at times create enough activity and electromagnetic vibration to attract sharks.

Questions 5 to 8 in this section asked a variety of questions to determine where the respondents gathered their information about sharks. The findings for these questions are presented in Table 4.11.

Table 4.11: Responses to questions about knowledge formation

Question	# Response	Percentage
5: Do you watch wildlife documentaries e.g. BBC, Discovery	n=60	
YES	**54**	**90**
NO	6	7
6: Have you ever watched Shark Week on Discovery Channel	n=60	
YES	27	45
NO	**33**	**55**
7: Have you ever watched the movie *Jaws*?	n=60	
YES	**52**	**87**
NO	8	13
8: Do you read any wildlife or environmental publications?	n=60	
YES	26	43
NO	**34**	**57**

In question 5 respondents were asked if they watched wildlife documentaries on channels such as BBC and Discovery Channel. The majority (90%) indicated that they did watch wildlife documentaries, which would possibly have given them access to scientific shark information and objective reporting.

Question 6 asked respondents if they had ever watched "Shark Week" on Discovery Channel. The majority (55%) responded no; while 45% responded yes, they had watched it. Shark Week is an annual, weeklong programming block created by the Discovery Channel which features shark-based programming, both real and fictional. In recent times it has attracted criticism for airing dramatic fictional programs to increase viewership. Watching "Shark Week" would have given respondents access to some scientific information about sharks, but also exposure to much sensationalism and negative reporting on sharks.

In question 7 respondents were asked if they had ever watched the movie *Jaws*. The vast majority (87%) answered yes, while only 13% answered no. As previously discussed, the *Jaws* movie appeared to have had a negative influence on some respondents' attitudes towards sharks.

The final question in this section asked respondents if they read any wildlife or environmental publications. The majority (57%) responded that they did not, while 43% indicated they did read such publications. Reading wildlife publications could possibly provide access to information about sharks that is scientific and evidence based, as opposed to negative or subjective reporting.

In question 9 participants were asked *where do you receive most of your information about sharks?* Respondents indicated their three most accessed sources from a list of 9, which included: newspaper, Internet, TV news, TV documentaries, magazines, movies, other people, books and education e.g. school. Data for this question is presented in Figure 4.9.

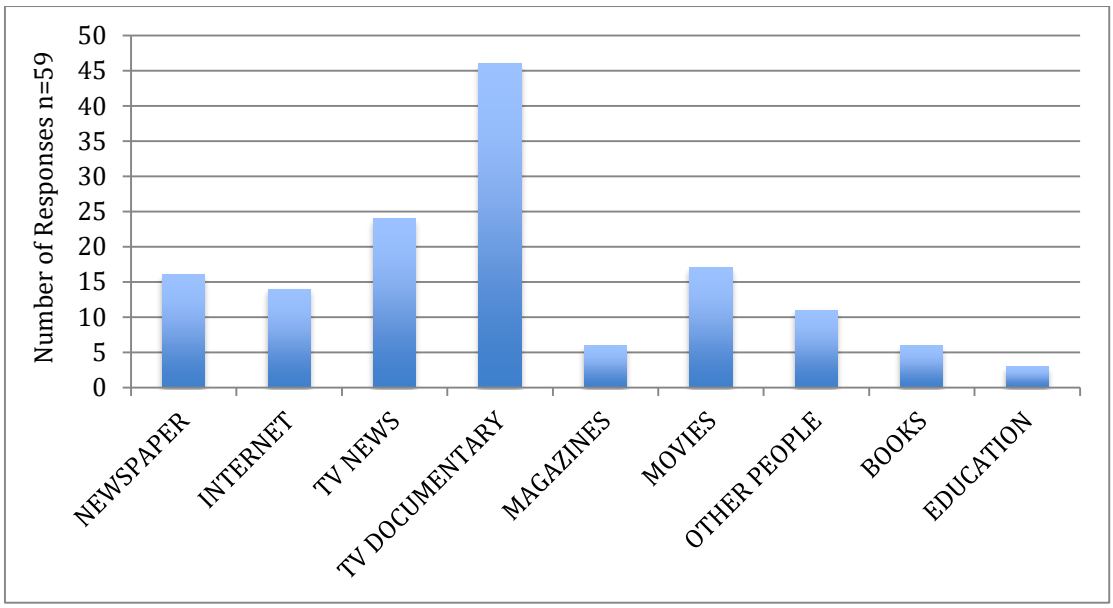

Figure 4.9: Where do you receive most of your information about sharks?

Based on the number of respondents (n=59), percentages were determined for where participants received most of their information about sharks. The majority (77%) indicated TV documentaries as a source of their information about sharks. While documentaries have the potential to be a 'good' source of information, it is also possible that they may not be. Documentaries are available through a variety of channels; as such there may be a difference in the quality and level of scientific information being reported between a Discovery channel "shark week" documentary and a BBC Blue Planet documentary. As such knowledge and attitude formation through exposure to these different documentaries may be very different for the individuals that watch them.

TV news was the second most reported means of obtaining information about sharks (40%), followed by movies (29%), and newspapers (27%). These means are possibly not the best for accurate information gathering on sharks. The news and entertainment media have been widely credited for perpetuating negative portrayals of sharks and for amplifying public fear (Philpott, 2002). This feature has been highlighted by some of the responses to previous attitude questions by respondents in this study.

Interestingly, only 5% of respondents indicated education as the source of their information about sharks. As Kellert (1996) states, education is one of the most powerful forces in shaping perceptions of nature and biodiversity. As such, there

is an untapped potential for creating greater awareness, understanding and developing positive attitudes towards sharks through education.

The majority of respondents had some experience with sharks, whether through aquarium visits or in the natural environment. For many this experience was positive, perhaps as a result of seeing the shark in a natural state, which may have helped to dispel some fears and misconceptions about sharks presented in the media and movies. This possibly shows that experience with sharks can be a powerful tool to create greater understanding of sharks and as such develop positive attitudes towards them. Respondents indicated they obtained information about sharks from a variety of sources, with TV documentaries being the most common. This was followed by the TV news, movies and newspaper. As such respondents have been exposed to varying levels of scientific information about sharks, as well as a wide variety of negative portrayals of sharks, all which have helped to develop their attitudes towards sharks.

4.2.5 Environmental Behaviour

Question 4, and questions 10 to 12 in this section sought to determine respondents' behaviour with regards to certain environmental actions. Table 4.12 shows the responses to these questions.

Table 4.12: Responses to questions regarding environmental activity

Question	# Response	Percentage
4: Are you a member of a conservation or environmental group	**n=60**	
YES	6	10
NO	**54**	**90**
10: Have you ever donated money to a wildlife or environmental project?	n=60	
YES	**33**	**55**
NO	27	45
11: Have you ever volunteered for a wildlife or environmental project?	n=60	
YES	17	28
NO	**43**	**72**
12: Would you donate money or time to a project to help conserve sharks?	n=58	
YES	26	45
NO	**32**	**55**

The majority of responses in this section were in the negative. The respondents were largely not members of conservation or environmental groups, nor had they volunteered for wildlife or environmental projects. While just over half have never donated money to a wildlife or environmental project, just under half have, indicating the willingness to donate money, but perhaps not time.

In question 12: *would you donate time or money to help conserve sharks*?, the majority (55%) of respondents indicated they would not. If we compare this with the response in question 10: *have you ever donated money to a wildlife or environmental project*, the majority (55%) indicated they had. The question is then raised, why do respondents not want to donate money or time to help

conserve sharks, when many (55%) indicated they have previously done so for other wildlife and environmental projects? Furthermore, if we compare this with the question of protecting sharks in the attitudes and values section where 75% strongly agreed or agreed that sharks should be protected, there appears to be a disparity between a largely naturalistic attitude regarding shark protection and respondents' environmental behaviour to support such protection. Is this due to respondents' overwhelming attitude of fear towards sharks? If so, much needs to be done to create greater awareness and understanding of sharks in order to develop more positive attitudes towards them, if they are to have the protection they need. It has been found through research on public perceptions of marine wildlife that individuals with high levels of knowledge and positive attitudes towards animals such as sharks are more likely to support their conservation (Thompson & Mintzes, 2002).

Interestingly, those respondents (45% n=58) who indicated support for shark conservation had a good level of knowledge in response to the knowledge questions posed. In the attitudes and values section they largely responded in the fear theme (54% n=26) based on initial "gut" reaction to sharks. However, when more thoughtful consideration of sharks was given their attitudes were mostly naturalistic and scientistic in nature. Further, most respondents in this group had some experience with sharks, 92% (n=26) had seen a shark in an aquarium and 73% (n=26) in the ocean. Research has found that individuals with high levels of knowledge and positive attitudes towards animals such as sharks are more likely to support their conservation (Thompson & Mintzes, 2002)

Overall, participants in this research were largely unsupportive of conservation or environmental groups and projects. While a small majority of respondents had donated money to a wildlife or environmental project, very few had donated time. The majority view was that support, by way of time or money, would not be given to a shark conservation project.

4.2.6 Community Group Findings Summary

Sixty participants from the Bay of Plenty region took part in this research study; the group was made up of 26 males and 34 females all, of varying ages.

While most of the respondents rated their knowledge of sharks as poor to average, they actually demonstrated a reasonable level of knowledge on the survey questions. In only three of the nine questions did the majority of participants respond with a less scientifically-accepted answer. These three questions could perhaps be considered more specific or scientific questions relating to sharks. However, knowledge of this type is valuable as a greater overall understanding of sharks could help to develop positive attitudes and values towards them.

The large majority of respondents indicated that they felt fear about sharks; those negative views of sharks seemed to have little to do with actual experience and more to do with perceptions based on exposure to sharks through the media, movies and general negative imagery of sharks. This was also highlighted by the majority of respondents selecting the great white as the shark they first thought of, again due to the association with sharks in movies such as *Jaws* and in the media. This highlights the important role of education in creating greater awareness and understanding of sharks to develop attitudes towards them. Despite a largely fear-based attitude shown in first thoughts about the idea of sharks, responses to more considered attitude orientation questions tended to be more naturalistic and scientistic in nature, as opposed to negativistic / utilitarian. This potentially opens the way, through education, for developing attitudes and values towards sharks and their protection.

Interestingly, the majority of respondents in this study had some experience with sharks, either through aquarium visits or in the natural environment. For most, this experience was positive, perhaps as a result of seeing the shark in a natural state, which may have helped, to dispel fears and misconceptions about sharks presented in the media and movies. This may show that experience with sharks can be a powerful tool to create greater understanding of these animals and, as such, develop positive attitudes towards them. Most participants indicated their information about sharks was obtained through TV documentaries, followed by

the TV news, movies and newspapers. As such, respondents have been exposed to varying levels of scientific information about sharks, as well as a wide variety of negative portrayals of sharks through the media, all of which may have developed their attitudes towards sharks.

The participants in this study were largely unsupportive of conservation or environmental groups and projects. While a small majority of them had donated money to a wildlife or environmental project, very few had donated time. The majority view was that support, by way of time or money, would not be given to a project to help conserve sharks, despite their reported belief that sharks should be protected.

4.3 Primary School Group Findings

4.3.1 Demographic of Primary School Students

Twenty-five students from a local primary school class (year 5-6) participated by completing a survey questionnaire. All students were between 10-11 years and the group comprised 14 male and 11 female students.

4.3.2 General Knowledge of Sharks

Participants responded to a number of questions regarding their general knowledge of sharks. The majority (88%) rated their knowledge as average to good (see Figure 4.10).

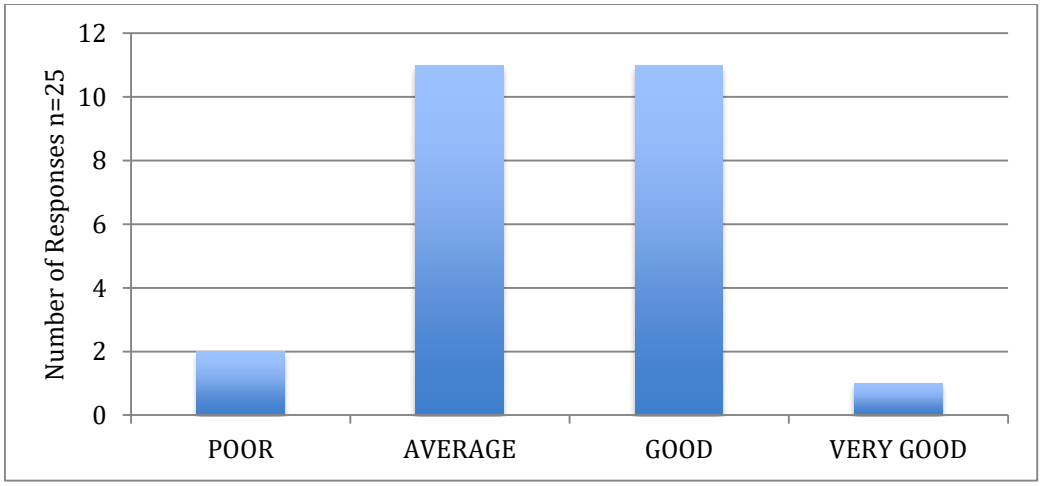

Figure 4.10: How would you rate your knowledge of sharks?

Based on their responses to specific general knowledge questions about sharks, five of the nine questions were answered using scientifically-accepted answers by the majority (over 50%) of students. Table 4.13 below shows the findings to these questions, with the scientifically-accepted response in bold italics along with the number of responses and the percentage.

