

Running head: CONSERVATION EDUCATION IN SHARK
ECOTOURISM

Conservation Education in Shark Ecotourism

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We accept this thesis as conforming
to the required standard

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Abstract

Sharks, as top predators, are vital a healthy marine ecosystem. Sharks regulate species abundance, distribution, and diversity, which in turn can impact the health of marine habitats. The biggest issue relating to the endangered status of many shark species is the unsustainable international trade in shark fins, used as a delicacy in shark fin soup. Ecotourism is one strategy that can help foster conservation, increase protection, and educate the public about sharks. Shark ecotourism can provide a range of education and conservation benefits for visitors, foremost education about human threats to sharks. This study examines the role of dive operators and guides in Playa del Carmen, Mexico in regards to shark conservation education. This study will help to develop a pre-dive instructional process that will better inform tourists and the diving industry. Furthermore, this process can lead to improved strategies for shark education and conservation that can be applied globally.

Key words: shark ecotourism, scuba diving, conservation, ecotourism, education, Bull sharks

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List of Abbreviations

CITES	Convention on International Trade in Endangered
DFO	Department of Fisheries and Oceans
IANTD	International Association of Nitrox and Technical Divers
IUCN	International Union for Conservation of Nature
MPA	Marine Protected Areas
NAUI	National Association of Underwater Instructors
NAAEE	North American Association of Environmental Education
NOAA	National Oceanic & Atmospheric Administration
PADI	Professional Association of Diving Instructors
RFMO	Regional Fisheries Management Organisations
SCUBA	Self-Contained Underwater Breathing Apparatus
SSI	Scuba Schools International
UNCLOS	United Nations Convention on the Law of the Sea
WWF	World Wildlife Fund

Chapter One - Project Overview

Sharks are one of the oldest and most mysterious groups of creatures inhabiting the Earth today. Sharks live in oceans and seas all over the world and shark dive sites are found in over 40 different countries, involving at least 24 different species including many endangered animals (Cawardine & Watterson, 2002). Self-Contained Underwater Breathing Apparatus (SCUBA) Divers have been diving with Bull sharks (*Carcharhinus leucas*), mostly pregnant females, on the reefs off Playa del Carmen, Mexico for 30 years (Van Der Haar, 2013). Currently, it is the only known Bull shark aggregation along Mexico's Yucatán Peninsula (Gurash, 2010).

Most sharks are apex predators that are at the pinnacle of the marine food chain, playing a vital role in the ocean ecosystems (Kempster, 2013). Kempster (2013) elaborates that sharks live in a wide range of aquatic habitats ranging from fresh water, brackish waters and shallow coastal regions to deep waters on the ocean floor and in the open ocean. Cawardine & Watterson (2002) highlights the fact that the Bull shark, in particular, has a long life span, late age of maturity, is known to swim in salt, fresh and brackish waters, and is a widely distributed, large coastal shark species known to travel long distances. Sharks are not the man eating monsters falsely portrayed in movies. They feed on old, weak or sick prey, which helps to regulate the natural balance of the marine ecosystem at all levels (Cawardine & Watterson, 2002). The effects of removing sharks from ocean ecosystems are very likely to be ecologically and economically damaging.

As in the case with many other fish, humans constitute the main threat to sharks by hunting them globally for many different purposes (Cawardine & Watterson, 2002). According to the Convention on International Trade in Endangered Species (CITES) (2013), due to overexploitation and lack of proper management, many shark species are under considerable risk of unrecoverable decline with some species having declined to near extinction in recent years. Kempster (2013) elaborates that, although hard to determine, it is estimated that between 75 and 100 million sharks are killed each year from by-catch, ocean pollution, habitat destruction, and shark finning. Techera (2012) predicts that if the killing continues at this rate many species will be lost forever with potentially devastating implications for our ocean ecosystems.

CITES is widely considered one of the best tools for protecting vulnerable species from extinction. According to CITES (2013), approximately 400 species of sharks are found in the world and sharks were first included in Appendix II of CITES in February 2003. Of the 400 species, 100 of them are over-exploited. Although not listed as 'Endangered', the Bull shark is currently listed by the International Union for Conservation of Nature (IUCN) as "Near Threatened", but does not meet criteria to be considered endangered or vulnerable at this time (CITES, 2013). The Bull shark is a major tourist attraction on the Yucatán Peninsula in Mexico, in particular Playa del Carmen, Mexico.

Although the Bull shark is not a targeted species, it is captured in fisheries around the world. The biggest use for Bull sharks is their fins used in Asia (and in Asian restaurants world-wide) for shark-fin soup (Techera, 2012). Due to this

shark's life history and environmental requirements which brings it in close proximity to human populations, it could potentially be heavily impacted by human activities in these inshore regions. For instance, the inshore nursery grounds of this species could be particularly threatened (Techera, 2012). Further research on this unique species of shark is necessary so more can be understood of its biological, ecological, and fisheries significance.

Higham and Lück (in Vianna, Meekan, et al., 2012), explain that wildlife ecotourism is becoming increasingly popular, and is helping to grow conservation efforts globally. Orams (2000), in Finkler and Highman (2004), adds that the study of human-wildlife interactions has been conducted mostly from a biological sciences perspective, which tends to focus on the negative impacts, and has not focused on the social science of the interaction. According to Reynolds and Braithwaite (2001), an understanding of the human aspect of wildlife ecotourism is crucial for successful management in ecotourism. In reality, ecotourism managers have the dual function of conserving wildlife while simultaneously providing quality recreational experiences (Hammit and Cole, 1998). Hammit and Cole (1998) argue that to meet both of these objectives, they need a good understanding of both the ecological and human aspects. In this regard the emergence of the social sciences can greatly assisted shark ecotourism operators in achieving the goal of balancing recreation and conservation.

Shark fisheries and shark ecotourism do not always intersect, but when they do, they are incompatible. While not all shark species and/or sites are shared with ecotourism, those that do must be protected to ensure continued economic benefits.

With added focus on consumer awareness of unsustainable fishing practices, shark ecotourism could prove crucial for the future of shark populations.

As the impacts of human activities on the ocean and the potential consequences for human wellbeing become increasingly evident there is a growing need for public engagement in the governance of the marine environment. By fostering awareness, dive operators and researchers can help to create agents of change to address marine environmental issues and help transform behavioural choices. Shark diving may provide an attractive economic alternative to shark fishing, while ensuring the ecological sustainability of shark populations and educating tourists of the important role sharks play in the marine ecosystem.

Background

Researcher's Perspective. Having worked with the Professional Association of Diving Instructors (PADI) for over 20 years as a Master Scuba Diver Trainer, diving guide, and commercial diver, I have great admiration, respect, and passion for the marine ecosystem, and for sharks in particular. I was fortunate to work as a White shark wrangler in the Guadalupe Islands off Mexico and travel the globe working all over south East Asia and the Cayman Islands. During this time, I had the opportunity to share my knowledge of nature and my passion for the marine ecosystem in education and interpretation programs with thousands of divers. In my experience, an educated diver is more likely to understand the importance of the marine environment and respect the waters they visit.

Project Rationale. The inspiration for this research project began many years ago as a professional diving instructor. I was guiding divers and teaching shark

diving in the Bahamas, Cancun Mexico, the Cayman Islands, Costa Rica, Cozumel and Guadalupe Island in Mexico, the Philippines, Playa del Carmen Mexico, and the Similan Islands off Thailand. I realized that certain shark diving operations in different regions focus on educating the divers on conservation as well as tag and photo identification of the resident shark populations. However, in Playa del Carmen, Mexico I noticed that although there are in depth shark conservation programs available through Project Aware Foundation (Project Aware, 2013), no one was teaching any shark conservation. An extensive, knowledge based shark conservation specialty course was available for a fee, however, there was no pre-dive conservation education being done before or after Bull shark dives.

I asked myself a simple question, “What is important to me?” I saw an opening, an opportunity to express and show my passion for a species that needs our help, to do my part in fostering sustainable behaviours and creating advocates for shark conservation in divers and the diving industry as a whole. I further questioned myself by asking, “What has to happen physically, mentally, emotionally, and spiritually for change to take place?” “How do I do my part to express the importance of sharks to a vastly diverse marine ecosystem?” Through education in conservation we can change the external perception of sharks and turn the focus inward to the importance of their role to the system, and not to fear them but to protect them. Moreover, the development of a streamlined pre-dive conservation education briefing for existing and potential diving operators would provide assurance that dive operators and their guides have a high standard of knowledge to practice environmental stewardship in shark diving.

Purpose of Research

The primary purposes of this research are to examine:

1. the extent of existing knowledge of shark conservation held by diving operators;
2. the extent of shark conservation education that is currently being taught in Playa del Carmen, Mexico, and;
3. The need for a more streamlined pre-dive conservation education program for diving operators and guides in the shark ecotourism industry based on the comprehensive programs already available.

Data collection involved: a) performing in-water participant observation, assessing the effectiveness of the shark diving instruction and; b) conducting semi-structured interviews with scuba diving guides.

The Target Audience

The target audience of this project are SCUBA diving operators in Playa del Carmen, Mexico. While diving operators provide a direct link between SCUBA divers and sharks and conduct activities that impact the marine environment and protected areas, there is currently no requirement for them to provide education on sharks and the important role they play in the marine ecosystem. This region of Mexico is host to over 45 active dive operations, with the majority conducting some kind of shark diving activity.

Chapter Summary

The PADI organization is one of the world's most diverse and extensive diving institutions, providing dive tourism opportunities for millions of people every year.

This demand on the marine ecosystem provides challenges to diving operators to find the balance between conservation education and providing safe and quality recreation. Diver education on conservation issues is an effective method of increasing awareness, thereby helping to reduce impacts on the marine environment. Many visitors to tropical destinations seek SCUBA diving operators to enhance their visits; therefore, operators play an important role in providing safe recreational experiences as well as information about the marine environment to the divers. SCUBA diving instructors are required to maintain a certain level of competence for teaching SCUBA diving and carry up to date insurance; but currently they are not required to obtain any conservation education training. The objectives of this project are to examine the extent of knowledge diving operators have with regards to shark conservation, and the amount of conservation education that is currently being taught. In addition, the research will examine the need for a more streamlined pre-dive conservation education program for diving operators and guides in the shark ecotourism industry based on the more comprehensive programs already available.

Chapter Two - Literature Review

This chapter is divided into three sections: Ecotourism and Shark Ecotourism, Conservation and Shark Ecotourism, and Dive Briefing Planning and Design. Each section addresses a key topic related to goals and purpose of this thesis and the design of a formal streamlined pre-dive conservation education briefing in shark ecotourism.

Ecotourism and Shark Ecotourism

Ecotourism in general involves travelling to fragile, pristine and mostly protected areas for the purposes of educating the traveller, fostering respect for different cultures, and directly benefiting the economic and political empowerment of local communities (Hill & Gale, 2009). Ideally, ecotourism also integrates the study of biological and cultural diversity, exploration of unspoiled natural habitats, and learning about local culture, and flora and fauna, providing environmental education experiences for visitors and managing this in a sustainable manner (Orams, 2004).

Ecotourism provides opportunities to educate and foster conservation by developing a relationship between ecotourism, sustainability, and education, and fosters effective interpretations of cultural and environmental values (Hill & Gale, 2009). In addition, ecotourism offers an avenue for educational as well as personal growth and nurtures values of appreciation and gratitude for the environment (Hill & Gale, 2009). Ecotourism is one of the fastest growing sectors in the tourism industry and has been suggested by Boo (1990) and Cater and Lowman (1994) as a way in

which visitors can have an intrinsically environmental experience that entails adventure tourism, cultural tourism, and rural tourism. Included in this category is SCUBA diving or more specifically shark diving as it relates to this research project. Honey (2008) expands ecotourism by saying that sustainable ecotourism aims to address the needs of visited environments to sustain them. This includes sustaining the environment and contributing to help local communities understand the importance and value of their environment. This is particularly relevant to shark ecotourism, which can be an important conservation tool for these species.

The concept of sustainability and sustainable development comes from The Brundtland Report (1987) written for the United Nations by a committee chaired by Dr. Gro Harlem Brundtland, the former prime minister of Norway, and is defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Sneddon, Howarth, & Nooragard, 2006). The basic criteria for sustainable ecotourism include the sustainable use of ecological resources, increased environmental and cultural awareness, conservation ethos, support of local economies through increased revenue from visitors and the use of local supplies and services (Weaver, 1999). It is important to note that for ecotourism to be realized, the above components need to be integrated. As mentioned previously, ecotourism entails nature as the main laboratory for learning through which attitudes and values on conservation are fostered. For these natural resources to be available in the future, sustainable practices need to be at the forefront.

There are several differences between ecotourism and other forms of tourism. The central difference is that ecotourism involves learning about the environment, whereas other forms of tourism such as adventure tourism focus primarily on the personal accomplishment of successfully completing the challenge provided by the environment (Fennell, 2002). Fennell (2002) elaborates that the interaction between environment and adventure travel are components of adventure tourism. This labels adventure travel with certain “risky” elements. Shark tourism is most often categorized as adventure tourism. Shark ecotourism needs to move towards being a more sustainable ecologically-based tourism or, ideally, towards being transformational tourism, which expands on ecotourism and is “a process that helps individuals to understand the environment in a way that may challenge their experiences, change their behaviours and influence their values, ultimately leading to individual and social transformation through the changed perspective” (Mezirow, 1991, in Reisinger, 2013, p.17). Transformation demands a shift in human awareness with strong communication to create meanings and to reach a common understanding from the interaction, connection, and reflection of the experience (Reisinger, 2013).

Ecotourism emphasizes interaction based on proximity to the natural habitat (e.g. watching sharks in the ocean) while mainstream tourism does not (e.g. watching sharks in an aquarium) (Anderson & Beasley, 2002). The levels of interactions described by Fridell (2003) are different in the two concepts. Ecotourism-based activities involve a “close” interaction with the environment with actions such as species identification and indigenous knowledge of certain phenomena. The level of

interaction related with tourism on the other hand is perceived to be “shallow” as little is learnt from the environment. Despite the differences, similarities also exist between ecotourism and other forms such as sustainable tourism and adventure tourism. The environment is recognized as the main functional unit, and the main activities are environmentally related. SCUBA diving, nature viewing, and participating in eco-challenge activities are examples of the environmentally-based activities (Honey, 2008).

The end result of ecotourism is to create opportunities to expose people to the environment and methods of conservation education. The human-environment interaction creates an aesthetic and intrinsic feeling of reconnecting with nature thus nurturing an atmosphere for mental relaxation. This becomes transformational when education helps to foster behavioural changes motivating people into movement as well as conservation and protection of the environment (Reisinger, 2013).

Ecotourism struggles with the relationship between the environment, sustainability, local communities, culture, economic development, and the motivation for profit. Ecotourism goes beyond the traditional tourism stereotype of beaches, shopping, and photographs. It is an experience that incorporates tourism specific to nature and the opportunity to interact with this natural environment. There are significant differences between tourism and ecotourism that exist, mainly revolving around conservation, sustainability, and levels of interactions with the environment. By adding the element of education, ecotourism can move further into a transformational tourism experience fostering behavioural changes and creating motivation for movement in tourists. Shark ecotourism is a sub set of ecotourism

categorized mainly as adventure tourism, and it provides an excellent opportunity for ecotourism or, even better, as a transformational tourism activity to educate divers on sustainability, conservation, protection and ecology. With strong communication and subsequent reflection of the shark diving experience the industry can transform behaviours.

Conservation and Shark Ecotourism

There are a variety of methods for preserving marine biodiversity, for instance, governments can create comprehensive bycatch and dis-card policies (Visit the Department of Fisheries and Oceans Canada (DFO) website for information on Canadian policies) (DFO, 2015), and by the development of sustainable fisheries which may involve establishing fishing quotas, restoring depleted or endangered populations, and developing artificial reefs (WWF, 2015). In addition, setting up marine reserves (Visit <http://www.marine-reserves.org.nz/> for more information) (Marine Reserves, 2015) or Marine Protected Areas (MPAs) helps to protect and sustain marine ecosystems (Visit the DFO for information on Canadian MPA's and the National Oceanic and Atmospheric Administration (NOAA) in the United States for further information) (DFO, 2015; NOAA, 2015). Further focus is to halt human activities that are detrimental to the marine environment through policy or legislation (Davis & Worm, 2013).

The current framework for thinking about environmental research is grounded in the biological sciences. Yet because humans are a major source of both the problems as well as the hope for solutions, the role of the social sciences has grown in importance. Freedman (2004) highlights the growing recognition that the

social sciences play a key role in conservation and require more efficient ways for working together toward a common vision. Education of the general public about conservation issues is vital in the process of conservation of the marine environment (Freedman, 2004). However, shark conservation, in this case Bull shark conservation, proves to be especially challenging due to their highly migratory behaviour and shared management with many other countries (Karl, Castro, Lopez, Charvet, & Burgess, 2011). Since this species falls under the mandate of Regional Fisheries Management Organizations (RFMOs) by the United Nations Convention on the Law of the Sea (UNCLOS), the convention only encourages cooperation with no enforcement resulting in little action for conservation (UNCLOS, 2013).

In conducting the literature review, it was important to reflect on the differing definitions of conservation and approaches to conservation. Despite the varying definitions, a common theme is the protection and preservation of natural resources while balancing human impact.

What is Conservation? Conservation is a comprehensive term with varying definitions. It is most commonly defined as “preservation, especially of the natural environment” or “the wise use of natural resources” (Freedman, 2004). More importantly, another more comprehensive term is ‘Conservation Psychology’:

“Conservation psychology is the scientific study of the reciprocal relationships between humans and the rest of nature, with a particular focus on how to encourage conservation of the natural world. Conservation psychology is an applied field that uses psychological principles, theories, or methods to understand and solve issues related to human aspects of

conservation. It has a strong mission focus in that it is motivated by the need to encourage people to care about and take care of the natural world. In addition to being a field of study, conservation psychology is also the actual network of researchers and practitioners who work together to understand and promote a sustainable and harmonious relationship between people and the natural environment” (Brook, 2001, p.138).

Brook (2001) further emphasizes that conservation implies active management of human-nature interactions, compared to “preservation,” which usually involves setting aside areas to minimize human impact. Conservation is value-driven because it focuses on benefits. With the world’s population increasing and the demand for natural resources (shark resources) steadily increasing, Freedman (2004) articulates that conservation, preservation, and protection of the earth’s natural resources and ecological processes is imperative to our survival. Therefore, conservation is a vital element in protecting sharks and the marine ecosystem.

In order to foster more awareness for sharks and a healthier marine ecosystem, a focus on conservation psychology has to be adopted in addition to conservation biology. This will directly complement the conservation biology already in place and address the problem situations where humans are challenged to live with sharks. As a result of this promising approach, social scientists can work together with biological scientists to create true conservation and adaptive management.

Pre-Dive Briefing Planning and Design in Shark Ecotourism

In its ideal form, marine ecotourism would involve a symbiotic relationship between tourism and the marine and coastal environments. Marine ecotourism has considerable global significance in terms of its economic, social, cultural, and environmental impacts. Certainly, there are many examples around the world of activities that are portrayed as marine ecotourism, but that do not meet with the minimum requirements of sustainability. As such, a particular challenge lies in addressing the educational and planning dilemmas that stand in the path of genuinely sustainable marine ecotourism operations.

Today's complex world demands that tourism operators understand societal changes and the specific benefits customers expect from their experiences. Instructional planning and design involves the process of identifying the skills, knowledge, information, and attitude gaps of a targeted audience and creating, selecting or suggesting learning experiences that close this gap (Fennell, 2002). Peake, Innes, & Dyer (2009) highlight many conservation programs that aim to alter behaviours'; however, increased awareness of a conservation problem does not guarantee meaningful behavioural changes in support of conservation. "To adopt the ethic for living sustainably, people must re-examine their values and alter their behaviour" (IUCN, 1991, p.11). Peake, Innes, & Dyer (2009) clarify that conservation educators initially suggested that the learning process necessary for conservation action progresses from ignorance to awareness, understanding, concern, and finally action. Following this model, programs should first deliver information to increase knowledge and shift attitudes about conservation problems, and then seek

to influence future behaviours. Simply giving people new information will not necessarily lead to behavioural changes. People might be aware of the problem, but may not have the knowledge, values, motivation, or skills to identify viable alternatives to their current behaviours.

By using educational briefings Medio and Pearson (1997) confirm that diver behaviour may be influenced by the use of educational tools. Medio and Pearson (1997) highlight that following the educational briefing on coral reef ecology, there was a change in both the voluntary and involuntary contacts with the marine substrate by divers. These observations, as well as the divers' responses to subsequent questioning, support the interpretation that the educational briefing did encourage divers to consciously try to avoid unnecessary contacts with the reef. More could be achieved if environmentally aware SCUBA diver-education programs and leadership development were initiated by diving associations such as PADI, National Association of Underwater Instructors (NAUI), Scuba Schools International (SSI), International Association of Nitrox and Technical Divers (IANTD), tour operators, and by individual dive schools and instructors. Development of marine ecotourism activities can strengthen and support its role in protecting coastal and marine environments by ensuring that local livelihoods are enhanced. Furthermore, planning and implementing educational briefings has a potential role in promoting, organising, and regulating marine ecotourism activities. The role of education within marine ecotourism can, therefore, be seen as crucial to the development of the principles of transformational tourism.

One of the biggest challenges facing dive operators will be agreement on what sustainable shark ecotourism looks like. Additionally, the dive community needs to be aware of the role that organizations play in the failure to adapt their approach to community needs. These are: denying that change is needed, refusing to accept responsibility and to make change and repression of exactly what change is needed (Agócs, 1997). Agócs (1997) advocates that to bring fundamental transformational change, proper leadership and governance is foundational to fostering tolerance for the past and is vital to move beyond denial. According to Levin et al., (2012) the role of leaders is to acknowledge they do not have all the answers and that community engagement is essential in addressing the problem. Therefore, a plan is required that involves extensive discussions and engagement with multiple levels of government, the SCUBA diving and fishing industry, local communities, interest groups, and youth.

With technology advancing at an exponential rate, there is unlimited access to digital information; however, this often creates a barrier to the outdoors and keeps people from spending time outside and developing an interest in nature (Louv, 2005). Still, effective communication can be one of the most powerful strategies for conservation. We communicate continuously through body language, tone of voice, and even a lack of communication is a form of communication. To carry out successful conservation programs, we must better understand how to engage audiences and effectively communicate conservation goals. When looking to change the minds, foster behavioural changes, and motivate a movement of a wide range of people, Gardner (in Prewitt, 2004) clarifies that one needs to be intelligent and

strategic using representational re-descriptions. This is where one needs to create a brand or social identity and then get the message out in a variety of different ways. It is extremely important to be resourceful in finding diverse ways to generate enthusiasm and encouragement. Gardner (in Prewitt, 2004) expands on this idea emphasizing the need to express the message in more than one way, re-enforcing the message so the audience is influenced differently every time.