Table 4.13: Responses to Knowledge Questions about sharks

Question	# Responses	Percentage
2: Sharks are a type of fish?	**n=25**	
TRUE	***19***	***76***
FALSE	6	24
DON'T KNOW	0	0
3: Sharks breed quickly & produce many young?	**n=24**	
TRUE	4	17
FALSE	***11***	***46***
DON'T KNOW	9	37
4: Sharks are not essential to the health of oceans?	**n=25**	
TRUE	0	0
FALSE	***20***	***80***
DON'T KNOW	5	20
5: The number of sharks in the ocean is declining?	**n=25**	
TRUE	***22***	***88***
FALSE	0	0
DON'T KNOW	3	12
6: The sale of shark fin in NZ is legal?	**n=25**	
TRUE	**6**	**24**
FALSE	*12*	*48*
DON'T KNOW	7	28
7: Shark meat is sold to be eaten in NZ?	**n=24**	
TRUE	8	**33**
FALSE	8	33
DON'T KNOW	8	33
8: All shark species are a threat to people?	**n=25**	
TRUE	2	8
FALSE	***22***	***88***
DON'T KNOW	1	4
9: The number of shark species in NZ is?	**n=25**	
(0-5)	0	0
(6-20)	8	32
(21-40)	3	12
(41-80)	7	28
(81-120)	***3***	***12***
DON'T KNOW	4	16
10: The total number of fatal shark attacks in NZ?	**n=25**	
(0-5)	3	12
(6-10)	***4***	***16***
(11-15)	9	36
(16-20)	4	16
DON'T KNOW	5	20

The majority of students (76%) indicated they understood sharks were a type of fish. This is perhaps not surprising given a possible association by students regarding the ocean habitat sharks share with other fish, and common features such as fins and gills. Concerning shark reproduction 46% of students understood that sharks do not breed quickly or produce many young, while 37% did not know the answer to the question.

The majority (80%) indicated their understanding of sharks' importance to ocean health, and also indicated their understanding that shark numbers are declining (88%). As previously discussed in the community section, this response may have been influenced by increased media coverage about sharks and banning finning, which highlighted the importance of sharks to ocean health and their decline. However, it seems unlikely that students would have obtained this information in entirely the same way. It is possible students got their information through parents and teachers exposed to the media, but also through books and documentaries that may have highlighted these facts.

The large majority (88%) responded *false* to question 8: about whether they thought - *all sharks are a potential threat to humans*. From this response, it may be the students have an understanding that there are many different species of sharks (as indicated in responses to question 9 below) and that only a small number may be a threat to people. Whereas the adults in the community section may have been exposed to this information through increased media coverage of shark attacks and the species associated with them, it again seems unlikely that students would have. As above, it is also possible students obtained this information through adults such as teachers and parents who were exposed to media coverage, as well as through books and documentaries.

The first of four questions to which fewer students gave the scientifically-accepted answers was question 6: *the sale of shark fin is legal in NZ.* A small number of students (24%) answered this question correctly. However, most (48%) answered incorrectly, believing the sale of shark fin to be illegal in NZ. It is possible that students were learning this information second-hand from adults who had been exposed to media coverage about the ban on shark finning in NZ

waters, and the requirement to land the whole shark may have led to some confusion when answering this question.

The second of the four questions that many students answered incorrectly was question 9: *the number of shark species in NZ is?* The correct answer was in the range *81-120 species,* which 12% answered correctly. The majority of students answered this question across two ranges, 32% of students believed there were *6-20* species of shark in NZ, and 28% believed there were *41-80* species. This generally indicates they had little idea of the number of species of shark in NZ.

The third question that was answered incorrectly by most students was question 10: *the total number of fatal shark attacks in NZ is?* The correct answer was the range *6-10 fatal attacks*, which only 16% answered correctly. Interestingly, the greatest number of responses came in the range *11-15 fatal attacks* (36%), which is very close to the correct answer. However, almost as many students underestimated or did not know the answer to this question, generally indicating they had little knowledge in this area.

The responses to question 7: *shark meat is sold to be eaten in NZ,* were split equally across all possible responses (33% each), indicating that most students did not know or answered incorrectly. As previously mentioned, shark meat is sold in supermarkets and takeaway shops, often labelled as lemon fish, so some students may possibly have been exposed to this through shopping with their parents or caregivers.

The majority of students had rated their knowledge of sharks as average to good which was a fairly true representation based on their demonstrated knowledge of many of the questions posed. The four questions where most students answered with the less scientifically accepted answer could perhaps be considered more specific or scientific questions relating to sharks and as such may not be considered general knowledge. However, knowledge of this type may help students gain a greater overall understanding of sharks and to develop positive attitudes and values towards them.

4.3.3 Attitudes and Values towards Sharks

In this section students responded to open-ended questions regarding their thoughts and feelings about sharks. In question one they were asked: *When you hear the word "shark" what is your first thought*? And *why is this your first thought?* Participants' responses were categorised based on their answers to both questions, and the emerging themes were: fear, empathy and a neutral stance which included responses that were based more on knowledge of sharks, as opposed to feelings. Figure 4.11 shows the spread of data for this question.

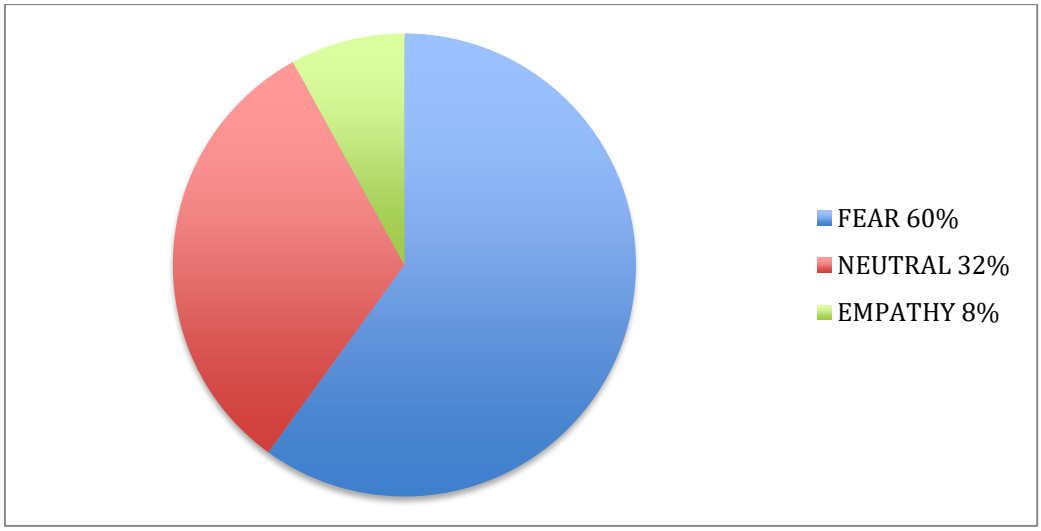

Figure 4.11: Themed responses to question: when you hear the word shark what is your first thought and why? n=25

The majority of students (60%) responded to this question in ways that were categorised as fear. Many of the responses in the fear theme indicated that general negative imagery; TV and movies were influential in their responses to this question. About one third of the students (32%) fitted into the neutral stance theme, which was generally indicated by more scientific and knowledge-based responses, as opposed those based on feelings. Finally, eight percent of respondents were placed into the empathy theme, whereby they indicated concern for sharks and the threats they face, such as over-fishing and finning. There was no distinct difference in responses to this question between boys and girls, for example 7/10 girls responded in the fear theme while 9/14 boys responded in the fear theme. Table 4.14 below provides a selection of students' responses to question one, and the reasons for their responses.

Table 4.14: Selection of responses to question one and the reasons for response

Category	When you hear the word shark what is your first thought?	Why?
Fear	Predator	Most sharks kill people
	Scary	They have sharp teeth
	Scary	I watch TV
	Blood	Because I watched *Jaws*
	Attacking me	I watched Soul Surfer movie
Neutral	Big fish	It is a big fish
	It's a sea creature	They live in the sea
	What happened?	Lots of things happened to sharks, e.g. finning
	Finning	Dad gets Greenpeace letters
Empathy	Shark is more scared of me	I have loved sharks since I was little
	Poor creatures	Number in decline, being killed

Participants responded to a second question in this section: *when you think of sharks, what type of shark comes to mind first? Why do you think this shark comes to mind?* Figure 4.12 shows the different species of sharks indicated by respondents in this question.

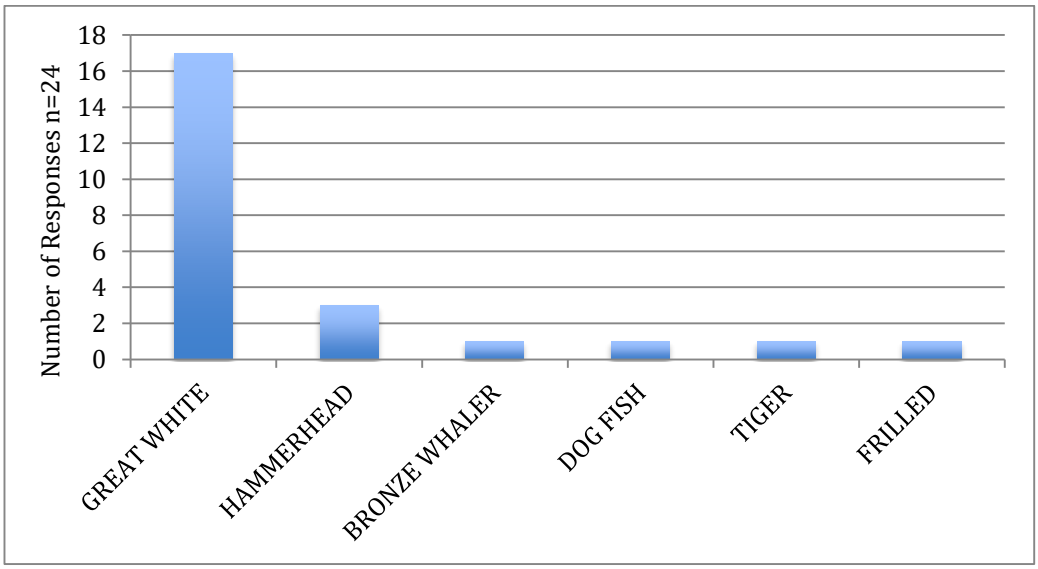

Figure 4.12: When you think of sharks what type comes to mind first?

As in the community section, the majority (71%) of students named the great white shark as the first shark that came to mind, followed by the hammerhead (13%). Regarding the great white response, 41% (n=17) made comments such as "scary" and "kills" as the reason it came to mind first. A further 41% of the group stated it was the shark they had heard about the most, or was the most famous and therefore came to mind first. Table 4.15 shows some examples of these responses below.

Table 4.15: Examples of responses to why students first thought of great whites

When you think of sharks what type comes to mind first?	Why?
Great White	Kill more people than others
Great White	They are scary
Great White	My favourite
Great White	Big, most scary
Great White	World's most dangerous
Great White	It's the main one
Great White	It's in a lot of movies
Great White	Most famous and coolest

The third question in this section represented a list of 16 attitude orientation statements towards sharks. A scale, which included: *strongly agree, agree, unsure, disagree to strongly disagree* was used to determine a participant's level of agreement with each statement. Table 4.16 shows the complete list of statements and participant responses as a percentage of the total number of responses (also indicated) and a mean and standard deviation for each statement. The mean and standard deviation for this group is indicative only as this group has a small sample size.

As indicated in Table 4.6 previously each possible response was allocated a numerical value in order to determine the mean and standard deviation of all responses to a particular statement. *Strongly agree* response =1, through to *strongly disagree* response =5.

Several of the statements were paired as a reliability check. For example, in statement 1: *I believe sharks hunt humans,* 32% disagreed and 48% strongly disagreed with this statement, with a mean of 4.2 and a standard deviation of 0.86. When this is compared with the similar but oppositely orientated statement 9: *I don't think sharks intend to harm humans*, it can be seen that 64% strongly agreed and 12% agreed with this statement, with a mean of 1.76 and a standard deviation of 1.2. These responses are consistent and were answered in almost similar ways therefore, they are considered reliable. This is also an indication that the students in this group have given thoughtful consideration to these questions, making them reliable. Furthermore, the findings indicate that the majority of students do not believe sharks intentionally harm or hunt people, which is a similar view to that held by the community group.

Similarly, in statement 7: *I would eat shark,* 16% disagreed and 64% strongly disagreed with this statement, with a mean of 4.28 and a standard deviation of 1.17. When this is compared with the similar but oppositely orientated statement 11: *I would never eat shark,* 58% of students strongly agreed and 21% agreed with this statement, with a mean of 1.75 and a standard deviation of 1.07. Similarly, as indicated above the students have answered these questions fairly consistently, making these findings reliable. Furthermore, these findings indicate that the majority of students would not eat shark, which is a distinctly different attitude than that held by those in the community section.

The 16-attitude orientation statements shown in Table 4.16 below link to specific attitude categories as defined by Kellert (1983). Specifically, they link to three categories: *utilitarian/negativistic, naturalistic and scientistic*. Table 4.17 shows the attitude statements as they were seen to respond to Kellert's attitude categories in this study.

Table 4.16: Attitude orientation statements and responses shown as a percentage, with mean and standard deviation

Question	Strongly Agree (1)	Agree (2)	Unsure (3)	Disagree (4)	Strongly Disagree (5)	Mean	SD
1: I believe sharks hunt humans n=25	0	8	12	32	48	4.2	0.96
2: Eating sharkfin has no nutritional value n=25	32	20	40	8	0	2.24	1.01
3: I am afraid of sharks n=25	20	28	16	32	4	2.72	1.24
4: I like to learn about sharks n=24	42	46	12	0	0	1.7	0.96
5: Sharks should be protected n=25	60	24	4	12	0	1.68	1.03
6: I worry about sharks when I go in the ocean n=25	16	32	16	24	12	2.84	1.31
7: I would eat shark n=25	4	8	8	16	64	4.28	1.17
8: I would like to see a shark in the ocean n=25	24	48	16	4	8	2.24	1.13
9: I don't think sharks intend to harm humans n=25	64	12	12	8	4	1.76	1.2
10: People are unlikely to see a shark in the wild n=23	9	30	30	22	9	2.91	1.12
11: I would never eat shark n=24	58	21	8	13	0	1.75	1.07
12: Sharks are essential to the health of the ocean n=24	29	17	46	8	0	2.33	1.01
13: I think the only good shark is a dead shark n=25	0	12	4	28	56	4.28	1.02
14: I believe sharks avoid human contact n=25	28	28	28	16	0	2.32	1.07
15: I don't care if sharks are killed n=25	0	0	12	36	52	4.4	0.71
16: I like sharks n=25	44	32	12	12	0	1.92	1.04

Table 4.17: Attitude statements and their corresponding attitude categories

	QUESTION
1	I believe sharks hunt humans
3	I am afraid of sharks
6	I worry about sharks when I go in the ocean
7	I would eat shark
13	The only good shark is a dead shark
15	I don't care if sharks are killed
4	I like to learn about sharks
5	Sharks should be protected
8	I would like to see a shark in the ocean
11	I would never eat shark
16	I like sharks
2	Eating sharkfin has no nutritional value
9	I don't think sharks intend to harm humans
10	People are unlikely to see a shark in the wild
12	Sharks are essential to the health of the ocean
14	I believe sharks avoid human contact

Utilitarian / Negativistic
Naturalistic
Scientistic

Students' responses to the attitude statements from Table 4.16 have been further analysed and grouped based on the attitude categories in Table 4.17. This was done to further determine their attitude orientations towards sharks. Table 4.18 below is separated into three different sections, one for each attitudinal category: *utilitarian/negativistic, naturalistic and scientistic*. Participants' responses are shown as a number (n=25, unless otherwise stated). As in Table 4.16 the same numerical values were assigned to each response in order to determine the mean and standard deviation for each statement. As above, the mean and standard deviation for this group is indicative only as this group has a small sample size.

Table 4.18: Responses to attitude statements separated into attitude categories, showing mean and standard deviation

#	Statement / Category	<15 (n=25)						Mean	SD
	Utilitarian	**SA**	**A**	**UN**	**D**	**SD**			
1	I believe sharks hunt humans	0	2	3	8	12		4.2	0.96
3	I am afraid of sharks	5	7	4	8	1		2.72	1.24
6	I worry about sharks when I go in the ocean	4	8	4	6	3		2.84	1.31
7	I would eat shark	1	2	2	4	16		4.28	1.17
13	The only good shark is a dead shark	0	3	1	7	14		4.28	1.02
15	I don't care if sharks are killed	0	0	3	9	13		4.4	0.71
#	**Statement / Category**	**<15 (n=25)**						**Mean**	**SD**
	Naturalistic	**SA**	**A**	**UN**	**D**	**SD**			
4	I like to learn about sharks *n=24*	10	11	3	0	0		1.7	0.96
5	Sharks should be protected	15	6	1	3	0		1.68	1.03
8	I would like to see a shark in the ocean	6	12	4	1	2		2.24	1.13
11	I would never eat shark *n=24*	14	5	2	3	0		1.75	1.07
16	I like sharks	11	8	3	3	0		1.92	1.04
#	**Statement / Category**	**<15 (n=25)**						**Mean**	**SD**
	Scientistic	**SA**	**A**	**UN**	**D**	**SD**			
2	Eating sharkfin has no nutritional value	8	5	10	2	0		2.24	1.01
9	I don't think sharks intend to harm humans	16	3	3	2	1		1.76	1.2
10	People are unlikely to see a shark in the wild *n=23*	2	7	7	5	2		2.91	1.12
12	Sharks are essential to the health of the ocean *n=24*	7	4	11	2	0		2.33	1.01
14	I believe sharks avoid human contact	7	7	7	4	0		2.32	1.07

In the utilitarian category the students exhibited a general disagreement with utilitarian thinking in their responses. For example, in statement 7: *I would eat shark,* the mean response was at the strongly disagree end of the scale. Similarly in statement 13: *The only good shark is a dead shark,* the mean response was also at the strongly disagree end of the scale. However, in two of the statements in this section the students exhibited more utilitarian or negativistic thinking towards sharks. For example in statement 3: *I am afraid of sharks,* the mean response was at the agree end of the scale. Similarly, in statement 6: *I worry about sharks when I go in the ocean;* the mean response was also at the agree end of the scale. While the students largely exhibited disagreement with utilitarian thinking, some negativistic attitudes came through which may have been influenced by exposure to negative imagery of sharks in the media and movies, resulting in fear based thinking in response to specific questions.

In the naturalistic category the students overwhelmingly indicated agreement with naturalistic thinking in their responses. For example, in statement 5: *sharks should be protected,* the mean response was at the strongly agree end of the scale. Similarly, in statement 11: *I would never eat shark,* the mean response was at the strongly agree end of the scale, indicating a naturalistic attitude towards sharks. Interestingly, in statement 4: *I like to learn about sharks,* the mean response was at the strongly agree end of the scale, and this is encouraging to note when considering opportunities for using environmental education to create greater awareness of and protection for sharks.

Within the scientistic category the students exhibited a general agreement with scientistic thinking in their responses, indicating a scientistic attitude toward sharks. For example in statement 9: *I don't think sharks intend to harm humans,* the mean response was at the strongly agree end of the scale. Further, in statement 12: *sharks are essential to the health of the ocean,* the mean response was at the agree end of the scale, however a large number of students responded in the *don't know* category, possibly indicating a lack of knowledge in this area, knowledge that would be useful in developing attitudes towards sharks.

As for the community group, the majority of students' feelings towards sharks were of fear, however those negative views of sharks seemed to have little to do with actual experience and more to do with perceptions based on exposure to sharks through the news and entertainment media. This was backed up by the majority of the students selecting the great white shark as the first species that came to mind; again due to an association with sharks through the news and entertainment media. As such, education may have an important role in creating greater awareness and understanding of sharks to develop attitudes towards them. Despite the students having largely fear-based attitudes in response to early questions, responses to the attitude orientation questions tended to be more naturalistic and scientistic in nature. As for the community group, this shows that although there is an initial "gut" reaction of fear towards sharks, when more thoughtful consideration is given attitudes were more neutral. This potentially opens the way for developing attitudes and values towards sharks through species-specific environmental education, which could lead to greater protection for them.

4.3.4 Experience with sharks

Students responded to open-ended questions about their experience with sharks, and in question one they were asked: *have you ever seen a shark in an aquarium? If yes, how did this make you feel?* The findings are shown in Figure 4.13 below.

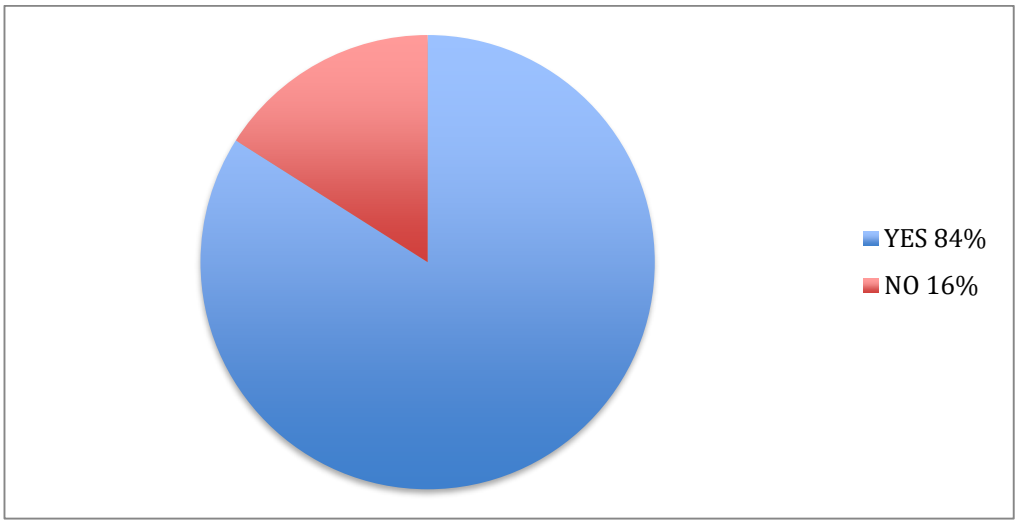

Figure 4.13: Have you ever seen a shark in an aquarium? n=25

The majority (84%) of participants responded that they had seen a shark in an aquarium, while 16% had not. Although there is no aquarium in the Bay of Plenty, it is possible that students have visited and seen sharks in aquaria, in other parts of the country, or possibly the world.

In the second part of question one participants' responses were categorised based on their answer to the question: *how did this make you feel?* The responses were coded into the following categories: positive, empathy, neutral stance (which includes responses that were based more on knowledge of sharks, as opposed to feelings), and fear. Figure 4.14 shows the spread of responses for this question.

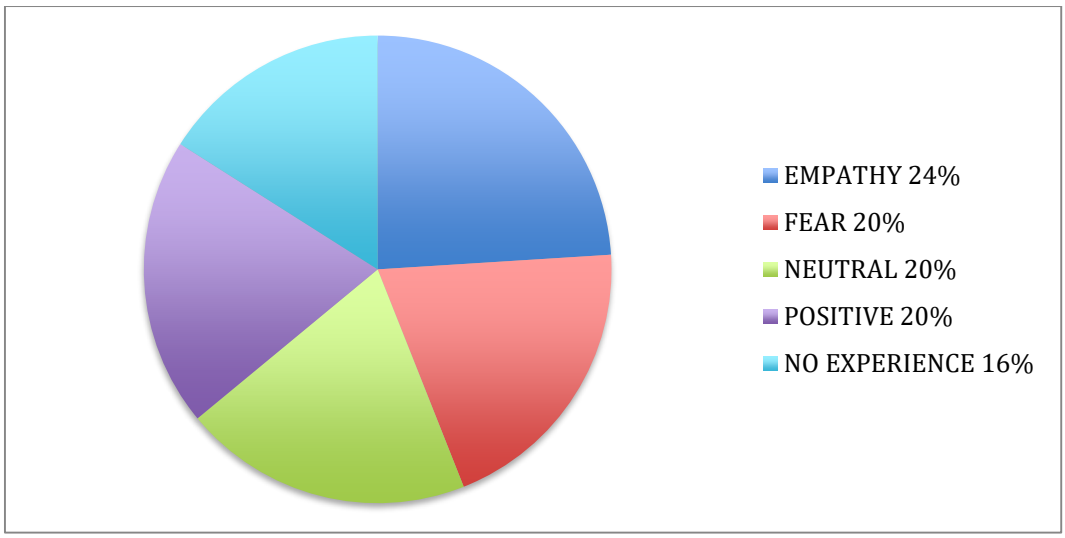

Figure 4.14: How did seeing a shark in an aquarium make you feel? n=25

The themes shown in Figure 4.14 were based on students' responses to the question *how did this make you feel?* and were evenly spread across all categories, empathy, fear, neutral and positive. A selection of responses to this question can be seen below in Table 4.19.

Table 4.19: Selection of responses to question one: how did it make you feel?

Category	**How did this make you feel?** ***(to see a shark in an aquarium)***
Empathy	Felt bad for the shark
	Sorry for shark taken away from habitat, family
	Sad, it should have a nice life in the sea
Fear	Scary, worry
	Creeped out
	It's teeth were scary, but safe
Neutral	Fine
	Not scared, it can't harm you
	I know it can't hurt me
Positive	Excited, it was really cool
	Excited to see it up close
	Amused

Respondents feeling "sad" or "sorry" for the shark not being in its natural environment typified the empathy theme. An equivalent response was seen across most other themes (20% in each). In the fear theme students still felt scared or

worried about seeing sharks in an aquarium. In the neutral theme students indicated more knowledge-based responses or a calm response to seeing sharks in an aquarium. Finally, in the positive theme students felt excited and thought it was "cool" to see sharks in an aquarium.

In the second question students were asked: *have you ever seen a shark in the ocean? If yes, how did this make you feel?* As Figure 4.15 shows most of the students (52%) had not seen a shark in the ocean. However, 48% reported they had seen a shark in the ocean; this may be attributed to the coastal nature of the Bay of Plenty and participants' involvement in recreation related to the ocean. This is explored in a later question.

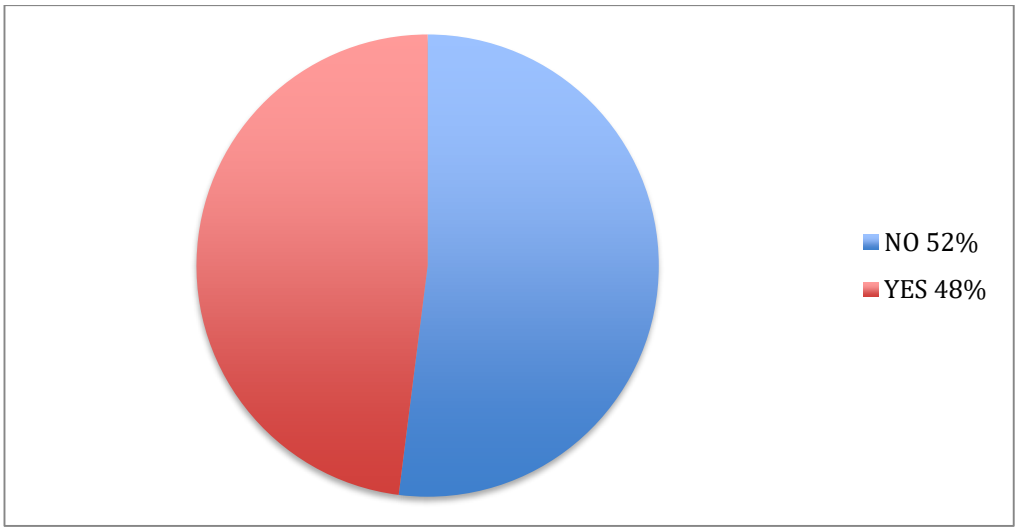

Figure 4.15: Have you ever seen a shark in the ocean? n=25

Students' feelings of having seen a shark in the ocean were categorised as: fear, positive, empathy and neutral. Of those who had seen a shark in the ocean (n=12) exactly half (6/12) expressed fear, a quarter (3/12) felt positive about the experience, 2/12 felt empathy and one student felt neutral about the experience. Figure 4.16 shows the findings for this part of the question.