In the PADI curriculum the standard techniques used to teach are centred on visual, oral, hands-on experiences, and written communication thus getting the information across in multiple ways so that students absorb and retain the information. Over the past 20 years of my professional career as an instructor in SCUBA diving, teaching basic open water to dive master certification levels, video images have been effective in influencing students because they simulate the real experience. The videos expose students visually to the experience before the activity begins. Oral briefings further implant the information, and hands-on experiences are very effective in engaging the interest in the activity. After the activity is finished, giving a written exam or questionnaire/survey helps the student recollect learned information and solidifies the teachings. Classes that are run over the course of a week, allow for repetition which further implants the information and qualifies a student for certification. A pre-dive briefing involving a video, an oral presentation, and literature can help in generating enthusiasm, motivation, encouragement, and fostering the desired behavioral changes.

The North American Association of Environmental Education (NAAEE) (2000) published *Environmental Education Materials: Guidelines for Excellence*,

which can help to develop a streamlined pre-dive briefing for shark ecotourism. In summary, NAAEE (2000) emphasizes the following:

1. Fairness and accuracy: materials should be fair and accurate in describing environmental problems, issues, and conditions and in reflecting the diversity of perspectives on them;
2. Depth: materials should foster awareness of the natural and built environment; an understanding of environmental concepts, conditions, and issues; and an awareness of the feelings, values, attitudes, and perceptions at the heart of environmental issues;
3. Emphasis on skills building: materials should build lifelong skills that enable learners to prevent and address environmental issues. Instructional soundness: materials should rely on instructional techniques that create an effective learning environment;
4. Usability: materials should be well designed and easy to use.

These guidelines are helpful to keep in mind as you design conservation education materials and programs.

Although the approaches people use to design and develop instructional literature vary widely, the common denominator is that the process is systematic and adaptive. The process typically starts with some type of assessment, goes through a design phase, follows along with development and production, implementation, monitoring, evaluation, and adjustment (Degraff, Degraff, and Jordan, 2005). (See Appendix A for a list of adaptive management and briefing designs proposed by Degraff et al, 2005)

Attitudes and knowledge with regard to the marine environment and marine life are shaped by several factors, including the SCUBA divers' general interest, values and preconceptions/misconceptions, the physical and behavioural characteristics of an animal, formal educational exposure as well as socioeconomic and demographic variables. Personal experience is another important influence on environmental attitudes and motivation for personal engagement and conservation behaviour.

For a successful briefing to have the desired results and to continue over the long term appropriate planning, management, implementation, and monitoring must be in place. The briefing must continually be assessed and reassess adapting and evolving. Leadership and communication is key, which includes collaboration with community, government, schools, and surrounding SCUBA diving communities. Information sharing with all dive operators as equals is crucial in the implementation process and 'owners' of the shared program. It also includes 'buy-in' from all SCUBA diving operators.

Chapter Summary

Overall, the main focus of shark ecotourism is to provide real and lasting benefits to the environment, communities, and perhaps foster transformational change towards shark conservation. As the literature described ecotourism is an experience specific to nature and incorporates tourism; however, the level of interaction and lower concern for sustainability and conservation separate tourism from ecotourism. By adding the element of education, ecotourism becomes more of a transformational tourism experience fostering behavioural changes creating motivation and movement

in tourists. Shark diving provides an excellent opportunity for ecotourism and with an educational briefing designed to focus on conservation, sustainability, protection, ecology, and fostering behavior changes, it can move into the domain of transformational tourism. Although natural sciences are important in understanding sharks and conservation, it is the social science of conservation that will unite the human aspect with sharks. As Brooks (2001) explained earlier conservation psychology within ecotourism, in this case the shark ecotourism industry, if not already, should be at the forefront for researchers, SCUBA diving operators, and the communities that provide ecotourism. The education and leadership of SCUBA diving professionals with regards to the social science of shark conservation is critical to the effectiveness and development of a conservation education pre-dive briefing in shark ecotourism.

Due to the rapid growth of the shark diving industry and the rapid depletion of certain shark species, a move towards more training and education in conservation could be required in shark diving. The SCUBA diving industry, as in any industry, should continually explore ways to improve conservation awareness, strengthen leadership and mentorship for instructors, and provide a more meaningful diving experience for the tourist. For a pre-dive briefing to have the desired mind change and to continue over the long term appropriate leadership, collaboration, and communication is needed amongst the SCUBA diving community, the local community, schools, and government.

Chapter Three - Research Methodology

This research utilized a qualitative method of design seeking to understand the given research topic from the perspectives of the local diving community. Newing (2012) articulates that this is a multiple method approach and is especially effective in obtaining specific information about the values, opinions, behaviors, and social contexts of particular populations making use of participation observation with diving operations and incorporating semi-structured short answer interviews with dive guides.

Data Collection Methods

Participation Observation. The first phase of the research, participation observation, was unstructured and interactive, observing and critiquing operators and guides as they instructed and guided the shark diving activities. Participant observational research is a social science technique that involves direct observation of the subject(s) in its natural setting. Participant observation does not involve the manipulation of variables, but rather involves the recording of field observations (Newing, 2011). Participant observation in this project involved the examination of the dive guides' environmentally conscious behaviours and conservation education in their work environment, providing insight into the principles and practices of the diving operations.

A five point observational rating scale was designed to evaluate the diving operations on shark conservation education and related aspects (see Appendix B). The four main topics were created from a more detailed observational checklist developed from the materials provided by the Project Aware Foundation which has a

comprehensive Shark Conservation instructor manual as well as a learning guide and materials for students, which can be found online through Project Aware (Project Aware, 2013). Observations focused on the extent, quality, and accuracy of:

1. the educational content deemed essential to the creation of a streamlined pre-dive shark conservation education briefing;
2. the content in shark conservation education;
3. shark biology and behaviours, and;
4. diver safety.

As a participant-observer, the researcher participated in five shark diving programs with five different operators during a period of one week, from August 9th through August 15th, 2014. Researcher participation helped to develop trust with the five operations; this was important to the collection of authentic qualitative data.

Rubin and Rubin (1995) explain that active participation may enable the researcher to learn enough to be considered an insider by the community giving the researcher an opportunity to learn any vocabulary necessary for a better understanding of the data. Another advantage of participant observation is its ability to facilitate the collection of 'rich' information that is frequently not available from other sources (Newing, 2011).

According to Valadez and Bamberger (1994) the three components of participant observation are pre-fieldwork, fieldwork, and analysis. Pre-fieldwork, as preparation for the study, included finding the location and making the appropriate contacts with the local diving operations. The fieldwork stage began with the researcher introducing himself, gaining the trust of the operators, and then collecting

data through observation. The analysis stage involved using the collected data from the simple rating scale and observation notes and then fitting the data into a logical framework that facilitated an understanding of the diving operations. Throughout this study, periods of reflection between observation and participation helped to maintain a balance and provided a better understanding of how the diving clients responded to the guides and the interaction with sharks.

Despite the positive aspects of participant observation as a method to collect qualitative data there are potential issues with this research approach. One potential problem with observational research is that the very presence of an observer could alter the behaviour of those being observed (Newing, 2011; Valdez and Bamberger, 1994). Other researchers refer to this weakness in observational methods as “reactivity” (Valadez and Bamberger, 1994). Reactivity can be minimized if the researcher adheres to certain principles of participant observation. In addition, it tends to involve the observation of only a few examples of a particular subject, behaviour, or event thus limiting the extent to which the findings are amenable to generalisation (Newing, 2012). Newing (2012) goes further to clarify that it is inherently subjective only focusing on a single (or limited number) of particular observations and the recording of the resultant data is subject to the interpretation of the researcher.

Semi-structured Interviews. The second phase, structured interview questionnaires, involved asking a fixed set of short-answer questions in the same way and in the same order to each set of dive guides. Additional time was given after the question to expand on the conservation education issue and allowed for discussion

with participants sharing their thoughts and ideas about creating a streamlined pre-dive briefing. In January 2014, draft interview questions were piloted with two local SCUBA diving operators who were not part of the research project to ensure quality and accuracy of the questions. After minor revisions, a set of interview questions relating to the research questions were finalized. These are listed in Appendix C.

This study was interpretive by design using applied subjective meaning focusing on the extent of knowledge the guides had of shark biology and conservation, and the extent and accuracy of conservation education of sharks being taught to the participants in the activity.

Data collection method for this analysis used face-to-face semi-structured interviews allowing for a relatively informal setting with relaxed discussion based around a predetermined topic giving the interviewees the opportunity to express opinions through discussion with ten SCUBA diving guides. The research project is a basic interpretive qualitative study understanding how participants make meaning of situations. This meaning is mediated through the researcher, the strategy is inductive, and the outcome is descriptive (Newing, 2011).

Incorporating interviews with the participation observation data collection addresses different aspects of the overall objectives of the project. It also allows for the researcher to build on interpretation of the different perspectives from the interviewees (Newing, 2011). Once all data was collected from the interviews it was then compared and evaluated with the observational data collected and the literature review documented earlier, giving a more comprehensive understanding of the findings.

Project Participants and Consideration of Participants

The research participants were selected using reputational-case sampling. This sampling method selected diving operations and dive guides based on the recommendations of experts in the field (Cohen et al., 2004). Discussions with local diving professionals and the thesis supervisor regarding potential participants and operations with appropriate levels of knowledge and understanding of SCUBA diving, ecotourism, and conservation determined the potential participants. During this collaborative process, ten SCUBA diving operation and 25 SCUBA diving guides were selected. In the selection of project participants, there was no consideration given for age, gender, or level of education. Of the ten operations five agreed to participate and of the 25 guides, ten agreed to participate in the project. There are 45 diving operations in the region and the ten selected were well established and had good reputations throughout the diving community. Of the ten selected five agreed to participate in the project. The guides all had extensive experience teaching and guiding, working globally in the SCUBA diving field. Four of the participants had over ten years of experience working at a variety of locations and in a variety of positions in the SCUBA diving industry, including those of diving instructor, diving guide, dive manager/supervisor, and owner/operator. Each of the participants had been an instructor or guide for over 15 years. They had come to this field out of a passion for the ocean and concern for the environment. The ten participants selected from the 25 had the most experience, and had spent the most time in the area. The 15 guides not selected for the project all had less than 5 years' experience in the industry and had only worked in a few different locations globally.

Research participants were treated in accordance with the “Ethical Standards” set out by the Royal Roads University Research Ethics Board (see Appendix D), and each signed two approved Research Consent Forms (see Appendix E), one for the research records and the other for participants’ records.

The qualitative research data collected is open ended and exploratory, leaving the results of the research open to interpretation. The researcher must be cautious not to create bias stemming from selective observation and selective documentation of information (Newing, 2011). Close attention was paid to the wording and format of the questions asked to the participants. The researcher had to be very careful not to affect participants’ experience with the process. It is imperative for this project to interpret, assess, and apply various research rules when making decisions. The researcher must have social responsibility and strive to promote social good and prevent or mitigate social harms through the research, public education, and advocacy.

By researching sharks researchers must take into consideration animal care and show proper respect and care for the animals when using them in the research. Since the researcher planned to have questionnaires with human subjects it was important to minimize harms and risks and maximize benefits; respect human dignity, privacy, and autonomy; take special precautions with vulnerable populations; and strive to distribute the benefits and burdens of research fairly.

Data Collection

After potential dive operator participants had been selected, the researcher first made contact with them in Playa del Carmen, Mexico in December 2013 to

introduce the research project and to extend an invitation to participate and sign a letter of invitation (See Appendix F). The researcher then scheduled face-to-face interviews at times and locations convenient for them in early August 2014.

The participation observation portion of the research project was also conducted between August 9th, 2014 and August 12th, 2014. Five of the ten operations were used to observe Bull shark activities. The ten interviews occurred between August 12th, 2014 and August 17th, 2014. All interviews followed the same format, took place in person, and hand-written detailed notes were taken to ensure accurate information. During the interviews, notes were taken documenting initial impressions and possible themes arising. Each interview began with an introduction, an expression of gratitude for participating, a brief statement of the project purpose, and identification of the University and program involved. Once introductions were completed, participants signed the two copies of the Research Consent Form. The researcher used the semi-structured interview process utilizing the four predetermined interview questions, which allowed for open discussion on the topic and other relevant topics. Once interview questions were completed, the researcher encouraged participants to add any further comments. Interviews lasted an average of 30 minutes.