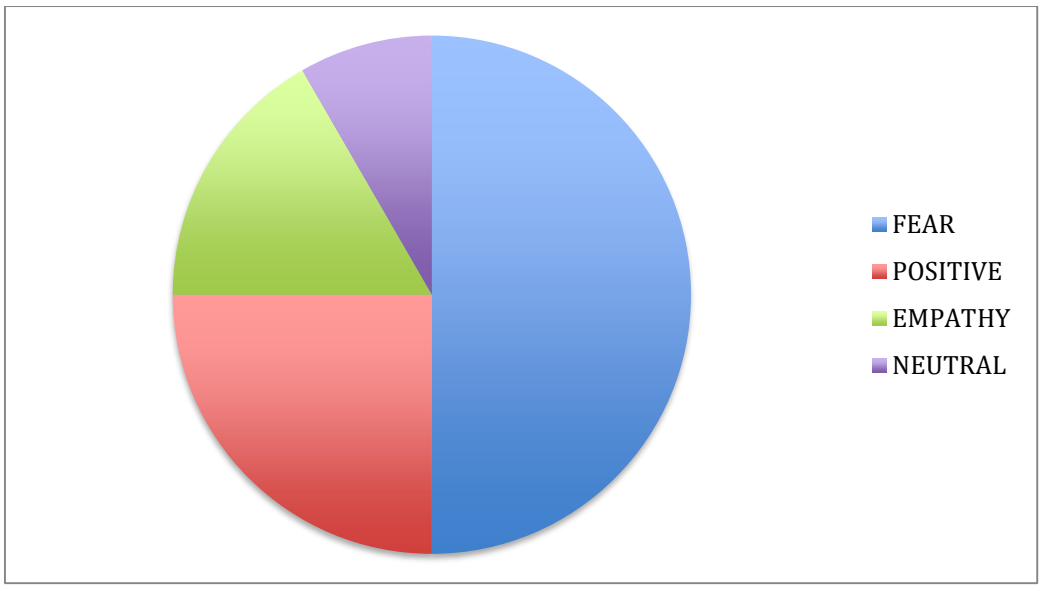

Figure 4.16: How did it make you feel to see a shark in the ocean? n=12.

The half (6/12) of the students who had seen a shark in the ocean felt fear about the experience, and they indicated they felt scared and wary of being near the shark in the ocean. This fear is possibly based on the prior association with sharks through negative imagery in the media and movies, rather than based on their actual experience with sharks in the ocean. Of those who had seen a shark in the ocean 4/12 did feel positive, and they indicated feelings of happiness at seeing the shark in its natural habitat, and it is possible this experience with sharks in their natural environment may have helped to create greater understanding and awareness of the nature of the shark, helping to alleviate any possible fear. Table 4.20 provides a selection of the responses that participants gave to this question.

Table 4.20: Selection of responses to question two: how did this make you feel?

Category	How did this make you feel? (to see a shark in the ocean)
Fear	Little scared
	Surprised, I jumped out of the water
Positive	Happy seeing it in its habitat
	Entertained
Empathy	Sad, I tried to scare it off as we were fishing
Neutral	It was a sand shark

The third question in this section asked participants about their use of the ocean for recreation. The majority (19/25) answered yes to the question: *do you use the ocean for recreation.* These respondents were asked to explain how they used the ocean for recreation and the responses are shown in Figure 4.17.

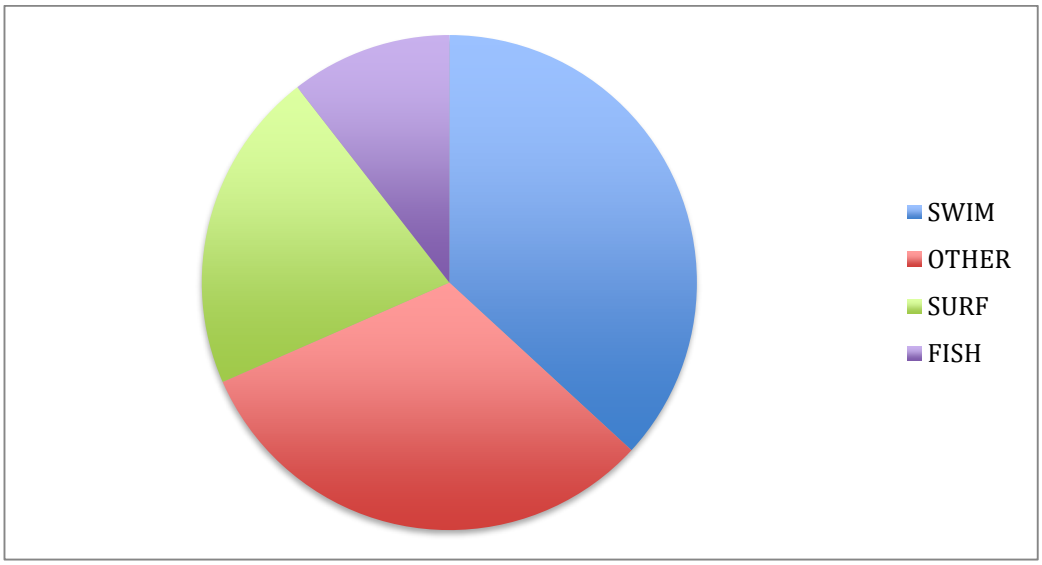

Figure 4.17: How do you use the ocean for recreation? n=19

In response to *how* students use the ocean for recreation the majority (7/19) indicated they used it for swimming, followed by 6/19 in the *other* category, which included responses such as surf lifesaving and playing. Of the students that used the ocean for recreation 4/19 used it for surfing and 2/19 for fishing. While all of these activities have the potential for contact with sharks, as previously discussed people are more likely to come into contact with sharks through fishing and boating activities, due to the possibility of blood in the water and increased electromagnetic vibration which attracts them. It may also be argued that swimming and surfing could at times create enough activity and electromagnetic vibration to attract sharks.

Questions 5 to 8 in this section asked a variety of questions to determine where the students gathered their information about sharks. The findings for these questions are presented in Table 4.21.

Table 4.21: Response to questions about knowledge formation

Question	# Response	Percentage
5: Do you watch wildlife documentaries e.g. BBC, Discovery	n=24	
YES	**20**	**83**
NO	4	17
6: Have you ever watched Shark Week on Discovery Channel	n=24	
YES	**16**	**67**
NO	8	33
7: Have you ever watched the movie *Jaws*?	n=24	
YES	11	46
NO	**13**	**54**
8: Do you read any wildlife or environmental publications?	n=24	
YES	**15**	**63**
NO	9	37

In question 5 students were asked if they watched wildlife documentaries on channels such as BBC and Discovery Channel. The majority (83%) indicated that they did watch wildlife documentaries, which would have possibly given them exposure to scientific shark information and objective reporting.

Question 6 asked students if they had ever watched "Shark Week" on Discovery Channel, the majority (67%) responded yes. As previously discussed, Shark Week is an annual, weeklong block created by the Discovery Channel featuring real and fictional shark-based programs. It has attracted criticism for airing dramatic fictional programs as such watching "Shark Week" would have given students access to some scientific information about sharks, but also exposure to much sensationalism and negative reporting on sharks.

In question 7 students were asked if they had ever watched the movie *Jaws*, most students (54%) answered no, while 46% answered yes. This response is quite different to that of the community group where 87% of respondents had watched the movie. As with the community group, the *Jaws* movie appears to have had a negative influence on some students' attitudes towards sharks.

The final question in this section asked students if they read any wildlife or environmental publications. The majority (63%) responded that they did, while 37% indicated they did not read such publications. Based on their response to question 9 (below) it is possible the students also included books under the wildlife publications heading. Reading wildlife publications possibly provides exposure to information about sharks that is scientific and evidence based, as opposed to negative or subjective reporting.

In question 9 students were asked *where do you receive most of your information about sharks?* They indicated their three most accessed sources from a list of 9, which included: newspaper, Internet, TV news, TV documentaries, magazines, movies, other people, books and education e.g. school. Data for this question is presented in Figure 4.18.

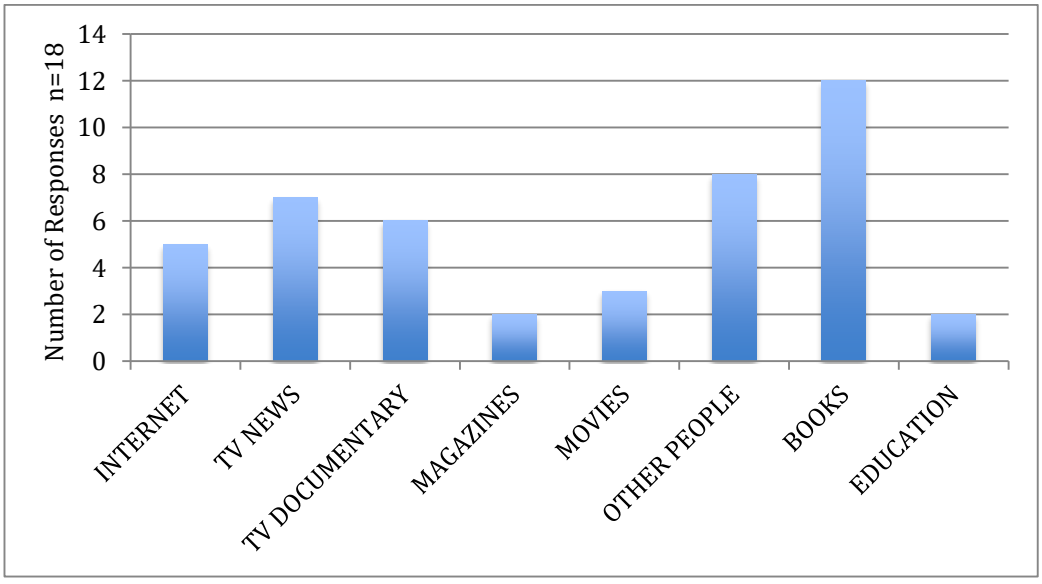

Figure 4.18: Where do you receive most of your information about sharks?

Based on the number of students who responded to the question (n=18), percentages were determined for where they received most of their information about sharks. The majority (67%) of students indicated books as a main source of their information about sharks. In general books would be a considered a quality source of scientific and fact-based information on sharks. The students indicated "Other people" as the second most reported means of obtaining information about sharks (44%), followed by the TV news (39%). As previously discussed in the community group section these are possibly not the best resources for accurate information gathering on sharks. For example, the news and entertainment media have been widely credited for perpetuating negative portrayals of sharks and for amplifying public fear (Philpott, 2002).

Only 33% of students indicated documentaries as a source of their information, compared with the community group who indicated documentaries as their greatest source of information. As previously discussed, documentaries are available through a variety of broadcasters and channels, and as such there may be a difference in the quality and level of scientific information being reported. Therefore, knowledge and attitude formation through exposure to these different documentaries may be very different for the individuals that watch them. As with the community group, only a small percentage (11%) of students indicated education as the source of their information about sharks. As previously mentioned, education is one of the most powerful forces in shaping perceptions of nature and biodiversity (Kellert, 1996). As such, there is potential for creating greater awareness, understanding and developing positive attitudes towards sharks through education.

Most of the students had some experience with sharks, whether through aquarium visits or in the natural environment. For many this experience was positive, perhaps as a result of seeing the shark in a natural state, which may have helped to dispel some fears and prior misconceptions about sharks. This possibly shows that experience with sharks can be a powerful tool to create greater understanding of them and as such develop positive attitudes towards them. The students indicated they obtained information about sharks from a variety of sources, with books being the most common. This was followed by information from other people, TV news and documentaries. As such students have been exposed to varying levels of

scientific information about sharks, as well as a wide variety of negative portrayals of sharks, all which have helped to develop their attitudes towards them.

4.3.5 Environmental Behaviour

Question 4, and questions 10 -12 in this section sought to determine students environmental behaviour. Table 4.22 shows the responses to these questions.

Table 4.22: Responses to questions regarding environmental activity

Question	# Response	Percentage
4: Are you a member of a conservation or environmental group	n=24	
YES	5	21
NO	**19**	**79**
10: Have you ever donated money to a wildlife or environmental project?	n=22	
YES	8	36
NO	**14**	**64**
11: Have you ever volunteered for a wildlife or environmental project?	n=23	
YES	6	26
NO	**17**	**74**
12: Would you donate money or time to a project to help conserve sharks?	n=23	
YES	**21**	**91**
NO	2	9

The students were largely not members of conservation or environmental groups, nor had they volunteered for wildlife or environmental projects. Given the age of the students and their access to funds to donate, or the physical ability to attend volunteer projects these responses are possibly not surprising. Despite this, most students (91%) indicated they would donate money or time to a project to help sharks. It was not clear as to whether they would support shark conservation now or in the future, or perhaps both. Their indication of support for such projects is

distinctly different to that of the community group, despite both groups sharing similar views toward shark conservation, similar levels of knowledge and mostly positive attitudes towards sharks.

4.3.6 Summary of Student Findings

Twenty-five year 5/6 students from a Bay of Plenty school took part in this research; the group was made up of 14 males and 11 females.

Most of the students rated their knowledge of sharks as average to good and demonstrated a reasonable level of knowledge based on their answers to many of the questions posed. The four questions that were answered with the less scientifically-accepted answer may be considered more specific or scientific questions relating to sharks and as such may not be considered general knowledge. However, knowledge of this type may help students gain a greater overall understanding of sharks and to develop positive attitudes and values towards them.

The majority of students' feelings towards sharks were of fear, however, those in the fear theme generally indicated negative views of sharks that had little to do with actual experience and more to do with perceptions based on exposure to sharks through general negative imagery in movies and the media. This was also highlighted by the majority of these respondents selecting the great white as the first species that came to mind, again due to an association with sharks through movies and media coverage. This highlights the important role of education in creating greater awareness and understanding of sharks to develop attitudes towards them. Despite a largely fear based attitude indicated in first thoughts about sharks, responses to more considered attitude orientation questions tended to be more naturalistic and scientistic in nature. This potentially opens the way, through education, for developing attitudes towards sharks and their protection.

Most of the students had some experience with sharks, whether through aquarium visits or in the natural environment. For many this experience was positive, perhaps as a result of seeing the shark in a natural state, which may have helped to dispel some prior fears and misconceptions about sharks. This may show that

experience with sharks can be a powerful tool to create greater understanding of sharks and as such develop positive attitudes towards them.

The students indicated they obtained their information about sharks from a variety of sources, with books being the most common. This was followed by information from other people, TV news and documentaries. As such, it would appear that students have been exposed to varying levels of scientific information about sharks, as well as a wide variety of negative portrayals, all which have helped to develop their attitudes towards them. Interestingly, only a small number of students indicated education as the source of their information about sharks. As mentioned, education is one of the most powerful forces in shaping perceptions of nature and biodiversity. As such, there is an untapped potential for creating greater awareness, understanding and developing positive attitudes towards sharks through education.

Despite the fact that most students had never donated money or volunteered for a wildlife or environmental project, the majority indicated that they would donate money or time to a project to help conserve sharks. This is perhaps as a result of their knowledge and mostly positive attitudes towards sharks, which have been shown to lead to greater support for conservation (Thompson & Mintzes, 2002). However, it may be simply be due to a desire to want to help, despite not having an understanding of what might be involved, for example, money and time. Either way, their willingness offers hope for a species that has in the past suffered from a negative image, which has worked to reduce populations, rather than conserve them.

4.4 Chapter Summary

A questionnaire exploring knowledge, experience and attitudes towards sharks was undertaken by a cross section of the local Mount Maunganui community. Sixty participants, male and female of varying ages made up the community group. Twenty-five year 5/6 students from a local primary school made up the student group.

Across both groups respondents demonstrated a reasonable level of knowledge about sharks on the survey questions posed. In the community group only three of the nine general knowledge questions were answered, by the majority, with less scientifically acceptable responses. In the student group four of the questions were answered, by the majority, with less scientifically acceptable responses. These questions may be considered more specific or scientific questions about sharks and as such may not be considered general knowledge. However, knowledge of this type may help people gain a greater overall understanding of sharks and help develop positive attitudes and values towards them, possibly leading to increased conservation.

For both groups the large majority of respondents' initial reaction to sharks was one of fear. However, those views of sharks seemed to have little to do with actual experience and more to do with perceptions based on exposure to sharks through negative imagery in the media, movies and TV. This was also highlighted by the majority of respondents in both groups selecting the great white as the shark they first thought of, again possibly due to the association with sharks in the media and in movies such as *Jaws*. Despite a largely fear based attitude indicated in first thoughts about sharks, responses to more considered attitude orientation questions tended to be more naturalistic and scientistic in nature, as opposed to utilitarian / negativistic.

Interestingly, the majority of respondents across both groups had some experience with sharks, either through aquarium visits or in the ocean. For most this experience was positive, perhaps as a result of seeing the shark in a natural state, which may have helped, to dispel fears and misconceptions about sharks presented in the media and movies. This may show that experience with sharks

could be used as a powerful tool to create greater understanding of, and as such develop positive attitudes towards sharks.

Participants from both groups indicated they obtained their information about sharks from a variety of sources. The community group indicated their main source of information was obtained through TV documentaries; followed by TV news, movies and newspapers. The vast majority of respondents had watched the movie *Jaws*, which, as previously mentioned appeared to have had a negative influence on some respondent's attitudes towards sharks. The student group indicated they obtained their information about sharks mainly from books. This was followed by information from other people, most likely parents and teachers who shared their knowledge (possibly obtained as indicated above) with them. The TV news and documentaries followed as sources of information. Interestingly, both groups ranked education low as a source of their information about sharks. However, education has been found to be one of the most powerful forces in shaping perceptions of nature and biodiversity. As such, there is potential for creating greater awareness, understanding and developing positive attitudes towards sharks through education.

The participants in this study were largely unsupportive of conservation or environmental groups and projects. Previous research has found that individuals with high levels of knowledge and positive attitudes towards animals such as sharks are more likely to support their conservation (Thompson & Mintzes, 2002). However, despite the community groups' sound knowledge of sharks and their mostly positive attitudes towards them, the majority view was that a shark conservation project would not be supported by donating money or time; despite the fact they believed sharks should be protected. Although most students had never supported a wildlife or environmental project, likely due to their age and access to resources, the majority indicated that they would donate money or time to a project to help conserve sharks.

These findings are now discussed in the final chapter of this thesis.

Chapter Five
Discussion, Conclusion and Recommendations

5.1 Chapter overview

In this chapter the findings of the research are discussed. The discussion is explored through the research questions, the themes emerging from the data analysis and the literature reviewed for this research. In the final section conclusions are outlined, as are the implications of these and recommendations.

5.2 Research questions

This research sought to determine people's knowledge, experience and attitudes towards sharks. It further explored the relationship between knowledge, experience and attitudes. The questions:

- What knowledge and experience do people have with sharks?
- Where do people obtain their information / knowledge about sharks?
- What attitudes do people hold towards sharks?
- Do knowledge and experience appear to influence attitudes towards sharks?

5.3 Knowledge and Experience with sharks

In this section findings relating to people's knowledge about, and experience with, sharks are discussed. Research has found that knowledge and experience may be determinants of attitude development.

In this research both the community and student group demonstrated a reasonable level of knowledge about sharks based on the general knowledge questions posed.

Across both groups participants had a good understanding of the basic biology of sharks, their ecological importance, and threats they face.

In the community group only three of the nine questions were answered, by the majority, with less scientifically-acceptable responses. In the student group four questions were answered, by the majority, with less scientifically-acceptable responses. For both groups the questions answered with the less scientifically acceptable responses were the same, except, of course, in the case of the fourth question for the student group.

The first question answered with the less scientifically-acceptable response by both groups focussed on whether the sale of shark fin was legal in New Zealand. In the community group exactly half (50%) believed the sale of shark fin was illegal, while 15% did not know. In the student group 48% believed the sale of shark fin was illegal, while 28% did not know. This finding, indicated above, shows the majority of respondents in both groups were not able to provide the accepted answer, which is possibly due to some confusion around the recent ban on shark finning in New Zealand waters, which did not include a ban on the sale of shark fin (Ministry for Primary Industries, 2014). This lack of knowledge about the threats to sharks highlights the important role of species-specific environmental education to create greater awareness and understanding of sharks, which may lead to increased conservation behaviour.

The second question where the majority of respondents gave less scientifically-acceptable answers asked about the number of shark species found in New Zealand waters. In the community group the majority (62%) indicated they did not know. In the student group the majority (88%) answered across all other ranges or don't know; generally indicating they had little idea of the number of species in NZ. Once again, the majority of respondents across both groups generally did not give the accepted answer to this question; this is perhaps not surprising given the small number of species most people would be typically exposed to through the media, movies etc. Furthermore, much of the reported information, through these sources, is often not specific to a New Zealand context. Again, this lack of knowledge about shark species in New Zealand highlights the important role of environmental education in creating awareness of sharks,

specifically knowledge of their biodiversity, biology and behaviours, which when understood may help to develop people's attitudes towards them, from attitudes of fear due to a lack of understanding, to attitudes of care, for an important and mostly harmless species.

In the third question where the majority of respondents gave less scientifically-acceptable answers, respondents were asked about the total number of fatal shark attacks in NZ. In the community group the majority indicated they did not know (40%) or answered incorrectly (40%). In the student group only 16% answered in the correct range, while the remainder (84%) answered don't know or across all other ranges; again indicating they had little knowledge in this area. For both groups this response may reflect their exposure to this type of information in the news media, which reports both New Zealand and international news, and often reports on any and all shark incidents. In their research, Muter et al., (2012) investigated the portrayal of sharks in 20 major Australian and American newspapers; shark attacks were the emphasis of over half of the articles (52%). They further found that local shark events received international coverage, for example, shark incidents in South Africa made headlines in Australia and America. While no similar research is available in New Zealand, anecdotally these themes are echoed in media reports in this country. This highlights the role of the news and entertainment media in influencing people's attitudes towards shark incidents and with the role that reporting on shark research and conservation may play in providing a balanced perspective on the species. Further, it highlights the important role of environmental education to create greater awareness of sharks amongst the news and entertainment media, and to provide a possible point of contact to give scientific opinion on articles and documentaries that they may otherwise be without.

For the student group, the fourth question answered with the less scientifically-acceptable response asked whether shark meat was sold to be eaten in New Zealand. The majority of students indicated they did not know, or answered incorrectly (66%). In contrast, most of the community group answered this question correctly (67%). These findings are in line with Thompson and Mintzes (2002) research, which found that knowledge relating to sharks increases with age. Furthermore, as this question relates to the sale of shark for consumption it seems

unlikely that students would have been involved in this activity, as such reducing the likelihood of their knowing through experience.

The responses to these more in-depth questions about sharks highlight misconceptions that are possibly due to a lack of exposure to quality scientific information about sharks, specifically in the New Zealand context. Access to this type of information and developing this type of knowledge would be useful in helping people gain a greater overall understanding of sharks, which may help develop attitudes towards them. As research has shown, knowledge is an important factor in changing people's attitudes and perceptions towards animals (Kellert, 1996). Furthermore, Thompson and Mintzes (2002) also found a strong relationship between knowledge and the types of attitudes people held toward sharks.

However, attitudes are not only shaped by knowledge, but also by experience, and direct experiences with nature have been recognised as important variables for developing pro-environmental values and attitudes (Miller, 2005; Bogeholz, 2006). Interestingly, in this research the majority of respondents across both groups reported that they had had some experience with sharks, either through aquarium visits or in the marine environment, and for most this experience was positive. As such, this experience may have helped to correct misconceptions and improve negative attitudes influenced by the media or by others. This highlights the value of direct experience with sharks as a tool to create greater understanding of them, and to develop positive attitudes towards them. Research has found that direct experience with sharks helped to create more positive attitudes towards them (Dobson, 2004, 2007). Later, Seraphin (2010) also found that students' misconceptions were corrected and negative attitudes were improved through direct experience with sharks in the marine environment. For some respondents in this research this appears to have also been the case. This is discussed in the section on knowledge, experience and attitudes.

Such direct experience may come through encountering a shark in its natural environment or through visits to zoos and aquariums, which also provide access to information available for immediate interpretation or complementing formal education. As such, zoos and aquariums are well placed to contribute to an

increase in social conservation awareness, that is, the possible overall increase in social knowledge with nature and its conservation (Packer & Ballantyne, 2010).

5.4 Knowledge development – sources of information

In this section, findings relating to where people source their information about sharks are discussed. As previously mentioned, knowledge is one determinant of attitude development, and an important part of the learning process.

Sources of information are important factors to consider in the development of knowledge and, as such, attitudes. In this research, participants from both groups indicated they obtained their information about sharks from a variety of sources including: newspaper, Internet, TV news, TV documentaries, magazines, movies, other people, books and education e.g. school.

Those in the community group indicated their main source of information about sharks was obtained through TV documentaries. The majority indicated they watched wildlife documentaries on channels such as BBC, and Shark Week on Discovery Channel. This would have exposed them to a variety of both quality scientific information and sensationalist reporting on sharks. The next most accessed sources of information indicated were the TV news, movies and newspapers. The news and entertainment media are widely credited for perpetuating negative portrayals of sharks and for amplifying public fear through stories and documentaries with sensationalist headlines and imagery (Philpott, 2002 & Peschak, 2006, as cited in Muter et al., 2012). The vast majority of respondents (87%) indicated they had watched the movie *Jaws*, which appeared to have a negative influence on some respondents' attitudes towards sharks, as discussed in the next section. Interestingly, in the wake of the release of the *Jaws* movie a shark killing frenzy, motivated by fear, was responsible for decimating great white shark populations in America, Australia and South Africa (Peschak & Scholl, 2006).

In the student group, respondents indicated they obtained their information about sharks mainly from books. This was followed by information from other people,

most likely parents and teachers who shared their knowledge (possibly obtained as indicated above) with them. The TV news and documentaries followed as next most accessed sources of information. Similarly, to the community group, the majority indicated they watched wildlife documentaries and Shark Week on Discovery Channel. Again, this would have exposed them to a variety of both scientific information and sensationalist reporting on sharks. In this group less than half had watched the movie *Jaws*, which is possibly not surprising given the movie came out long before they were born.

Of interest, only a very small number in both groups indicated formal education as a source of information about sharks. As previously discussed, education is one of the most powerful forces in shaping perceptions of nature and biodiversity (Kellert, 1996). Although both groups demonstrated a reasonable level of knowledge in response to the general knowledge questions posed, more specific questions were answered with less scientifically-acceptable responses. However, knowledge of this type is valuable if a greater overall understanding of sharks could help to develop positive attitudes towards them. Attitude can be viewed as a type of knowledge structure stored in memory (Fabrigar et al., 2005). Attitudes are learned, and formed in an experiential way based on direct or indirect cognitive, affective and behavioural responding to an attitude object (Vaughan & Hogg, 2005), in this case the attitude object is sharks. As such, there is potential for creating greater awareness, understanding and developing attitudes towards sharks through education.

5.5 Attitudes towards sharks

In this section findings relating to the attitudes people hold towards sharks are discussed. Attitude has been defined as a psychological tendency expressed by evaluating an object or entity with some degree of favour or disfavour (Eagly & Chaiken, 1993). In this case the object or entity is sharks.

Across both the community and student groups, the large majority's initial reaction or attitude towards sharks was one of fear. However, this response seemed to have little to do with actual experience and more to do with perceptions

based on exposure to sharks through negative imagery in the media, movies and TV. As Corbett (2006) explains, the way people feel about animals is a subjective evaluation, one that often bears little relation to actual contact or experience.

For example, in the community group, the large majority (72%) responded to first thoughts about sharks in ways that were categorised as fear. Of these, almost half (44%) mentioned the movie *Jaws* in response to *why*, showing that this movie had influenced their attitudes about sharks. Other responses in the fear category related to general negative imagery seen in movies and on TV. This response was also backed by the majority (55%) of respondents selecting the great white as the first shark they thought of, again due to the association with sharks in the media and in movies such as *Jaws*.

In the student group the majority (60%) also responded in ways that were categorised as fear. As in the community group many of the responses indicated negative imagery in movies and on TV as being influential in their response. However, less than half of this group had seen the movie *Jaws.* Also, like the community group, the majority (71%) of students named the great white shark as the first shark that came to mind, again due to the association with these sharks as being "scary", "killers" and seen in the media and movies.

Despite most respondents from both groups mentioning the great white shark as the first shark that came to mind, they are not common in Bay of Plenty, or New Zealand waters. However, great white sharks are publicised widely in the media and are often implicated in attacks on humans, as such this may explain why they come to mind first. As previously mentioned, the news and entertainment media have widely been credited for perpetuating negative portrayals of sharks and for amplifying public fear through stories and documentaries with sensationalist headlines and imagery (Philpott, 2002 & Peschak, 2006, as cited in Muter et al., 2012). Research has further shown that our attitudes towards the natural world are strongly influenced by our values, which are, as Rezsohazy (2001) explained, shaped, built in, and structured primarily by the process of socialisation whose main agents are the family, the school, the peer-group and the media.