Data Analysis

The researcher used several methods of qualitative data analysis to transform observational and semi-structured interview data into research results. According to Cohen et al. (2004), data analysis involves organizing, accounting for, and explaining the data; in short, making sense of the data, noting patterns, themes, categories and

regularities. The task of analysis, which makes interpretation possible, first requires the researcher to determine how to organize the data, construct an intact portrait, and describe what that portrait means (Newing, 2011).

In analyzing the data, all collected materials including annotations, memos, field notes, interview transcripts, and literature were reviewed. Newing (2011) specifies that good analysis depends on understanding the data. This means reading and rereading or listening and re-listening to data collected. Multiple readings were used to clearly understand all material before categorizing the data. Hand-written transcripts were transferred to Microsoft Word documents. They were then read and reread to obtain an understanding of the data. The researcher noted initial impressions during the interviews and later identified themes that presented themselves. Raw data from the rating scale, observations, and interviews were grouped into these themes by recognizing key words, phrases, ideas, response to the questions, concepts, behaviours, and interactions.

The analysis of the data stage in this research project began with an attempt to move from the perspective of a participant to the perspective of objective researcher in order to better explain the data. The data analysis focused on reviewing notes from participation observation of the five diving operators, reviewing the researched literature, and looking at the individual interviews and their answers to discover consistencies and differences. The researcher created themes to draft an outline of the results, and again reread the materials, further refining the results. Through critical reflection on field notes, the researcher identified and limited

subjectivity in the interpretation of the data. The goal was to accurately reflect the opinions and beliefs of the participants.

According to Newing (2011), the researcher organizes data into categories; patterns and connections that emerge between these categories or themes. In this case, data analysis first focused on each interview question from the individual participants to discover the consistencies, differences, and emerging themes. For each interview question, data was combined from the participants into a summary. Following the same procedure the data from participant observation from all five operators were combined into a summary. The researcher reviewed the emergent themes, reduced them, and re-evaluated them to identify six key themes related to the main research question: Is there a need for a streamlined pre-dive conservation education briefing for Bull shark diving operators in Playa del Carmen, Mexico? The final data summaries and the six themes identified will be discussed in more detail in the following chapters.

Validity and Reliability of Data

The researcher has endeavoured to ensure reliability and validity in the qualitative collection and analysis of the data by following the four concepts of conformability, dependability, credibility, and transferability.

Conformability and dependability focused on research method consistency. Two draft interviews were completed prior to the start of data collection to ensure quality and accuracy of the questions. The ten interviews occurred at a location selected by the participants. All interviews followed the same format, took place in person, and were hand-written then transcribed to ensure that detailed and accurate

information was captured. During the interview, the researcher documented initial impressions and possible themes.

To ensure credibility the research was conducted consistently; the participants' data was checked, rechecked, and handled in the same manner. All transcripts were transferred to Microsoft Word documents, then read and reread to obtain an understanding of the data. By using peer reviewed literature, observation, and interviews triangulation of the data included determining themes agreed upon by all creates validity in research studies (Newing, 2011). This research gives theoretical validity to the information being gathered through literature and interpretive validity through the participation feedback and interviews.

In terms of transferability, given the research context and the multiple methods used, there is a strong probability that if this research project was repeated with different participants, the results would be similar. The methodology could also easily be used in other diving locations around the world that involve shark diving operations as well as any marine ecotourism activity that does not have a conservation education program in place.

Chapter Four - Project Results

This chapter presents the results and summary of (1) the participation observation findings with the five SCUBA diving operations and (2) semi-structured interviews with ten diving guides from Playa del Carmen, Mexico.

Participation Observation Findings

Over a five day period the researcher conducted participation observation with five different diving operations to assess a) the extent of existing knowledge of shark conservation held by diving operators and guides and; b) the extent of shark conservation education currently being taught.

Key assessments from observations. Observations were documented using a checklist of 16 specific criteria assessing each diving operation. The checklist (see Appendix B.) was developed from the comprehensive Shark Conservation instruction material provided by the Project Aware Foundation (Project Aware, 2013). The data collected was then broken down into five specific categories and summarized as shown in Table 1.

Table 1.

Participation Observation Results of Five Shark Diving Operations

	Poor	Minimal	Sufficient	More than sufficient	Excellent
Shark Conservation Education	3	1	0	0	1
Shark Biology	1	0	3	0	1
Shark Behaviours	0	0	1	3	1
Diver Safety	0	0	0	1	4

Note: A simple five level rating scale identifying the importance placed by all operations. Numbers are based on each diving operation meeting the specific criteria in each category.

Shark conservation education. In assessing shark conservation education the observational criteria were an introduction to conservation, major threats to sharks (finning, pollution, and by-catch), identify hazards to sharks, and inspiring one to become advocates of shark conservation. These criteria were chosen based on the comprehensive shark conservation education instructional materials set out by the Project Aware Foundation.

Of the five operators one operator was rated as excellent in conservation education; this involved having a well-structured and informative briefing and showing a 10 minute video of shark conservation issues and practices. One guide addressed shark conservation issues and the importance of sharks to the ecosystem. Three of the five operators were well versed in shark conservation issues and were able to answer all questions in regards to sharks, shark conservation, and

conservation in general. The criteria was based on conservation education, however not part of the criteria, it was observed that none of the pre-dive briefings included education to foster good conservation habits or the need to share the education they learnt with others. None of the diving operations provided follow up or post dive briefings.

Shark biology and behaviors. In assessing the knowledge of the biology and the behaviours of sharks, observational criteria were an introduction to shark biology and behaviours, feeding and the altering of shark behaviors, touching the sharks, answering questions on biology and behaviours of sharks.

Three of the dive operations were rated as sufficient in shark biology and one operator was excellent. Three guides spoke briefly about how sharks behave and the how sharks react to feeding underwater. Only one operator out of the five did not mention anything about shark biology or conservation.

Diver safety. In assessing diver safety, observational criteria were based on overall diver safety with equipment, checking skill level, and experience. Underwater observations were based on keeping with the group, hanging on the ground line, avoiding contact with sharks, dive time, and ascent rates.

All five dive operators made safety the number one priority. Four out of the five operators were assessed as excellent and one operator was assessed as above average. Since the Bull sharks in this location inhabit deep water, it was a priority for all operators to emphasize the importance of monitoring air pressure and time underwater. All dive operators were excellent in regards to staying low to the ground, keeping contact with the line provided while diving with the sharks, slow

ascent rates and the emphasis placed on not touching the sharks. In regards to checking equipment safety, diver skill level, and experience, four operators were excellent and one was more than sufficient.

Additional observations. Throughout the five days of participation observation a list of additional observations were made:

- Three diving operations had Bull shark diving advertised as their main attraction for the season and two did not advertised it, but had shark diving as an extra attraction. One operation had a special permit for research purposes allowing them to do feedings
- Through observation and listening to conversations between client divers, 35 out of 40 client divers seemed to have a positive general attitude toward the environment and to hold the view that human impacts can be detrimental to the survival of the marine environment; however, all divers had little comprehension of shark conservation issues;
- There were 3 client divers were ‘outliers’, who seemed to have little interest in the sharks and were diving only for the adrenaline rush of diving with sharks;
- The majority of client divers observed were young, aged between 18 and 40 years;

Participation observation summary. The observations taken from the five dives revealed that the development of skill and technical competency was related primarily to safety and not to the responsibility of conservation and protection of the sharks and the environment. The five level rating scale identified that all operations

took safety seriously; the majority of the guides were educated in shark behaviours, but less knowledgeable in shark biology. Only one operation was excellent in shark conservation education, while one did minimal conservation education and the other operations did none at all. The observations taken from the five dives helped to develop a foundation of understanding of where the guides stand in regards to shark conservation and developed a baseline context for the questions moving forward with the interview process with ten participants.

Interview Questions

Ten semi-structured interviews were conducted with ten guides. Six guides had English as a first language (two from Europe, four from the United States), and four guides had Spanish as a first language (from Mexico, Spain, and South America). Two instructors were female and eight were male and all ranged in age range 25 to 35 years.

For each interview question and additional conversations, the collected data was combined into a summary, and then reviewed to identify emergent concepts, which were then consolidated into six key themes. Presented below are the summaries related to each of the questions asked, followed by a detailed description of the themes emerging from those summaries.

The statements below reflect input that was agreed upon by all ten guides. Responses to the interview questions establish the group perspective and some are highlighted by specific quotes from individual participants. It was significant to discover the participant's perspectives on the concept of conservation, the importance of conservation, and the participant's overall view of the importance of

education within the shark diving activity. Pertinent information from the discussions that provided rationale to the answer of the questions and that identified emergent themes were placed in a spreadsheet and then transferred into rationale, themes, and quotes (See Appendix G).

Question 1: *Do you think shark conservation education should be part of your dive programs?*

All participants expressed concern for the need for shark conservation, while emphasising the protection and maintenance of marine ecosystems and natural resources in general.

All ten participants expressed concern for conservation on a biological level that limits shark species impacts.

None of the guides knew of or expressed opinion on conservation psychology or the need to foster behavioral change.

Eight of the guides felt that conservation was important to the SCUBA diving industry but that it was not the primary responsibility of diving operators to teach conservation to divers. These guides believed that major responsibility to integrate shark conservation in the open water courses lay with the diving organizations (e.g. PADI, NAUI, SSI).

All guides explained that their briefings were focused on safety while diving with the sharks and to not touch them. Guide #4 explained that “I talk about shark

biology, how sharks react to food in the water or to the issue of touching sharks; however, it is strictly for safety purposes.”

Of the ten, only one diving operator offered a structured pre-briefing on shark conservation. Client divers were shown a brief pre-dive video outlining the importance of sharks to the ecosystem, the current global shark finning threat, and the importance of sharks as tourism to the local economy.

Question 2: *Are you aware of existing shark conservation education programs and manuals (e.g., Project Aware)?*

The Project Aware Shark Conservation Education Program is advertised through PADI and only seven of the ten guides were certified through PADI. Five of the seven guides were aware that Project Aware had a shark conservation awareness program available. Of the five guides that knew about the program, four of the guides said that their dive shop offered the Shark Conservation Awareness Program for a fee.

Two guides were certified through NAUI and one was certified through SSI. None of these guides had any knowledge of a shark conservation education program being offered.

The five guides who were unaware of the program were very interested in learning more about the Project Aware Program and were exploring whether it might be something they could teach in the future.

Four of the guides work year round in Playa del Carmen, Mexico and were aware of the protection regulations surrounding whale shark, which congregate in the

region from June until September, as an endangered species. However, none of the guides were aware of any regulations based around the Bull shark expeditions.

Guide #6 speculated that “the lack of regulation surrounding Bull sharks (other than a restriction on feeding) may be due to the fact that they are not globally protected.”

Question 3: *Do you teach these programs? If not, what prevents you from using these programs?*

All ten participants unanimously said ‘no’ in regards to teaching these programs. Four participants said they do not teach the course because of the time constraints. Guide # 4 explained that “We are paid mostly on a commission basis per diver and therefore we make more money by taking as many divers out per day as possible.”

Of the four participants that did offer the program one explained that they offer the program, but created their own conservation briefing video and few customers are interested in taking a two day program and paying extra money.

Question 4: *Would a streamlined and condensed version of this program be useful in delivering pre-dive shark education? And would you use a program if one was developed?*

All ten participants agreed that a streamlined pre-dive shark conservation briefing would be very beneficial to their operations. However, they also expressed a need for a standard industry wide briefing developed by the diving organizations.