However, despite a largely fear-based attitude indicated in first thoughts about sharks, responses to more considered attitude orientation questions about sharks tended to be more naturalistic and scientistic in nature, as opposed to utilitarian or negativistic. This is possibly explained through the theory of attitude structure, whereby attitudes may be viewed as simple object-evaluation associations, or may also be parts of larger sets of knowledge structures (Eagly & Chaiken, 1993). For example, an overall attitude toward an object might be influenced by evaluations of many specific attributes of the object or emotions associated with the object (Eagly & Chaiken, 1998). Relating to this research, it seems likely that inter-attitudinal structures, whereby many specific attributes or emotions associated with sharks, are at play and have influenced peoples' attitudes towards sharks.

The attitude orientation questions used in this research were based on Kellert's (1983) attitude orientations towards animals. Kellert reported that the most prevalent attitude orientations towards animals were: humanistic, neutralistic/negativistic, moralistic and utilitarian.

In this research, it was found that both groups generally disagreed with utilitarian or negativistic thinking towards sharks. For example, in response to the statement: *I believe sharks hunt humans,* the mean response for both groups was at the strongly disagree end of the scale, as was the case for most of the statements in this section. However, for both groups there was a majority agreement with negativistic thinking in response to two statements: *I am afraid of sharks,* and *I worry about sharks when I go in the ocean.* This is of interest, as these responses appear to be in contrast with the indicated belief that sharks do not hunt humans, and with the general knowledge understanding that all sharks are *not* a threat to humans. So, despite the majority of respondents having an understanding or knowledge that most sharks are not a threat, and an attitude or belief that they do not intentionally harm or hunt humans, most respondents still held an attitude of fear about sharks.

In the naturalistic category both groups overwhelmingly indicated agreement with naturalistic thinking towards sharks. For example, in response to the statement: *sharks should be protected,* the mean response for both groups was at the strongly agree end of the scale, as was the case for most of the statements in this section.

Further, and of interest was the response to the statement: *I like to learn about sharks*, the mean response for both groups was at the strongly agree end of the scale. This is encouraging to note when considering future opportunities for using environmental education as a tool to create greater awareness of and develop attitudes towards sharks. As previously mentioned, research has determined education as one of the most powerful forces in shaping perceptions of nature and biodiversity (Kellert, 1996).

Within the scientistic category respondents from both groups exhibited general agreement with scientistic thinking towards sharks, further backing up their good level of general knowledge about sharks. For example, in response to the statement: *I do not think sharks intend to harm humans*, the mean response for both groups was at the agree end of the scale, as was the case for most of the statements in this section. Once again, this highlights that despite a belief or understanding that sharks do not intend to harm humans there is still fear associated with them, perhaps due to negative imagery of sharks portrayed in the media, movies and TV.

Historically, sharks have been perceived as dangerous and have had a reputation as 'monsters' due to their fierce appearance (Pollard et al., 1996); often evoking strongly negative, utilitarian and moralistic attitudes (Thompson & Mintzes, 2002). These negative attitudes have been shown to affect the status of species populations, and the effectiveness of conservation programmes (Newhouse, 1990). This has certainly been the case for sharks, although this research indicates attitudes towards sharks, amongst this group of respondents, held hope for a better relationship between sharks and humans in the future.

In this research there is no clear indication that age has an influence on attitudes towards sharks. Very broadly, the older participants (41-55 and 56-70) exhibited slightly less naturalistic attitudes towards sharks than the younger participants in this research. Similarly, in Kellert's (1983) research, those who rated in the naturalistic attitude orientations were found to be less than 35 years old. Although Kellert found differences in feelings towards animals varied dependent on people's age, gender and ethnicity, this was not found to be the case in this research, as there was no indicative difference dependent on age or gender.

5.6 Knowledge, experience, and attitudes

In this section findings relating to the link between knowledge, experience, and attitudes are discussed. The connection between these variables as they relate to environmental behaviour is also touched on related to this research.

As discussed in previous sections, participants from both groups demonstrated a good level of knowledge about sharks through both the general knowledge questions and the scientistic attitude orientation statements. The majority, across both groups indicated they had some experience with sharks, either through aquarium visits or in the marine environment. Further, despite a largely fear-based attitude indicated in first thoughts about sharks, possibly due to associations with sharks through the media, movies and TV, responses to more considered attitude orientation questions were more naturalistic in nature, indicating a mostly positive attitude towards sharks. As such, it seems likely that respondents' knowledge and experience with sharks has possibly helped them in developing positive attitudes towards them.

Research has found that individuals with high levels of knowledge and positive attitudes towards animals are more likely to support their conservation (Thompson & Mintzes, 2002). Attitudes in some way guide, influence, direct, shape, or predict a person's behaviour (Kraus, 1995). As such, the attitude a person holds towards an animal is important as their attitude affects their behaviour toward that animal. Therefore, people with a positive attitude towards a specific species, such as sharks, are more likely to support legislation to protect and conserve them, donate time or money for their conservation, or simply refrain from harmful practices or activities involving them (Thompson & Mintzes, 2002).

In this research participants from both groups were largely unsupportive of conservation or environmental groups and projects, specifically in relation to shark conservation.

In the community group, while respondents exhibited a good level of knowledge and mostly positive attitudes towards sharks, the majority indicated they would not support shark conservation; despite believing sharks should be protected. For

example, in response to the question: *would you donate time or money to help conserve sharks*, the majority (55%) of respondents indicated they would not. However, in the response to the question: *have you ever donated money to a wildlife or environmental project*, the majority (55%) indicated they had. It is interesting to note that despite previous positive environmental behaviour, the majority of respondents were reluctant to support shark conservation. Furthermore, the majority (75%) of these respondents believed sharks should be protected. As such, there appears to be a disconnect between the naturalistic attitudes indicated toward shark protection and likely environmental behaviour to support such protection.

This disconnect may be due to the underlying, but prominent, fear-based attitude indicated toward sharks, due to associations through the media, movies and TV. In attitude formation theory, research has shown that attitudes are learned (Chaiken, 2001 and Vaughan & Hogg, 2005), and can be based on beliefs or cognitions formed directly, through first-hand experience, or indirectly, via socialisation agents such as parents, teachers, peers and the mass media (Chaiken, 2001). The media has been found to be a major influencer on the learning of attitudes (Atkin, 1980), and the representation of sharks in the media is often focussed on negative imagery and shark attacks (Muter et al., 2012). Mere exposure effect, whereby repeated exposure to an object (in this case sharks) affects our evaluation of that object, may explain why the fear-based attitudes persist when it comes to thinking about sharks. Interestingly, mere exposure effect has the most impact when there is a lack of information about an object (Vaughan & Hogg, 2005).

Research has found that despite the rarity of incidents between sharks and humans, public engagement and support for their conservation is limited (Friedrich et al., 2014). The image of sharks as fearsome predators, representation in movies such as *Jaws*, and sensationalist media coverage of shark incidents may contribute to frame sharks negatively in the public image. Furthermore, the physical and behavioural characteristics, and the predatory behaviour of some sharks may influence attitudes towards them (Friedrich et al., 2014). If this is the case, much needs to be done to create a more positive image of sharks, to develop awareness

and understanding in order to improve attitudes towards them, attitudes that lead to positive environmental action.

Of interest, those respondents in the community group that indicated they would support shark conservation (45%, n=58) exhibited a good level of knowledge in response to the general knowledge questions posed. In the attitudes and values section those that indicated they would support shark conservation responded almost equally in the fear theme (54%, n=26) and in the positive/neutral theme (46%, n=26) based on initial reaction to sharks. When more thoughtful consideration of sharks was given in response to the attitude orientation statements, their attitudes were mostly naturalistic and scientistic in nature. Furthermore, and of most interest, these respondents who indicated they would support shark conservation had experience with sharks, either having seen a shark in aquarium (92%, n=26) or in the ocean (73%, n=26) or both. As such, it is perhaps this experience with sharks that makes the difference.

Dobson (2004, 2007) found that prior to direct experience with sharks, most people had negative attitudes towards them. His research showed that direct experience with sharks helped to break down the *Jaws*-like stereotypes and create more positive attitudes towards them. Furthermore, he found that attitudinal changes occurred despite there being poor educational content on the dive trips taken by the respondents. In more recent research, Seraphin (2010) found that students' negative attitudes were improved through direct experience with sharks in the marine environment. Whatmough et al. (2011) found a change in attitude towards sharks amongst divers from 'fear and danger' to 'excitement', 'wonderment and respect' in response to seeing them in the ocean. The common theme among all these changes in attitude is that they all involve direct experience with sharks in the natural environment. Much theoretical and empirical research has suggested an important role of nature experience for the development of environmental values and attitudes, as well as influencing pro-environmental behaviours (Bogeholz, 2006).

Although most of the student group had never supported a wildlife or environmental project, likely due to their age and access to resources, the majority indicated that they would donate money or time to a project to help conserve

sharks. This response is more in line with research, which suggests people with high levels of knowledge and positive attitudes are more likely to support conservation (Thompson & Mintzes, 2002). As such, the student group's overall good level of knowledge and mostly positive attitudes towards sharks, along with the fact they believed sharks should be protected, may have led them to indicate they would support shark conservation.

5.7 Conclusions, Implications and Recommendations

In this section conclusions and implications are drawn from the findings of this research, and recommendations made.

In this research, respondents across both groups demonstrated a reasonable level of general knowledge about sharks. However, responses to several more specific knowledge questions were answered, by the majority, with less scientifically-acceptable responses. Knowledge of this nature, for example knowing that shark fin is sold and eaten in New Zealand and the implications of this, is important in having a good overall understanding of sharks and the threats they face. This is important as a sound knowledge and good overall understanding of sharks helps in the development of positive attitudes towards them.

Many of the respondents in this research reported that they had some experience with sharks, either through aquarium visits or in the marine environment. These mostly positive experiences with sharks may have helped to develop attitudes by correcting misconceptions and improving negative attitudes influenced by the media or by others. This highlights the value of direct experience with sharks, through aquarium visits or in the natural environment, as a powerful tool to create greater awareness and understanding, which may help develop positive attitudes towards sharks.

The sources of people's information are important to consider in the development of knowledge and, as such, attitudes. In this research, respondents in the community group indicated they obtained their information about sharks primarily from TV documentaries, TV news, movies and newspapers. The vast majority indicated they had watched the movie *Jaws*, which appeared to have had a negative influence on some of their attitudes towards sharks. Those in the student group indicated they obtained their information primarily from books and from other people, most likely parents and teachers who shared their knowledge (possibly obtained as indicated above). These sources of information would have exposed respondents to some quality scientific information, but also to sensationalist reporting and negative portrayals of sharks, which may have had an effect on the attitudes they held. Only a very small number of respondents from

both groups indicated formal education as a source of information about sharks. However, through environmental education *about* sharks, a deeper and more accurate knowledge could be developed, helping to create a greater understanding of them, which may in turn lead to more positive attitudes.

Across both groups the large majority's initial reaction or attitude towards sharks was one of fear. However, this response had little to do with their actual experience and more to do with perceptions based on exposure to sharks through the news and entertainment media. For example, in the community group almost half of those in the fear category mentioned the movie *Jaws* as the reason for their response. These findings link to the indicated sources of information and highlight the power of the news and entertainment media in the development of attitudes towards sharks. As such, the news and entertainment media have a responsibility to report on shark-related stories in a balanced, factual and objective manner.

However, despite a largely fear-based attitude indicated in first thoughts about sharks, responses to the more considered attitude orientation questions tended to be more naturalistic and scientistic in nature, indicating a mostly positive attitude towards sharks. Despite the majority of respondents indicating an understanding that most sharks are not a threat, and that they do not intentionally harm or hunt humans, most respondents still indicated an attitude of fear about sharks in response to specific attitude orientation statements focussed on fear of sharks, and worry about sharks when in the ocean. This underlying fear of sharks, possibly due to a lack of knowledge and experience, may have influenced their support for shark conservation.

Participants in this research were largely unsupportive of conservation or environmental groups and projects, specifically those relating to shark conservation. For the student group, this is perhaps understandable given their access to resources to facilitate support. However, despite many of the respondents in the community group indicating they believed sharks should be protected, they were not willing to offer their support. This is possibly due to the underlying fear-based attitude indicated towards sharks due to associations through the news and entertainment media, and to a lack to understanding about the need for shark conservation, due to a lack of knowledge in this area. In the

community group, those that indicated support for shark conservation exhibited a good level of knowledge about sharks, they indicated an almost equal response between fear and positive/neutral first thoughts about sharks, and were largely naturalistic/ scientistic in more considered attitude orientations towards sharks. However, the large majority of these respondents had experience with sharks, either in aquariums or the ocean. As such, it is perhaps this experience with sharks, along with their sound knowledge, that makes the difference, and which helped develop their mostly positive attitudes towards sharks, as such, influencing their for support shark conservation.

5.8 Recommendations

- Develop a species-specific environmental education programme to create greater awareness and understanding of sharks. Through education *about* sharks, knowledge can be developed from a science-based perspective, which will also help to develop attitudes towards sharks. This programme should be implemented in local schools through a marine environmental education unit integrated across the school curriculum.

- This programme must also provide opportunities for education *in* the environment to gain direct experience with sharks. This could be facilitated through aquarium visits, on boat excursions in the local marine environment, and possibly through the coastal marine research centre.

- The Ministry of Education must promote and encourage schools to integrate environmental education through the curriculum. Species-specific environmental education such as the proposed programme may lead to the development of more positive attitudes towards sharks, which may also lead to positive environmental behaviours, or action *for* sharks, and ultimately *for* the whole marine environment.

- Mount Maunganui, being surrounded by the ocean, should have a marine environmental education centre for locals and visitors to connect with, explore, and learn about, the local marine environment, and its inhabitants, including sharks. This would provide experiential learning opportunities for all ages, and help develop attitudes towards sharks and the marine environment, ultimately leading to greater care for the local environment.

- A shark awareness campaign should be developed and implemented to help change some of the fear-based attitudes associated with sharks. The media and organisations such as the Department of Conservation, Ministry for the Environment and Forest & Bird could promote the campaign run as an annual weeklong event as part of Conservation Week. This could also link to the education programme in schools, which could be introduced and implemented during this time through a whole school approach and a focus on connecting with our local marine environment.

- This same education *about* and *in* should be extended to the news and entertainment media to develop their awareness and understanding of sharks, in the hope that it will encourage more balanced reporting. Furthermore, access for media to shark experts who can provide scientific information, this should be facilitated by the Department of Conservation and Ministry for the Environment.

- Shark experts, such as Malcolm Francis from NIWA and Clinton Duffy from the Department of Conservation, must work with the news and entertainment media to change the way sharks are portrayed and provide a better balance to the current reporting on shark sightings and incidents.

- Further research should be undertaken to determine the specific influence of knowledge *about* sharks and experience with sharks *in* the environment as a tool for developing attitudes and more specifically how with or without these variables environmental behaviour is affected.

References

Albarracin, D., Johnson, B. T., Kumkale, G., T., & Zanna, M. (2005). Attitudes: Introduction & Scope. In D. Albarracin, B.T. Johnson, & M. Zanna (Eds.), *Handbook of Attitudes*. New Jersey, USA: Lawrence Erlbaum Associates Publishers.

Albarracin, D., Johnson, B.T., Zanna, M. (2005). *Handbook of Attitudes*. New Jersey, USA: Lawrence Erlbaum Associates Publishers.

Barker, M. and Rogers, L. (2004). "In, about and for": Exploring the foundations of environmental education. *Set 2,* 15-18.

Bay of Plenty Regional Council. (2015). *Coast Care Bay of Plenty*. Retrieved from:http://www.boprc.govt.nz/sustainable-communities

Bell, J. (2010). *Doing your research project* (5th Ed.). Berkshire, England: Open University Press, McGraw-Hill Education.

Bernal, D., Dickson, K. A., Shadwick, R. E., & Graham, J. B. (2001). Review: analysis of the evolutionary convergence for high performance swimming in lamnid sharks and tunas. *Comparative Biochemistry and Physiology, A 129*, 695-726.

Bernal, D., Sepulveda, C., Mathieu-Costello, O., & Graham, J. B. (2003). Comparative studies of high performance swimming in sharks. I. Red muscle morphometrics, vascularisation and ultrastructure. *Journal of Experimental Biology, 206*, 2831-2843.

Bird, J. (2002). *Generalised body parts of shark.* Retrieved from: http://www.photonesta.com/shark-body-parts

Blair, M. (2008). Community environmental education model for effective environmental programmes. *Australian Journal of Environmental Education, 24,* 45-53.

Bogeholz, S. (2006). Nature experience and its importance for environmental Knowledge, values and action: recent German empirical contributions. *Environmental Education Research 12(1),* 65-84.

Bolstad, R. (2003). Environmental education: Roots in the past, visions of the future, opportunities in the present. *Set* 2, 10-13.

Bonfil, R., Meyer, M., Scholl, M. C., Johnson, R., O'Brien, S., Oosthuizen, H., Swanson, S., Kotze, D. & Paterson, M. (2005). Transoceanic migration, spatial dynamics and population linkages of white sharks. *Science, 310*, 100-103.

Broadhead, K. (2008). *C. carcharias* showing ampullae of Lorenzini and nostril. Authors own photo.

Burgess, G. H. (2013). *International Shark Attack File, 2013 Worldwide Shark Attack Summary*. Retrieved from: http://www.flmnh.ufl.edu/fish

Chaiken, S. (2001). Attitude formation: Function and Structure. In N. J. Smelser & P. B. Baltes (Eds.) *International Encyclopaedia of Social & Behavioural Sciences.* (pp. 899 – 905). Oxford: Pergamon.

Clover, D.E., Jayme, B. Hall, B.L., & Follen, S. (2013). The Nature of Transformation: Environmental Adult Education. *International Issues in Environmental Education. 13.*

Cohen, L., Manion, L., & Morrison, K. (2011). *Research methods in education* (7th Ed.). London, England: Routledge.

Corbett, J. (2006). *Communicating Nature: How We Create and Understand Environmental Messages.* Washington DC, USA: Island Press

Correia das Neves, J. P. & Rocha Monteiro, C. R. (2014). How full is your Luggage? Background knowledge of zoo visitors regarding sharks. *Environmental Education Research. 20* (3). 291-312.

Cox, G., & Francis, M. (1997). *Sharks and Rays of New Zealand*. Christchurch, New Zealand: Canterbury University Press.

Day, B. (1999). Environmental communications strategies for sustainability. *Environmental Education in Asia and Beyond: An international workshop.* (pp 18-23).

Davison, I. (2014, January 9). Shark finning gets total ban in NZ. *The New Zealand Herald.* Retrieved from: www.nzherald.co.nz.

Demski, L. S. & Northcutt, R. G. (1996). The brain and cranial nerves of the white shark: an evolutionary perspective. In A.P. Klimley and D.G. Ainley, (Eds.), *Great White Sharks: The Biology of Carcharodon Carcharias* (pp 121-130). San Diego, USA: Academic Press.

Denscombe, M. (2010). *The good research guide.* (4th Ed.). Berkshire, England: Open University Press: McGraw-Hill Education.

Denzin, N.K., & Lincoln, Y.S. (Eds.), *The SAGE handbook of qualitative research*. Los Angeles, USA: SAGE.

Dietz, T., Fitzgerald, A., & Shwom, R. (2005). Environmental Values. *Annual Review of Environment and Resources. 30,* 335-372.

Disinger, J. & Monroe, M. (1994). Defining environmental education: EE toolbox, workshop resource manual. Retrieved from: http://www.naaee.net/sites/default/files/publications/eetoolbox

Dobson, J. (2004). Sharks, Wildlife Tourism and State Regulation. *Tourism In Marine Environments 3,* 15-23

Dobson, J. (2007). Jaws or Jawesome? Exploring the Shark Diving Experience Retrieved from: http:// www.academia.edu

Duffy, C. (2013). Simple ways of avoid shark encounters. In Bay of Plenty Times. Retrieved: http://www.nzherald.co.nz/bay-of-plenty-

Eagly, A. H., & Chaiken, S. (1993). *The Psychology of Attitudes.* New York, USA: Harcourt Brace Jovanovich Inc.

Eagly, A. H., & Chaiken, S. (1998). Attitude structure and function. In D. Gilbert, S. Fiske, & G. Lindzey (Eds.), *Handbook of social psychology* (4th ed.) (pp. 269-322). New York: McGraw-Hill.

Eames, C. and Cowie, B. (2004). Environmental education in New Zealand's schools: Characteristics and achievements, *Set 2*, 19-24.

Elasmodiver (2014). *Shortfin Mako.* Retrieved from: http://www.elasmodiver.com/Shortfin Mako

Elliott, R. (2014). Riley Elliott, shark research and conservation. Retrieved from: http://rileyelliott.com

Fabrigar, L. R., MacDonald, T. K., & Wegener, D. T. (2005). The Structure Of Attitudes. In D. Albarracin, B.T. Johnson, & M. Zanna (Eds.), *Handbook of Attitudes.* (p.3). New Jersey, USA: Lawrence Erlbaum Associates, Publishers.

Feather, N. T. (1991). Human values, global self-esteem, and belief in a just world. *Journal of Personality, 59***.** 83-106.

Feather, N. T. (1994). Attitudes towards high achievers and reactions to there fall: Theory and research toward tall poppies. In L. Berkowitz (Ed.), *Advances in experimental social psychology.* (Vol. 26) (pp.1-73). New York: Academic Press.

Fien, J. (1993). *Environmental Education: A pathway to sustainability.* Geelong, Australia: Deakin University Press.

Fischhoff, B. (2001). Environmental Cognition, Perceptions and Attitudes. In N. J. Smelser & P. B. Baltes (Eds.) *International Encyclopaedia of Social & Behavioural Sciences.* (pp. 4596-4602). Oxford. Pergamon.

Fishbein, M., & Ajzen. (1975). Belief, attitude, intention and behaviour: an Introduction to theory and research. Reading, MA. Addison-Wesley.

Fish, F. E. & Shannahan, L. D. (2000). The role of pectoral fins in body trim of sharks. *Journal of Fish Biology, 56,* 1062-1073.

Francis, M. (2012). *Coastal fishes of New Zealand*. Nelson, New Zealand: Craig Potton Publishing.

Friedrich, L. A., Jefferson, R., & Glegg, G. (2014). Public perceptions of sharks: Gathering support for shark conservation. *Marine Policy, 47,* 1-7.

Grogan, E. D., & Lund, R. (2004). The origin and relationships of early Chondrichthyes. In J.C. Carrier, J. A. Musick, & M. R. Heithaus (Eds.), *Biology of sharks and their relatives* (pp. 3-27). Boca Raton, USA: CRC Press.

Heithaus, M. R. (2004). Predator-Prey Interactions. In J.C. Carrier, J. A. Musick, & M. R. Heithaus (Eds.), *Biology of sharks and their relatives* (pp. 325-358). Boca Raton, USA: CRC Press.

Henderson, A.C., Flannery, K., & Dunne, J. (2001). Observations on the biology and ecology of the blue shark in the North-East Atlantic. *Journal of Fish Biology, 58,* 1347-1358.

Heupel, M. R. (2010). Sharks. In M. D. Breed & J. Moore (Eds.) *Encyclopaedia of Animal Behaviour*. (pp.184-191). Science Direct: Academic Press

Hueter, R. E., Mann, D., Maruska, K., P., Sisneros, J., A. & Demski, L., S. (2004). Sensory biology of elasmobranchs. In J.C. Carrier, J. A. Musick, & M. R. Heithaus (Eds.), *Biology of sharks and their relatives* (pp. 325-358). Boca Raton, USA: CRC Press.

Hughey, K. F. D., Kerr, G. N., & Cullen, R. (2013). *Public Perceptions of New Zealand's Environment (2013).* Christchurch, New Zealand: EOS Ecology.

International Shark Attack File. (2011). *ISAF Statistics on Attacking Species of Shark.* Retrieved from: http://flmnh.ufl.edu/fish

International Union for Conservation of Nature (2014). IUCN Red-list of Threatened Species. Retrieved from: http://iucnredlist.org

Iozzi, L, A. (1989). What research says to the educator. *The Journal of Environmental Education. 20* (3), 3-9.

Jensen, B. B. & Schnack, K. (1997). The action competence approach in Environmental education. *Environmental Education Research. 3*(2).163-178.

Jickling, B. & Wals, A. (2008). Globalization and environmental education: Looking beyond sustainable development. *Journal of Curriculum Studies. 40* (1), 1-21.

Kellert, S. R. (1983). Affective, Cognitive and Evaluative Perceptions of Animals. In I. Altman & J. Wohlwill (Eds.), *Behaviour and the natural environment.* New York: Plenum Press.

Kellert, S. R. (1989). Perceptions of Animals in America. In R.J. Hoage (Ed.), *Perceptions of Animals in American Culture.* Washington D.C: Smithsonian Institution Press.

Kellert, S. R. (1996). *The Value of Life: Biological diversity and human society* Washington D.C. USA: Island Press / Shearwater Books.

Klimley, P.A., Leboeuf, B.J., Cantara, K.M., Richert, J.E., Davis, S.F., Van Sommeran, S., & Kelly, J.T. (2001). The hunting strategy of white sharks *(Carcharodon carcharias)* near a seal colony. *Journal of Marine Biology, 138*, 617-636.

Kollmuss, A. & Agyeman, J. (2002). Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behaviour? *Environmental Education Research, 8* (3), 239-260.

Kuczynski, L. (2001). Values, Development of. In N. J. Smelser & P. B. Baltes (Eds.) *International Encyclopaedia of Social and Behavioural Sciences.* (pp. 16148-16150). Oxford. Pergamon.

Land Information New Zealand. (2014). *Marine Chart of Bay of Plenty.* Retrieved from: www.linz.govt.nz

Long, D.J., Hanni, K.D., Pyle, P. Roletto, J. Jones, R.E., & Bandar, R. (1996). White shark predation on four pinnipeds species in central California waters: geographic and temporal patterns inferred from wounded carcasses. In A.P. Klimley and D.G. Ainley, (Eds.), *Great White Sharks: The Biology of Carcharodon carcharias.* (pp. 121-130). USA: Academic Press.

Lynch, A. M. J., Sutton, S. G., & Simpfendorfer, C. A. (2010). Implications of recreational fishing for elasmobranch conservation in the Great Barrier Reef Marine Park. *Aquatic Conservation: Marine and Fresh-water Ecosystems, 20,* 312-318.

McLean, T. (2003). Environmental education in Otago primary schools: Education *for* the environment? *Set 1,* 4-9.

Markula, P. & Silk, M. (2011). *Qualitative research for physical culture.* Hampshire, England: Palgrave Macmillan.

Menter, I., Elliot, D., Hulme, M., Lewin, J., & Lowden, K. (2012). *A guide to Practitioner research in education.* London, England: Sage.

Milfont, T. L. & Duckitt, J. (2009). The environmental attitudes inventory: a valid and reliable measure to assess the structure of environmental attitudes. *Journal of Environmental Psychology 30*, 80-94.

Miller, J. R. (2005). Biodiversity conservation and the extinction of experience *TRENDS in Ecology and Evolution 20 (8).*

Ministry of Education (1999). *Guidelines for Environmental Education in New Zealand Schools.* Wellington, NZ: Learning Media.

Ministry of Education (2007). *The New Zealand Curriculum.* Wellington, New Zealand: Learning Media.

Ministry for the Environment (2014). *Enviornmental Education.* Retrieved from: http://www.mfe.govt.nz/withyou/teachers.

Ministry of Fisheries, (2010). *Blue shark fishery summary.* Retrieved from http://www. fish.govt.nz.

Ministry of Fisheries, (2008). *National plan of action for the conservation and management of sharks - Draft.* Retrieved from: http:www.fish.govt.nz.

Ministry of Primary Industries. (2014). *National plan of action for the conservation and management of sharks - 2013.* Retrieved from: http://www.fish.govt.nz/en-nz/Environmental/Sharks

Monroe, M., Day, B., & Grieser, M. (2000). GreenCOM weaves four strands. In B. A. Day & M. C. Monroe (Ed's), *Environmental Education and Communication for a Sustainable World.* (pp. 3-6). Washington D.C, USA: Academy for Education Development.