Four participants suggested that PADI should have a mandatory shark guiding certificate so instructors would already have the proper training when applying for employment. Guide #7 expressed concerns about having to train new instructors every year because of high turnover rates.

Eight of the participants suggested that the briefing would need to be short enough to keep the participants' attention and keep them motivated to go diving. Guide #3 mentioned “a video format that could be shown to guests while the guides set up for the excursion would benefit instruction.”

All ten participants said they would use the streamlined video and briefing if it was in a pre-packaged format that did not require further development. They also said that PADI should be responsible for creating an industry-wide pre-dive conservation program.

Six of the participants also expressed several challenges (detailed later in the theme identification) in regards to developing a pre-dive briefing with their busy schedules.

Theme Identification and Analysis

The emergent concepts were reviewed, condensed, and re-evaluated to identify six key themes that were related to answering the over-arching research question: “Is there a need for a streamlined pre-dive conservation education briefing for Bull shark diving operators in Playa del Carmen, Mexico?”

Presented in this section are the synopses of the themes from the data analysis, along with a description of challenges identified by the participants.

Theme 1: Value to the industry. From the interviews a significant theme emerged that shark conservation education could increase value to the industry by creating knowledge and understanding of shark conservation principles. The diving organizations are based on training and education. Education is an important part of any diving operation as Guide #8 stated, “By adding a shark conservation education briefing to diving, it would increase the quality of their product and strengthens the reputation of the organizations.”

The protection of the marine ecosystem is a vital part maintaining a strong recreational diving industry, and guides need to prove they have the knowledge and training to contribute to these goals. Guide # 9 stated, “Divers pay a lot of money to dive with the Bull sharks” and Guide # 5 explained, “Operators could advertise the education as a service to their clients and perhaps, they could have added information like brochures or an information booklet, thus strengthening the awareness of sharks to the ecosystem.” It was commonly expressed that the clientele are not just diving with the sharks for excitement but they are also engaging in a learning experience.

An industry wide shark conservation education briefing would promote diving organizations with conservation education for divers. Guide #5 commented “I think that would be great for the industry if guides could make sure that everyone is aware of the need for shark conservation.”

Theme 2: Value to Operators. There was a high level of consistency among the guides that shark conservation education could bring value to the dive operations in the region. The Yucatan peninsula is one of many marine park systems on the eastern coast of Mexico, representing some of the most diverse marine

ecosystems in the world. Conservation education for the guides should be a minimum standard in the shark diving industry. Guide # 2 stated, “I know that my dive shop would benefit greatly by exceeding the industry standard and would draw more clientele by having a reputation for conservation education and advertising this.”

Four of the participants expressed that shark conservation-educated operators could assist in developing a community-based shark conservation awareness program. By developing a relationship with the fishermen in the community one can establish awareness and shared benefits as Guide #5 noted,

“If the guides were to get involved with the community and promote shark conservation it would help to promote awareness and bring the community closer to the operators. Most operators are foreign owned and this could help close the gap between them.”

Theme 3: Value to Divers. There was broad consensus by all participants that there are an ever increasing numbers of people getting involved in dive travel vacations. More and more divers are seeking the use of a diving operation and guides that are educated in conservation values and principles. Many of these divers are looking for educational trips with reputable operators who are educated about the area and are environmentally ethical.

There was a sense among six of the guides that shark conservation education could provide divers with a superior product by having instructors and guides knowledgeable and trained in shark conservation principles. This could help to foster conservation awareness, practices, and values in divers. By having dive

operators and guides with high conservation standards, divers would perhaps realize that the industry takes pride in the principles of conservation. Shark diving is only a small part of the diving operations in this region so there is an opportunity to expand shark conservation education into all other areas of marine conservation. “We do interact closely with our clientele and it would give us the opportunity to become role models and stewards of this area of the marine ecosystem” said Guide #3.

Environmental stewardship teaches the divers acceptable behaviour for conservation ethics and consequently foster conservation attitudes within everyday activities. As one participant mentioned “If we provide high standards and accurate information about conservation and the protected areas we could help to foster conservation with our clientele.”

It is of vital importance that guides are educated in conservation issues to ensure they are providing their divers with accurate and current information on sharks, the marine ecosystem, and conservation principles. This viewpoint is reflected in statements from Guide #2 “It is important that as a guide I ensure my guests act responsibly as ultimately I am accountable for my guests’ actions” and Guide #7 “As dive guides we have divers under our control; if they don’t follow the rules they get sent back to the boat and spend their time waiting for the rest of the group to finish”

Theme 4: High standards. Another significant theme emerged in setting high standards for the industry through shark conservation education. Seven of the ten participants agreed that dive operators should ensure instructors and guides

understand their role in conservation and the rules that govern the marine parks and their conservation.

Shark diving is a growing industry with operators doing business in all parts of the world. A shark conservation education briefing would provide a higher standard for diving in the region. As Guide #4 suggested, “Having educated operators and guides would create a positive reputation, encouraging higher standards and assisting with conservation management.”

A commonly expressed response from participants was that the information provided in the briefing would ensure dive operators demonstrate a high standard of education aimed to protect sharks, display environmental stewardship, and foster conservation behaviours.

All participants in the project and throughout the diving industry are highly skilled individuals and are setting a good standard for the industry. However, as Guide #6 expressed there are guides that choose not to concentrate on conservation, and rather focus on economic benefit, which is can be devastating to the marine environment in the long-term As Guide 6 stressed it is important for the local operators to set high standards and enforce them and “... it would be a daunting task to have to collaborate with all the guides and make sure that they are maintaining and meeting the requirements. Without industry standards it is difficult.”

Three of the participants suggested mandatory shark conservation education set out by the industry would help to ensure that all dive operations and employees meet these requirements and are up holding a higher standard. The remaining seven

participants agreed that mandatory requirements would aid in regulating the operators and guides.

Theme 5: Fostering education on conservation. A notable theme that emerged throughout conversations with participants was the interest to foster conservation behaviours with their clients. None of the participants thought about the ability and opportunity to be advocates of change. Through discussion on conservation all participants agreed that there was always time and opportunities to educate divers since most trips require a boat excursion somewhere. Guide #3 explained that they have the full attention of divers for long periods of time which would allow the opportunity to educate them on both sharks and the surrounding marine environment they are diving in.

Education about shark conservation could encourage divers to respect nature, become responsible divers, and foster behavioral changes as Guide #1 highlighted “There is great potential within the experience of diving with sharks to learn something about them and how important they are to the ecosystem.”

All interview participants shared a common belief that divers who have a great diving and learning experience are more likely to discuss and share their experience and the information learned. Guide #10 highlighted this by saying that he had many casual conversations with divers about experiences, both good and bad, but it was the excitement in the conversations about positive experiences that resonated with him.

Theme 6: Challenges. When fostering change with the public and implementing new ideas and programs there are always challenges to overcome and

the concept of conservation education for shark diving is no exception. During the interview process, six of the ten participants shared several challenges to implementation. Due to the diverse nature of the dive operators and the variety of the people involved, an education briefing will require flexibility and variety to meet the requirements mentioned by the participants. As well, the briefing needs to be straightforward and easily implemented, one that the operators and the guides will want to embrace.

The challenges identified include:

- The need for a briefing that is easily implemented;
- Level of content in briefing and the frequency of retraining. The view of conservation, whether on a biological level or psychological level, is always evolving and training needs to be ongoing and updated regularly.
- The development of public relations skills;
- Conservation is more than just information. It is a concept and operators and guides need the skills to move beyond the class and into the community, creating a community-based campaign as well as demonstrating community leadership;
- Creating buy-in;
- The short briefing would need to be collaboratively developed and involve all stakeholder dive operations;
- Monitoring and enforcement would need to be monitored in some way; the diving community needs the ability to enforce the rules and penalize operators who choose not to abide by these rules;
- Staff turnover, training, and staying current

Recommendations. A series of recommendations were made by participants that would help strengthen the ability to implement a conservation education briefing in Playa del Carmen, Mexico:

- Include a diver survey with a standard set of questions measuring interest in shark diving and conservation education;
- Identify and describe key features of shark ecotourism situations that influence visitor behaviour, satisfaction and attitudes;
- Recommend further research to enhance the sustainability of shark ecotourism in Playa del Carmen;
- Explore the possibility of making recommendations to improve current shark ecotourism practices;
- Raise funding for shark conservation and research;
- Create outreach program to educate the local fishermen and the community on the benefits of shark ecotourism;
- Create shark conservation social media accounts.

Interview summary. All of the research participants in the interview process supported a shark conservation education briefing and the six themes provide justification for the creation and implementation of such a briefing. Although only one out of the ten participants taught shark conservation to their clients, all participants were unanimous in stating shark conservation education was a benefit to the industry, operator, and divers. They also agreed that conservation education would allow for the development of a high standard with consistent information, and would encourage guides to engage in conversations about shark conservation. It was

significant to recognize the several challenges expressed by participants that require consideration as well as the multitude of recommendations suggested in developing such a briefing.

Chapter Five - Discussion and Conclusion

The primary purposes of this study were to determine (a) the extent of existing knowledge of shark conservation held by diving operators, (b) the extent of shark conservation education that is currently being taught in Playa del Carmen, Mexico, and (c) to determine if there was a need for conservation education in shark ecotourism in Playa del Carmen, Mexico. In addition, the research explored the concept of ecotourism in relation to shark ecotourism, the meaning of conservation in general, and the role of shark diving ecotourism in conservation.

Playa del Carmen, Mexico has one of the most outstanding marine ecosystems in the world containing part of the Mesoamerican barrier reef, the second largest in the world, an important area of sea grass and large mangrove fields (Odériz, I., E. Mendoza, et al., 2014); which provides for a wide variety of marine based activities. There is evidence that SCUBA diving and snorkelling are having detrimental effects on the marine environment, and as the number of people involved in marine ecotourism rises, so does the potential for significant environmental degradation (Hawkins and Roberts, 1993). With the potential of an increasing negative impact on the marine environment, diving operations and governing organizations must continue to strive to find a balance between shark conservation and recreational diving.

Research indicates that increased knowledge, awareness, and involvement by tourists are important to conservation and that the education of tourists increases conservation behaviours (Frauman, 1999). Dive guides and their relationship with client divers are important for enhanced conservation practices. Currently however,

dive guides are not required to have conservation education or training. The results of this study suggest that if a pre-dive briefing was developed and it was easily implementable, then diving operations and guides would embrace this educational resource as a fundamental stage in pre-diving training.

This chapter discusses the findings of the research project, provides recommendations on the development of a pre-dive briefing and addresses the study's research conclusions, implications, and considerations for further research on shark ecotourism and conservation.

Discussion

Shark conservation is always challenging, and Bull shark conservation proves to be especially so due to their highly migratory behaviour and the fact that several countries share management of this single shark species (Karl et al, 2011). Although many species of oceanic sharks are highly migratory species, under the UNCLOS they fall under the mandate of RFMOs and Conventions (UNCLOS, 2013). Since the convention only encourages cooperation with others but does not provide enforcement, very few actions to conserve sharks have been undertaken by these organizations (UNCLOS, 2013). It may be argued that through appropriate management actions and leadership, exploitation rates can be reduced in order to allow sensitive species to recover from overexploitation. Nonetheless, in order to strengthen established shark conservation goals, this study focused on the need for conservation education in shark ecotourism in Playa del Carmen, Mexico.

The research results support the need for shark conservation education and a pre-dive shark conservation briefing for diving operations. The results in this study

established that increasing the conservation knowledge of dive operations, guides, and divers would provide benefits to the overall management and protection of sharks and the marine ecosystem. This correlates directly with Freedman (2004) when he describes conservation, preservation, and protection is imperative to the survival of our ecosystems. Further solidifying that operators should deliver shark conservation education as part of a pre-dive briefing for client divers.

Moreover the results linked with the description of conservation laid out by Freedman (2004) that conservation is the protection of the natural environment, allowing this environment to function with minimal human impact, and that the Playa del Carmen, Mexico region plays a significant role in conservation in the Yucatan Peninsula. Participants provided the researcher with qualitative data, which after analysis offered six key themes, providing the justification for shark conservation education for SCUBA diving operations in Playa del Carmen, Mexico. In addition, the creation and implementation of a pre-dive shark conservation education briefing would help to create an educational resource of a high standard and of a consistent format that would encourage and support guides to engage in conservation discussions and education with their client divers, and address the potential impacts of diving activities on the marine ecosystem.

SCUBA diving conservation education programs do exist and if used to their full extent they would provide benefits to SCUBA diving operations by increasing the standards in the industry. The research shows that by SCUBA diving operators adopting a view of conservation through the lens of Brooks (2001) focusing on human-nature interaction, the need to care, and promoting a sustainable and

harmonious relationship between nature and humans; would encouraged operators and guides to become environmental stewards and would in turn educate other divers. A pre-dive shark conservation education briefing would provide this added value to divers by giving them assurance that, in addition to their diving qualifications, their guides are familiar with environmental and behavioural aspects of the sharks, and that they are educated about conservation principles, as well as ensuring that they have the knowledge to practice conservation stewardship. A shark conservation education pre-dive briefing would offer value to the SCUBA diving industry by enhancing the quality of the operators' product and raising the standards of environmental protection in the industry.

By introducing a shark conservation pre-dive briefing, the research showed that the briefing would meet the objectives of balancing the conservation of sharks and simultaneously provide a top quality recreational experience, highlighting the ecological and human impacts to sharks. Hill & Gale (2009) re-enforce these objectives clarifying that fostering conservation through ecotourism is an effective way to educate and sustain the ecosystem. The research also highlighted that the integration of the pre-dive briefing with community involvement would increase environmental awareness, support the local community, and helping help to move shark tourism towards transformational tourism. As stated by Mezirow, (1991, in Reisinger, 2013) that transformational tourism stems from individuals learning about the environment in a way that may challenge their experiences, change their behaviours and influence their values, giving them a changed perspective.

The research revealed that a pre-dive briefing would be an excellent tool for getting a conservation messages to an increasing number of divers, thus potentially creating more advocates for the protection of sharks. However, there was discussion about the difficulties with creating and implementing such a briefing. The results exposed concern that there are certain personalities that would be against a standard briefing. This correlates directly to Agócs (1997) in the literature review explaining that there will be individuals who will deny change is needed and refuse to accept responsibility for change. Also identified earlier in the literature Gardner (in Prewitt, 2004) explained that in moving forward it is extremely important to be resourceful, re-enforcing, and communicating the desired message in a way that will be encouraging to those few individuals to join the movement.

To implement such a community wide pre-dive briefing the results indicated that the SCUBA diving operations, guides, community, and local government will need to collaborate with a long term vision, be guided by committed and engaging leaders amongst the groups, and communicate the message in way that acknowledges and respects all parties generating enthusiasm and encouragement creating 'buy-in' from all parties. In moving forward, it was recognized that strong leadership development and mentorship is vital and for the program to be successful and the diving community will need to reach out to the surrounding area encompassing Cancun and Cozumel.

Recommendations

Based on the findings of this study, it is recommended that a new 'short and manageable' pre-dive shark conservation education briefing be created and implemented in Playa del Carmen, Mexico.

This briefing would fulfill the conservation education needs for SCUBA diving operators to develop a more knowledgeable diving community to help educate, conserve, and protect sharks. This briefing would address the challenges and concerns presented by participants. It should be straightforward, easy to implement, and cost-effective. It should provide flexibility for operators and guides, given the diversity of the shark diving industry both in Playa del Carmen, Mexico and in other regions of the globe. It is recommended that this briefing become a mandatory requirement in the shark diving community as it would help to influence briefings in other conservation education based diving activities.

It is recommended that a short (15 minutes), manageable pre-dive shark conservation education briefing with an introduction video would introduce to client divers to sharks and shark conservation, introduce major threats to sharks (including the impacts of shark finning, fishing, and by-catch), provide information on the value of sharks to the marine ecosystem, provide a pathway for the diver to actively get involved in shark conservation, and to inspire divers to become shark conservation advocates (see Appendix H). Overall, the briefing is seen as a tool to communicate important shark conservation messages to operators that would provide them with the information and knowledge to both practice environmental stewardship in the

protection of sharks and the marine environment and to share this information with their clients.

In addition it is recommended to have a short post-dive debriefing afterwards to solidify the learnt information discussed earlier and to develop subsequent take home materials for clients to assist in fostering behavioral changes at home (See Appendix I for sample brochure information).

Conclusion

The conservation of sharks is imperative to the survival of the species and the overall health of the marine ecosystem (Cawardine & Watterson, 2002). There is a strong relationship between conservation and education in relation to the protection of the natural environment and tourism destinations. Education is one of most effective tools for conservation in these areas. As tourism has evolved into ecotourism, so too must ecotourism evolve into transformational tourism (Reisinger, 2013). With an ever increasing numbers of divers travelling to marine protected regions, education programs are critical in the preservation and conservation of these regions.

In the realm of recreational SCUBA diving, organizations generally focus on teaching students to dive and rarely discuss the marine ecosystem that they are diving in. There are associate organizations, such as the Project Aware Foundation, that focus on conservation education; however, these programs are generally not well promoted or utilized. Program availability is generally online and the onus is on the participant to sign up and learn the material. This leaves the important role of conservation education to volunteers, dive operators, and guides with no formal

guidance, tools, goals, or objectives. The implementation of a shark conservation education pre-dive briefing for diving operations and guides would assist in the conservation and preservation of sharks with potential spin-off briefings for all diving activities. Shark conservation education would provide operators with high standards and current information on sharks and their vital role to the marine ecosystem, and the need to provide further education and conservation, to protect this vital species. It would encourage operators to practice environmental stewardship and communicate conservation ethics to their staff and customers.

The education and leadership of diving professionals with regards to shark conservation is critical to the effectiveness in assisting the Project Aware campaign in the conservation and protection of the marine environment. It is difficult to motivate people to save what they don't understand. Through education we can help people understand, through understanding we can do our part to protect these animals, and through protection we can conserve. The power to foster change lies in education and knowledge; well informed individuals can make a difference by motivating and influencing those around them, and together we can create change that conserves the species.

Implications

This research study provides two significant implications for dive operations and guides in Playa del Carmen, Mexico.

1. It suggests what the necessary educational materials for SCUBA diving operations in Playa del Carmen would be to develop and implement a pre-dive shark conservation education briefing.

2. It is recommended that SCUBA diving operations in Playa del Carmen, Mexico collaborate to develop a pre-dive shark conservation education briefing for the specific purpose of shark diving in the region.

Future Research

This research project determined that there is a need for shark conservation education for SCUBA diving operations and provides a recommended strategy to implement this. Through data collection, participants identified many challenges and concerns that require further inquiry. The research determined only that there is a strong need for a pre-dive shark conservation education briefing for SCUBA diving operators in Playa del Carmen, Mexico.

The research project recommended the method for shark conservation education training be a pre-dive briefing. A feasibility study would be valuable to develop a training program in collaboration with other diving organizations and conservation educators to formally teach instructors. Probable collaborators could include PADI, NAUI, SSI, and IANTD. Conservation education can be beneficial for all diving operations, as conservation principles are universal to all.

This project represented a small sample of participants involved in the shark diving industry. To expand on the research questions and to obtain a broader representation, a larger sample size incorporating other research methods could provide more information on the concept of shark conservation education for diving operators in the region. There is an enormous amount of research that could be done in the surrounding region encompassing Cancun and Cozumel. These are only of few suggestions for future research in relation to this research project.

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Appendix A: Pre-dive Briefing Planning and Design

Foundation, Direction, and Reflection (FDR) Concepts

1. Philosophy, mission, vision, values, traditions, and goals and objectives
2. Communicate effectively in visual, oral and written form.
3. Apply current research and theory to the practice of instructional design.
4. Update and improve one's knowledge, skills, and attitudes pertaining to instructional design.
5. Apply fundamental research skills to instructional design.
6. Identify and resolve ethical and legal implications of design in the workplace (Degraff, Degraff, and Jordan, 2005).

Planning and Analysis

1. Conduct a needs assessment.
2. Design a curriculum or program.
3. Select and use a variety of techniques for determining instructional content.
4. Identify and describe target population characteristics.
5. Analyze the characteristics of the environment.
6. Analyze the characteristics of existing and emerging technologies.
7. Reflect upon the elements of a situation before finalizing design solutions and strategies (Degraff, Degraff, and Jordan, 2005).

Design and Development

1. Select, modify, or create a design and development model appropriate for the activity

2. Select and use a variety of techniques to define the instructional content and strategies.
3. Select or modify existing instructional materials.
4. Develop instructional materials.
5. Design instruction that reflects an understanding of the diversity of learners
6. Evaluate and assess instruction and its impact (Degraff, Degraff, and Jordan, 2005).

Implementation and Management

1. Plan and manage
2. Promote collaboration, partnerships and relationships in a design project.
3. Apply business skills to managing instructional design.
4. Design instructional management systems.
5. Provide for the effective implementation of instructional products and programs (Degraff, Degraff, and Jordan, 2005).

Figure 1. Adaptive Management Cycle

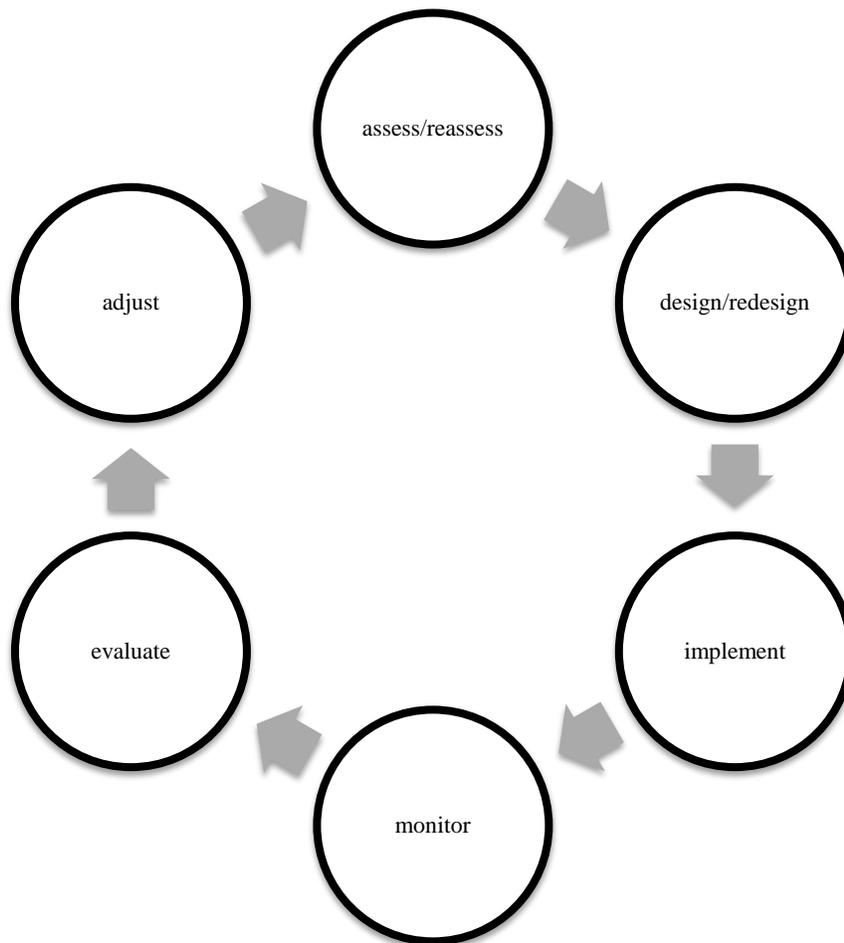


Figure1. Adaptive Management Cycle depicts the cyclical design continuously assessing, designing, implementing, monitoring, evaluating, and adjusting for the ever changing environment.