Motta, P.J. (2004). Prey Capture Behaviour and Feeding Mechanics of Elasmobranchs. In J.C. Carrier, J. A. Musick, & M. R. Heithaus (Eds.), *Biology of sharks and their relatives* (pp. 325-358). Boca Raton, USA: CRC Press.

Muter, B. A., Gore, M. L., Gledhill, K. S., Lamont, C. & Huveneer, C. (2012). Australia and U.S. News Media Portrayal of Sharks and Their Conservation. *Conservation Biology 27,* 187-196.

National Institute of Atmosphere and Water (NIWA), (2014). *Rig shark.* Retrieved from: http://niwa.co.nz/fisheries.

National Institute of Atmosphere and Water (NIWA), (2014). *Bronze Whaler.* Retrieved from: http://niwa.co.nz/fisheries

Neff, C. L. & Yang, J. Y. H. (2013). Shark bites and public attitudes: Policy implications from the first before and after shark bite survey. *Marine Policy, 38,* 545-547.

Newhouse, N. (1990). Implications of attitude and behaviours research for environmental conservation. *The Journal of Environmental Education, 22,* 26-32.

Noble, K. (2009). Education for sustainability in primary social studies education. In M. Littledyke, N. Taylor, and C. Eames (Ed's), *Education for Sustainability in the Primary Curriculum.* (pp. 114-137). South Yarra, Australia: Palgrave MacMillan.

North American Association for Environmental Education. (1999). *Excellence in EE – Guidelines for Learning.* Troy, OH: NAAEE. Retrieved from: http://eelinked.naaee.net

Olson, J., & Zanna, M. (1993). Attitudes and attitude change. *Annual Review of Psychology. 44.* 117-154.

Oyserman, D. (2001). Values: Psychological Perspectives. In N. J. Smelser & P. B. Baltes (Eds.) *International Encyclopaedia of Social and Behavioural Sciences.* (pp. 16150-16153). Oxford: Pergamon.

Packer, J. & Ballantyne, R. (2010). The roles of zoos and aquariums in education for a sustainable future. *New Directions for Adult and Continuing Education. 127*. 25-34

Perrine, D. (2005). *Sharks and Rays*. Scotland, United Kingdom: Colin Baxter Photography.

Perrine, D. (2014). *Lemon Shark Live birth & Egg case.* Retrieved from: www.seapics.com

Peschak, T. P., & Scholl, M. C. (2006). *South Africa's Great White Shark.* South Africa: Struik Publishers.

Pollard, D. A., Smith, M. P. L., & Smith, A. K. (1996). The biology and Conservation status of grey nurse shark *(Carcharias Taurus)* in NSW Australia. *Aquatic Conservation Marine and Freshwater Ecosystems, 6,* 1-20.

Pooley, J. A., & O'Connor, M. (2000). Environmental education and attitudes: emotions and beliefs are what is needed. *Environment and Behaviour, 32* (5), 711-723.

Pratt, H. L. Jr., & Carrier, J. C. (2001). A review of elasmobranch reproductive behaviour with a case study on the nurse shark, *Ginglymostoma cirratum*. *Environmental Biology of Fishes, 60,* 157-188.

Punch, K. F., & Oancea, A. (2014). *Introduction to research methods in education.* London: SAGE.

Rezsohazy, R. (2001). Values, Sociology of. In N. J. Smelser & P. B. Baltes (Eds.) *International Encyclopaedia of Social and Behavioural Sciences.* (pp. 16153 - 16158). Oxford: Pergamon.

Rokeach, M. (1973). *The nature of human values.* New York: Free Press.

Schultz, W., Gouveia, V., Cameron, L., Tankha, G., Schmuck, P., & Franek, M. (2005). Values and their relationship to environmental concern and conservation behaviour. *Journal of Cross Cultural Psychology, 36,* 457-475.

Schwartz, S., & Bilsky, W. (1987). Toward a Universal Psychological Structure of Human Values. *Journal of Personality and Social Psychology, 53,* 550-562.

Seraphin, K. D. (2010). A partnership approach to improving student attitudes about sharks and scientists. *School Science & Mathematics. 110* (4), 203-219

Shadwick, R. E., & Goldbogen, J. A. (2012). Muscle function and swimming in sharks. *Journal of Fish Biology, 80,* 1904-1939.

Simpfendorfer, C.A., Huepel, M. R., White, W. T., & Dulvy, N. K. (2011). The importance of research and public opinion to conservation management of sharks and rays: a synthesis. *Marine and Freshwater Research, 62,* 518-527.

Statistics New Zealand. (2013). *Census 2013 – Tauranga City.* Retrieved from: http://www.stats.govt.nz/Census/2013-census

Stern, P., Dietz, T., & Kalof, L. (1993). Value orientations, gender and environmental concern. *Environment and Behaviour, 25,* 322-348.

Stern, P., & Dietz, T. (1994). The values basis of environmental concern. *Journal of Social Issues, 50,* 65-84.

Stevens, J.D., Bonfil, R., Dulvy, N.K., & Walker, P.A. (2000). The effects of fishing on sharks, rays and chimaeras (chondrichthyans), and the implications for marine ecosystems. *ICES Journal of Marine Science, 57,* 476-494.

Syme, D. A., & Shadwick, R. E. (2011). Red muscle function in stiff-bodied swimmers: there and almost back again. *Philosophical Transactions of the Royal Society, B 366***,** 1507-1515.

Tilbury, D. (1995). Environmental education for sustainability: Defining thenew focus of environmental education in the 1990s. *Environmental Education Research, 1(*2), 195-212.

Thomson, K. S., & Simanek, D. E. (1977). Body form and locomotion in sharks. *American Zoologist, 17,* 343-354.

Thompson, T. L., & Mintzes, J. J. (2002). Cognitive structure and the affective domain: On knowing and feeling in Biology. *International Journal of Science Education. 24* (6), 645-660.

UNESCO-UNEP. (1978). The Tbilisi Declaration. *Connect Vol. III* (1). Retrieved from: http://unesdoc.unesco.org.

Vaughan, G. M., & Hogg, M. A. (2005). *Introduction to Social Psychology.* (5th ed.), NSW, Australia: Pearson Education.

West, J.G. (2011). Changing patterns of shark attacks in Australian waters. *Marine and Freshwater Research, 62,* 744-754.

Whatmough, S., Van Putten, I., & Chin, A. (2011). From hunters to nature observers: a record of 53years of diver attitudes towards sharks and rays and marine protected areas. *Marine and Freshwater Research, 62,* 755-763.

Wikipedia (2015). *Jaws (film).* Retrieved from: https://en.wikipedia.org/jaws

Zanna, M. P., & Rempel, J. K. (1998). Attitudes: a new look at an old concept. In D. Bar-Tal & A. W. Kruglanski (Eds.), *The social psychology of knowledge* (pp.315-334). Cambridge, UK: Cambridge University Press

Appendix A

Attitudes and Values Towards Sharks : Survey Questionnaire

A. Background Information : please circle or complete the fields below.

1. My gender Male / Female
2. My age < 15 / 16-25 / 26-40 / 41-55 / 56-70 / 71 +
3. My ethnicity _____
4. Highest level of education Secondary / Tertiary Undergraduate / Masters or Phd

B. General Knowledge: Please circle one answer for each question.

1. How would you rate your knowledge of sharks *Poor / Average / Good / Very Good*
2. Sharks are a type of fish *True / False / Don't Know*
3. Sharks breed quickly and produce many young *True / False / Don't Know*
4. Sharks are not essential to the health of the oceans *True / False / Don't Know*
5. The number of sharks in the ocean is declining *True / False / Don't Know*
6. The sale of shark fin is legal in NZ *True / False / Don't Know*
7. Shark meat is sold to be eaten in NZ *True / False / Don't Know*
8. All shark species are a potential threat to humans *True / False / Don't Know*
9. The number of shark species in NZ is *0-5 / 6-20 / 21-40 / 41-80 / 81-120 Don't Know*
10. The total number of fatal shark attacks in NZ is *0-5 / 6-10 / 11-15 / 16- 20 Don't Know*

C. Attitudes and Values: Please write one or two words to answer the following questions.

1. When you hear the word "shark" what is your first thought? _____

   Why is this your first thought? _____

2. When you think of sharks what type of shark comes to mind first? _____

   Why do you think this shark comes to mind? _____

3. ***Please circle one answer for each statement.***

1.	I believe sharks hunt humans	*Strongly Agree / Agree / Unsure / Disagree / Strongly Disagree*
2.	Eating shark fins has no nutritional value	*Strongly Agree / Agree / Unsure / Disagree / Strongly Disagree*
3.	I am afraid of sharks	*Strongly Agree / Agree / Unsure / Disagree / Strongly Disagree*
4.	I like to learn about sharks	*Strongly Agree / Agree / Unsure / Disagree / Strongly Disagree*
5.	Sharks should be protected	*Strongly Agree / Agree / Unsure / Disagree / Strongly Disagree*
6.	I worry about sharks when I go in the ocean	*Strongly Agree / Agree / Unsure / Disagree / Strongly Disagree*
7.	I would eat shark	*Strongly Agree / Agree / Unsure / Disagree / Strongly Disagree*
8.	I would like to see a shark in the ocean	*Strongly Agree / Agree / Unsure / Disagree / Strongly Disagree*
9.	I don't think sharks intend to harm humans	*Strongly Agree / Agree / Unsure / Disagree / Strongly Disagree*
10.	People are unlikely to see a shark in the wild	*Strongly Agree / Agree / Unsure / Disagree / Strongly Disagree*
11.	I would never eat shark	*Strongly Agree / Agree / Unsure / Disagree / Strongly Disagree*
12.	Sharks are essential to the health of the ocean	*Strongly Agree / Agree / Unsure / Disagree / Strongly Disagree*
13.	I think the only good shark is a dead shark	*Strongly Agree / Agree / Unsure / Disagree / Strongly Disagree*
14.	I believe sharks avoid human contact	*Strongly Agree / Agree / Unsure / Disagree / Strongly Disagree*
15.	I don't care if sharks are killed	*Strongly Agree / Agree / Unsure / Disagree / Strongly Disagree*
16.	I like sharks	*Strongly Agree / Agree / Unsure / Disagree / Strongly Diagree*

D. Knowledge and Experience with sharks: Please circle one answer for each question and explain.

1. Have you ever seen a shark in an aquarium? Yes /No

   If yes, how did this make you feel? _____

   _____

   _____

2. Have you ever seen a shark in the ocean? Yes / No

   If yes, how did this make you feel? _____

   _____

   _____

3. Do you use the ocean for recreation? Yes / No

.

If yes, how do you use it? _____

How often do you use it? _____

4. Are you a member of a conservation / environmental group e.g. Forest & Bird? Yes / No
5. Do you watch wildlife programmes or documentaries e.g. BBC, Discovery Channel? Yes / No
6. Have you ever watched Shark Week on Discovery channel? Yes / No
7. Have you ever watched the movie JAWS? Yes / No
8. Do you read any wildlife or environmental publications? Yes / No

9. Where do you receive most of your information about sharks?

Indicate your top three (number 1-3), with 1 being where you would get most of your information.

Newspaper ☐ Internet ☐ TV News ☐ TV Documentaries ☐ Magazines ☐ Movies ☐

Other People ☐ Books ☐ Education e.g. School ☐

10. Have you ever donated money to a wildlife or environmental project? Yes / No
11. Have you ever volunteered for a wildlife or environmental project? Yes / No
12. Would you donate money or time to a project to help conserve sharks? Yes / No

Thank you for answering the survey and assisting me with my research.

Appendix B

Dear parent or caregiver,

I am writing to invite your child to participate in my Master's research study. Through this research I hope to gain an understanding of students' attitudes and values towards sharks, and what has shaped these. My goal is to use the information from this research to develop an environmental education programme that will create greater awareness, knowledge and understanding of this species and the marine environment.

I would like to involve your child in this study. This would require him/her completing an online anonymous questionnaire relating to their knowledge and attitudes about sharks. This survey will take about 15 minutes to complete. It can be completed at school with supervision by the teacher, or at home at a convenient time. Permission has been granted by the school principal and your child's teacher for this study to be conducted in their class.

Data collected during the study may be used in writing my thesis, publications or in presentations. I will not use your child's name in any publications or presentations. I will make sure that all the information gathered is securely stored. You and your child can decline to be involved in the research, and can withdraw any or all data provided up to the time the completed questionnaire is submitted.

I would appreciate your consent for your child to be involved as described by completing the attached consent form. If you need any more information about the project, or if issues arise for your child during the project, please contact me on 027 842 5645, or email: kab48@students.waikato.ac.nz. If I am unable to resolve your concerns, you may contact my research supervisor, Dr. Chris Eames, on 07 8384357 or email: c.eames@waikato.ac.nz

Yours sincerely

Kathy Broadhead

Appendix C

Dear participant,

I would like to invite you to participate in my Master's research. Through this research I hope to gain an understanding of people's attitudes and values towards sharks, and what has shaped these. My goal is to use the information from this research to develop an environmental education programme that will create greater awareness, knowledge and understanding of this species and the marine environment.

I would like to involve you in this study. This would require you to complete a questionnaire relating to your knowledge, attitudes and values about sharks. This survey will take about 10 minutes to complete.

Data collected in the questionnaire may be used in writing my Master's thesis, publications or in presentations. As the questionnaire is completed anonymously I will not use your name, or the names of other participants in any publications or presentations. I will make sure that all the information I gather is securely stored.

You can decline to be involved in the research, and can withdraw any or all data provided up to the time you submit the questionnaire (as data is anonymous once it has been submitted I will be unable to identify it amongst other data). By submitting survey data you grant your consent to the conditions outlined in this letter.

I would appreciate your consent to be involved as described. If you need any more details about the project, or issues arise for you during the project, please contact me on 027 842 5645, or email: kab48@students.waikato.ac.nz. If I am unable to resolve your concerns, you may contact my research supervisor, Dr. Chris Eames, on 07 8384357 or email: c.eames@waikato.ac.nz

Yours sincerely

Kathy Broadhead