<http://www.for.gov.bc.ca/hfp/amhome/Admin/index.htm>

Appendix B: Observation Checklist and Rating Scale

Table 2.

Participation Observation Checklist

Y/N	Observations	Additional information
	Introduce Shark Conservation and status of shark populations Introduce shark biology	
	Introduce shark behaviors Introduce the major threats that are greatly reducing shark populations Introduce the major threats that are greatly reducing shark populations	
	Introduce the major threats that are greatly reducing shark populations	
	Knowledgeable about shark biology	
	Knowledgeable about shark conservation	
	Inspire you to become a shark conservation advocate	
	Feeding sharks	

Y/N	Observations	Additional Information
	Answer questions in regards to sharks conservation	
	Interaction with customer on vessel	
	Provide a pathway for you to become actively involved in shark conservation	
	Show you how to identify hazards in marine environments that threaten sharks	
	Responsible for diver safety underwater Teach safety around sharks	

Note: Checklist used to evaluate diving operations and create rating scale. Checklist was developed from the information provided through Project Aware Foundation Shark Conservation instruction materials.

Appendix C: Research Questions

The research project consists of semi structured interviews with some close ended and open ended questions with dive operator and shark diving professionals and is foreseen to lasting 30 minutes per interview. The questions being asked are:

1. Do you think shark conservation education should be part of your dive programs? Why or why not? Please explain.
2. Are you aware of existing shark conservation education programs and manuals (e.g., Project Aware)?
3. Do you teach these programs? If not, what prevents you from using these programs?
4. Would a streamlined and condensed version of this program be useful in delivering pre-dive shark education? And would you use a program if one was developed?

Appendix D: Royal Roads University (2011) Ethical Principles

In reviewing proposed or ongoing research activity involving human participants, the Research Ethics Board (REB) shall ensure that such activity conforms to the following principles as set out in the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans. This policy is available on the Internet.

3. Respect for Persons
4. Concern for Welfare
5. Justice

To find the entire Royal Roads Research Ethics Policy
Retrieved from: <http://research.royalroads.ca/policy/royal-roads-university-research-ethics-policy>

Appendix E: Research Consent Form

Shark Conservation Education SCUBA Diving Operators and Guides

This research project is part of the requirements for the Master of Arts in Environment and Management at Royal Roads University.

The researcher concerned is Craig Golby and my credentials with Royal Roads University can be established by contacting either Chelsea Smith, Administrative Coordinator, Royal Roads University Email: Phone: or Dr. Chris Ling, Program Head, at

Research Consent Form

I, _____, give free and informed consent to participate in this research project on Shark conservation education in Playa del Carmen, Mexico.

I agree to be interviewed by Craig Golby under the following conditions:

1. I agree to meet for a 15-30 min. personal interview and be contacted to review the data analyzed and have the opportunity to revise or make additions.
2. I understand the interview will be hand written and audio taped and that only the researcher will have access to the information.
3. I understand that my identity will be kept confidential. I understand that the findings are to be used for academic papers and that the final paper will be housed at Royal Roads University and be publicly accessible.
4. I understand that the student's position as a professional diving instructor has no influence on the research for this project.

5. I understand that once I have agreed to participate I am free to withdraw at any time with no prejudice from the project. Any information that has been gathered will be destroyed and not used in the project.

6. The researcher will attempt to make sure that no harm will come to me through my

Participation in the project and that there is no deception involved in this study.

I agree to these conditions:

Signed: _____ Date:

Researcher

Signed: _____ Date:

A copy of the final report will be published and archived in the RRU Library.

Please feel free to contact me at any time should you have additional questions regarding the project and its outcomes.

You are not compelled to participate in this research project. If you do choose to participate, you are free to withdraw at any time without prejudice. Similarly, if you choose not to participate in this research project, this information will also be maintained in confidence.

If you would like to participate in my research project, please contact me at:

Name: Craig Golby

Email:

Sincerely,

Craig Golby

Appendix G: Interview Question Data Analysis

Table 3.

Interview Questions and Theme Analysis 1

Interview Question #1	Who	y/n	Rationale	Quote	Theme	Quote
Do you think shark conservation education should be part of your dive programs?	Guide #5	Y	Conservation education training	“it should be the responsibility of the diving organizations to integrate conservation in the open water courses required to become certified”	Value to industry Value to Divers	“Operators could sell the education as a service to their divers and perhaps, they can have added information like brochures or an information booklet. They are not just going down with the sharks for excitement they are actually learning a few things”
	Guide #8		Education	“we have a special permit from the local government to do shark research”		

Note: Guides all believe that conservation education is important and is a value to the industry and to the divers. One operation has a special permit from the local government allowing feeding to take place and observe behaviours, doing their own shark research.

Table 4.

Interview Questions and Theme Analysis 2

Interview Question #2	Who	Y/N	Rationale	Quote	Theme	Quote
Are you aware of existing shark conservation education programs and manuals?	Guide #2	N	Training	“Is there any other conservation education programs available for other types of diving situations?”	Value to Divers	“It is important that as a guide I ensure my guests act responsibly as ultimately I am accountable for my guests’ actions”
	Guide #6	Y	Other shark protection regulations	“There is a whale shark season from June until September and swimming with them is highly regulated due to their status as endangered species. For instance, there is a ban on diving with whale sharks, only two snorkelers per guide are allowed in the water, and touching them is prohibited.”	High standards	“We have to collaborate with all the guides, make sure that they are maintaining and meet our requirements, but without industry standards it is difficult”

Note: Some guides were aware of the existing programs and some were not. They were curious to find out if other organizations offered similar courses or materials. They all believed that these programs add value to divers and increase the standards in the industry.

Table 5.

Interview Question and Theme analysis 3

Interview Question #3	Who	y/n	Rationale	Quote	Theme	Quote
Do you teach these programs? If not, what prevents you from using these programs?	Guide #4	N	No compensation	“Their job was primarily to sell courses and equipment. They were paid mostly on a commission basis per diver and therefore they made more money by taking as many divers out per day as possible.”	Value to Divers	“Dive guides interact closely with their divers, allowing them to become role models and stewards of this area and the marine ecosystem”.
	Guide #8	N	Already have their own	“We do offer the program, but since they show the video before diving, few customers are interested in taking a two day program and paying the extra money.”	Value to industry	“By adding a conservation education briefing to shark diving it increases the quality of the product”

Note: Guides felt that they were too busy with other obligations and economic benefit to the individual guide isn't beneficial. Some operations offer the program but it is expensive and customers are not willing to pay extra, whereas a pre-dive briefing in conservation education would greatly benefit the divers and the industry.

Table 6.

Interview Question and Analysis 4

Question #4	Who	Y/N	Rationale	Quote	Theme	Quote
Would a streamlined and condensed version of this program be useful in delivering pre-dive shark education? And would you use a program if one was developed?	Guide 3#	Y	Value to operators	“The usefulness of a video format so that it could be shown to guests while the guides set up for the excursion would benefit instruction.”	Value to industry	“I think that would be great for the industry if guides would make sure that everybody is aware of the need for shark conservation”.
	Guide #1	Y	Streamlined and brief	“The briefing would need to be short enough to keep the participants' attention and keep them motivated to go diving.”	Fostering Education	“There is great potential within the experience of diving with sharks to learn something about them and how important they are to the ecosystem”

Note: All guides agreed that a briefing would be beneficial to all parties involved from divers to guides, operators, and the entire industry. However it would need to be designed so that it could be easily implemented and an introduction video would help as a teaching aid a speed the process along.

Appendix H: Sample Briefing

A. Pre-Dive Briefing introduction

1. Staff and student introductions

Note to Instructor: Introduce yourself and assistants. Explain your background with sharks if your students are not familiar with you. Have students introduce themselves and explain why they are interested in sharks. Break the ice and encourage a relaxed atmosphere.

Show conservation education in shark ecotourism video

<http://youtu.be/pm9nX8BNLP4>

2. Briefing goals:

- a. Inspire you to become a shark conservation advocate
- b. Introduce sharks including their conservation status and why they are vulnerable to impacts
- c. Introduce the major threats that are greatly reducing shark populations
- d. Provide information on the value of sharks to the marine environment and to local economies
- e. Introduce you to management approaches that can protect sharks
- f. Provide a pathway for you to become actively involved in shark conservation
- g. Show you how to identify hazards in marine environments and on land that threaten sharks

B. What are the unique physical attributes of sharks?

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1. The first sharks appeared in the world's oceans over 400 million years ago, more than 150 million years before the first dinosaurs took to the land. Most of the modern sharks we see today first appeared around 100 million years ago. By comparison the first humans evolved only around 200,000 years ago.
2. Sharks occupy every marine environment from tropical coral reefs, to temperate coastal waters, to the open ocean, to the icy ocean depths. Some species also venture into freshwater such as **the Bull and the river shark**.
3. Sharks have evolved into roughly 500 species and come in many sizes from the dwarf lantern shark at around 7 cm to the whale shark - the world's largest fish - that grows up to 12 metres.
4. Sharks eat a great variety of prey. Most sharks are predators, but some are scavengers, while whale and basking sharks are filter feeders with eating habits similar to a baleen whale.
5. The main unique physical attributes used to identify sharks are a skeleton made from cartilage, exposed gill slits and a large, oil filled liver to aid buoyancy.

C. What is the conservation status of sharks?

1. The International Union for the Conservation of Nature (IUCN) is a leading authority on the status of the world's plant and animal species. IUCN Specialist Groups assess and classify plants and animals to identify those in danger of extinction. Their findings are published in the IUCN Red List of Threatened Species™. Sharks in Peril and why we should care

2. Species assessed as Critically Endangered, Endangered or Vulnerable are considered by the IUCN to be Threatened. The Red List review of 1044 sharks, rays and chimaeras found that 30% are Threatened or Near Threatened with extinction. A further 47% are categorised as Data Deficient, meaning that more information is required to place them in a threat category. Species in the Data Deficient category may be found to be Threatened once they have been assessed. International Union for the Conservation of Nature (IUCN) Red List Review of 1044 Shark, Ray and Chimaera Species Critically Endangered 2% Extremely high risk of extinction in the wild Endangered 4% Very high risk of extinction in the wild Vulnerable 11% High risk of extinction in the wild Near Threatened 13% Close to qualifying or likely to qualify for a threatened category in the near future
3. Research into certain shark species or regions has uncovered more alarming estimates:
 - One third of pelagic (open ocean) sharks and rays are threatened with extinction
 - Hammerhead sharks have declined by 89% in the North West and Western Central Atlantic since 1986
 - Great hammerheads have declined by 80% in the eastern Atlantic
 - Porbeagle and spiny dogfish sharks have been reduced by 90% in the Northwest Atlantic
 - One third of European sharks are Threatened with extinction, one of the highest levels of all assessed regions in the world
4. 14 species of Mediterranean sharks and rays are Critically Endangered

5. These statistics show that sharks are in serious trouble. If we do not act quickly and decisively we risk virtually emptying the ocean of sharks. This will have devastating consequences for marine ecosystems and human society.

D. What life history traits make sharks vulnerable?

1. Most shark species are characterised by one or more life history traits that make them vulnerable to overfishing, including:
 - It takes them a long time to reach sexual maturity
 - They have long gestation periods (one to two years)
 - They have a small number of offspring (pups)
 - They breed only every second or third year
2. Compared to other vertebrates (animals with a backbone including mammals), sharks generally have a slow reproductive cycle. The reproductive strategy of most shark species more closely resembles those of whales, elephants and birds than other fish.
3. Under natural conditions this slow reproductive strategy works well for sharks as they have few predators and so have no need to rapidly replenish their numbers.
4. These traits work against sharks when they need to recover from overfishing or other substantial losses. A slow reproductive strategy means they are unable to respond quickly to the removal of many individuals from a population.
5. Another trait that makes some shark species vulnerable to heavy fishing is their tendency to form groups based on their age, sex and/or maturity. Large, older

females of many shark species produce greater numbers of stronger pups than younger females, so the sudden removal of these older females through fishing can have serious consequences for the population.

E. What is the importance of sharks to marine ecosystems?

1. Sharks play a crucial role in maintaining the health of marine ecosystems by keeping a balance among prey species and by removing sick, injured and diseased animals.
2. Sharks are often the apex predator in their ecosystem, meaning they are at the top of many food chains. As adults they have no or few natural predators.
3. Typical traits of apex predators is that they feed on many different species and change food sources when one prey animal becomes hard to find. In this way sharks help maintain a balance that ensures no one species over-populates and depletes the species on which it feeds.
4. Food chains describe how energy moves among species. A typical food chain starts with plants that use the sun's energy to make their body parts. Plants are consumed by herbivores (plant eaters), who are consumed by carnivores (meat eaters). Small carnivores are consumed by large carnivores until the apex predators - the last animal in the food chain - are reached.
5. Removing an animal from a food web can have repercussions throughout an ecosystem.

Managing threats and recognising values

F. What are the major threats contributing to declines in shark populations?

1. Overfishing is the main cause of the rapid decline in shark populations. It is mostly due to overfishing that many shark species are threatened with extinction.
2. Sharks are caught in targeted fisheries and as bycatch. Demand for high value fins, the primary ingredient for Asian shark fin soup, is a main driver of shark fisheries, but demand for shark meat, particularly in Europe, is also strong and has led to serious depletion of several shark populations.
3. Sharks are caught by countries from all around the world.
4. The top twenty nations account for nearly 80% of the annual reported shark catch. The top four shark fishing countries account for more than 35% of the annual reported take.
5. Estimating how many sharks are killed in fisheries every year is difficult for several reasons. Fishing nations have different reporting requirements and capacity, or none at all. For example, most countries fishing sharks in the Indian Ocean do not report their catches properly if at all. Reported totals do not usually include bycatch, illegal fishing, or sharks taken by small scale fishing (traditional, artisanal and/or subsistence) and recreational fishing.
6. Reports have revealed that the FAO figure is a serious underestimate. A study that analysed shark fin trade records estimated between 26 and 73 million sharks killed every year with a best estimate of 38 million individual sharks.

7. The report warns that actual global shark mortality is higher as this figure does not include sharks killed for the fishing country's domestic fin market, sharks discarded dead at sea, or sharks used only for their meat.

Major Threats: Shark Fin Soup

1. Shark fin soup is a status symbol in Chinese culture as historically it was a dish reserved for the Emperor. Today serving shark fin soup to your guests demonstrates that you think highly of them, and that you have great personal wealth.
2. But the demand for shark fin soup is fast outpacing supply. Rapidly growing populations and rising incomes means many more people can now afford shark fin soup. Demand for shark fins is driving the global depletion of shark populations as fishers from all countries learn of the opportunities for profit.
3. Shark fins are among the world's most valuable fisheries products. Processed shark fins can cost hundreds of dollars per kilogram compared with US\$1 to US\$10 per kilogram for shark meat depending on species. A bowl of soup can sell for as much as US\$100.
4. 13. Shark fins add texture to soup rather than flavour. Many chefs use chicken soup as a base for their shark fin soup.

Major Threats: Shark Finning

1. Shark finning is the practice of removing a shark's fins at sea and discarding the body overboard. Sharks are frequently finned while still alive.

2. Why do fishers go to the trouble of catching a shark only to throw most of it away? The answer lies in the high value of shark fins. Shark fins are among the world's most valuable fisheries products while shark meat is generally much less valuable. So the temptation is strong for fishers to throw the bulky shark carcasses overboard
3. Shark finning has been banned by many countries, though international trade in shark fins is allowed for most species. Because finning happens out at sea where monitoring is generally poor and fishing regulations are lacking or weak, the practice of finning continues.

Major Threats: Bycatch

1. Fishers use a variety of methods to catch fish; most of them result in bycatch. Bycatch refers to the part of a catch that is not the target species or is undersized. Bycatch cannot be landed in many regions depending on local regulations and how strictly they are enforced. When bycatch cannot be landed or is not wanted it is dumped overboard, sometimes live, sometimes dead or dying.
2. Bycatch includes sharks and bony fish as well as dolphins, whales, turtles, invertebrates and seabirds. Bycatch accounts for the majority of the total catch in some shrimp trawl fisheries.
3. Tens of millions of sharks are killed as bycatch every year. Discarded bycatch is rarely accounted for in fishery records so these shark deaths are missing from official statistics.

Major Threats: Other Impacts

1. Many human activities on land have a negative effect on sharks, particularly reef and coastal species. Scientists warn that 75 percent of the world's coral reefs are threatened from local pressures such as coastal development, pollution and overfishing, combined with the impacts of rising sea temperatures caused by increased concentrations of CO₂ and other greenhouse gases in the atmosphere. One fifth of the world's mangroves have been removed since 1980 for land reclamation projects and aquaculture farms.
2. Coastal development can damage important shark habitats and nurseries. Mangroves, estuaries and salt marshes provide important habitats for sharks to give birth and mature. These areas are rapidly being destroyed in mankind's rush to accommodate a growing population.
3. Marine debris - the rubbish we allow into the ocean- kills and injures sharks through entanglement or because they eat it. Ghost nets - fishing nets that have been accidentally lost or purposefully dumped at sea - also contribute to the annual shark death toll.
4. Other impacts include swimmer protection devices such as beach nets and drumlines with baited hooks used in Australia and South Africa. These devices kill sharks including species that are of no threat to humans, as well as many other marine animals such as dolphins, rays and turtles.

Appendix I: Brochure Material for Take Home

What are the key management strategies that can protect sharks?

1. Sharks need protection - from us! Many shark species migrate over great distances; they cross international boundaries and move from areas of high protection to areas of no protection.
2. NPOAs are intended to make shark fisheries sustainable by:
 - Assessing threats such as overfishing;
 - Protecting critical habitats;
 - Minimising waste and discards (e.g. finning bans), and;
 - Encouraging the full use of dead sharks.

Taking action and joining the Project AWARE movement

What personal actions can you take to protect sharks?

You have learned a great deal about the damage being done to shark populations. Now is your chance to help protect the sharks. Following are actions you can take for sharks. Get involved in these activities and encourage other people to join you.

Everyday Actions

- Get involved;
- Support Project AWARE's work that seeks greater protection for sharks
www.projectaware.org/project/sharks-peril;
- Find resources here: www.projectaware.org/category/resource-zone/sharks;
- Make personal changes to protect sharks;

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- Write a personal pledge or action plan on how you will protect sharks in the future;
- Join campaigns;
- Write a letter to your country's Fisheries Minister and Environment Minister letting them know you support shark conservation;
- Support Marine Protected Areas;
- Read about Project AWARE's involvement in Marine Park campaigns
www.projectaware.org;
- Tell others;
- Spread the word about the importance of shark conservation;
- Encourage friends to take this course;
- Share with others everything you learned in this course;
- Tell your shark conservation stories through Project AWARE's My Ocean or other online networks such as Facebook and Twitter;
- Respond to alarmist media stories;
- Write to the editor to correct factual errors and ask for balanced reporting;
- Support Project AWARE;
- Join the Movement - join thousands of divers around the world protecting our ocean planet – one dive at a time. Visit www.projectaware.org to join the movement;
- Donate to support a clean, healthy and abundant ocean
www.projectaware.org/donate;
- Tread lightly on the planet;

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- Reduce and offset your carbon emissions, and;
- Rethink, reduce, reuse and recycle;

Purchase Decisions

- If you choose to eat seafood;
- Only eat seafood, including shark meat, from sustainable fisheries and organically certified aquaculture;
- Find out which seafood products contain shark and avoid them;
- Look for eco-labels on fish products such as Dolphin Friendly or Marine Stewardship Council;
- Let restaurant owners know you only eat seafood from sustainable sources;
- Choose not to eat shark fin soup;
- Let restaurant owners know you will not eat in their restaurant if they have shark fin on the menu;
- Avoid purchasing items that contain shark products;
- Includes souvenirs, medicines, leather goods, jewellery, shark oil and others;
- Tell store owners about the issues and why you refuse to buy these items;
- Support genuine ecotourism operations;
- Stay at locally owned resorts and use locally owned businesses so that more of your money stays in the country and supports the local economy. This reinforces the value of natural assets that attract tourists, such as sharks, and;
- Look for resorts that treat sewage and wastewater and dispose of rubbish properly.

Be an AWARE Diver

- Make your dives count;
- Use your diving skills to increase knowledge of impacts to the marine environment;
- Participate in Project AWARE's Dive Against Debris survey;
- Monitor coral bleaching through the Coral Watch program;
- Be an AWARE diver, and;
- Follow Project AWARE'S Ten Ways a Diver Can Protect the Underwater World.

Project AWARE Foundation is a global movement of scuba divers protecting the ocean planet - one dive at a time. Focused on the critical issues of Sharks in Peril and Marine Debris, Project AWARE empowers thousands of divers in more than 180 countries to work together for a clean, healthy and abundant ocean planet. *Project AWARE's powerful movement for ocean protection starts with you.*

Join the Movement

The ocean is fighting for its life. But divers are a powerful, growing force who can give the ocean a big voice. Divers are acting in their own communities and favourite dive sites every day to tackle impacts on the marine environment. Visit www.projectaware.org and join the movement to discover actions and opportunities to support ocean protection in your local community and on a global scale.

Battle the Big Two

1. Divers around the world are focussed on two major ocean protection issues: shark decline and marine debris, or rubbish in the ocean. Project AWARE is zoning in on these two issues where scuba divers are uniquely positioned to make long-term change. Project AWARE is tackling these issues on three

fronts: ongoing underwater action, leading grassroots change and influencing effective environmental policies.

2. Many shark populations are on the brink of collapse and a growing number of AWARE divers will no longer stand for unsustainable fishing practices. You can help by telling others about this shark conservation course, frequently checking the shark Issues & Projects pages on Project AWARE's website, spreading the word and taking action.

Divers are critical to addressing marine debris issues underwater. Cleanups are important community actions but they're not the only answer. You can help by reporting data about the debris you find underwater through Project AWARE's 'Dive Against Debris' program. Your involvement will shine a light on debris issues and help reduce its devastating impacts on marine life. Project AWARE has the tools and training to get you started.

My Ocean

My Ocean is Project AWARE's unique eco-networking site where dive centers and AWARE leaders are taking action for ocean protection. Here, they manage local conservation events, report data and connect with passionate volunteers like you. You can explore My Ocean by creating a profile, volunteering for events and finding like-minded dive buddies in your community.

Be an AWARE Diver

Visit www.projectaware.org to find the latest calls to action, petitions and activities centered on our ocean planet. Think ocean protection every time you dive and report the data that is so important for our cause. Together, we can re-think

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what's possible and share a positive vision for our ocean future. Join the movement to protect our ocean planet – one dive at a time www.projectaware.org.