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Julianna Elizabeth Mullen

Spring 2010

MAS Marine Biodiversity and Conservation

Capstone Project



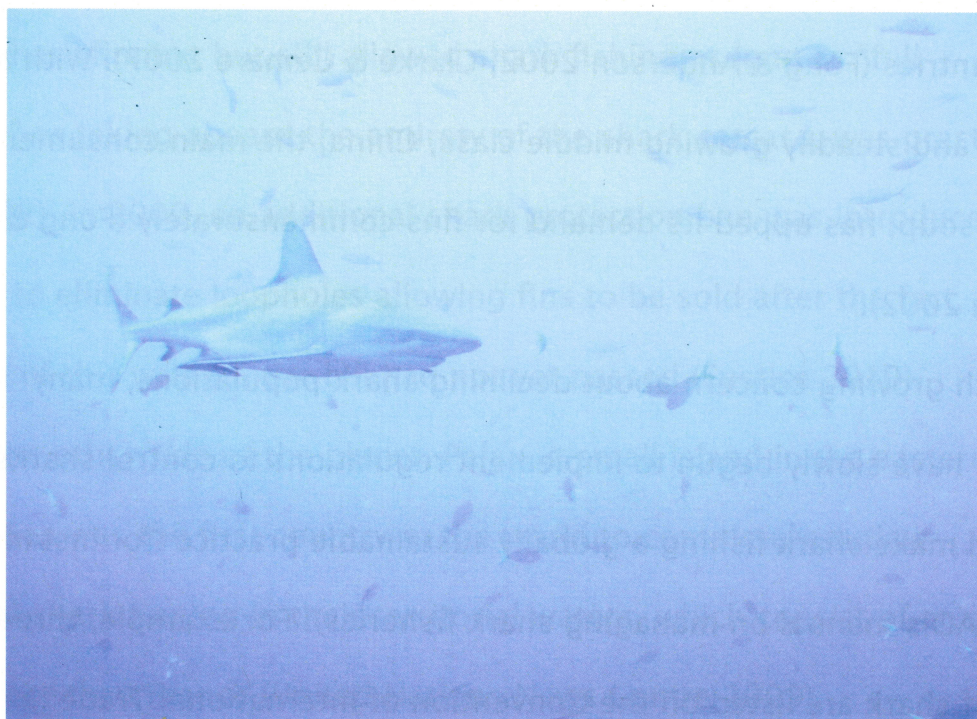
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Attitudes and Behaviors Towards Shark Conservation in the Republic of Palau, with Applications and Education Materials for Continued Protection of Sharks



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6.9.2010

Introduction

The depletion of sharks throughout every ocean is now a major concern, with current catch levels believed by many to be unsustainable (FAO 2001, 2007, Heithaus et al 2007, Myers et al 2007). Shark finning, the practice of removing shark fins and discarding the body, is practiced to satisfy the market demand for shark fin soup, a high-priced commodity in Asian countries (Fong & Anderson 2002, Clarke & Cemale 2007). With a wealthier and steadily growing middle class, China, the main consumer of shark fin soup, has upped its demand for fins commensurately (Fong & Anderson 2002).

With growing concern about declining shark populations, many countries have slowly begun to implement regulations to control shark takes and make shark fishing a globally sustainable practice (for instance, see the FAO's manual on managing shark fisheries). For example, three species of shark are listed on the Convention of International Trade in Endangered Species (CITES), whale sharks (*Rhincodon typus*), basking sharks (*Cetorhinus maximus*), and great white sharks (*Carcharodon carcharias*), and trade of shark products is strictly regulated or prohibited. CITES has been ratified by 175 countries (CITES 2010) and is generally accepted as a valuable regulatory body. Unfortunately, in the most recent Convention of the Parties for CITES held in 2010, all four species of sharks up for listing

and protection from trade were defeated (scalped hammerhead, great hammerhead, oceanic whitetip and porbeagle shark).

Outside of CITES, a handful of countries have gone further in their efforts to protect sharks, including the United States (NOAA 2002, United Nations News Centre 2009). In 2000, the United States instituted the Shark Finning Prohibition Act as part of the Magnuson–Stevens Act, which outlawed shark finning but still allowed shark fishing as long as “full utilization,” or taking aboard the entirety of the shark carcass, was practiced (NOAA 2002). In 2009, an additional shark protection ban was introduced in the senate to eliminate loopholes allowing fins to be sold after the fact, but at the time of this writing, the bill had not yet passed (Eustice 2010).

On the other side of the planet, Palau, a small island in the eastern Philippine Sea was the first country in the world to completely outlaw commercial shark finning in their territorial waters, which consist of an area slightly larger than France (United Nations News Centre 2009).

The History of Palau’s Shark Fishing Ban. The history of Palau’s ban on shark fishing begins several years before President Johnson Toribiong’s declaration at the 2009 UN Summit. In the 1980s, Palau was a burgeoning dive destination with a growing reputation as a Mecca for large–animal encounters, and in particular, sharks. In the mid and late 1990s, as Palau’s reputation for some of the best diving in the world was growing, the patrons of local dive shops were disturbed by the sight of large foreign fishing

vessels, primarily from mainland Asia, mooring in the small bays, their spars hung with drying shark fins. Palauans were apparently not participating in shark finning, despite the fact that some Palauan fishers had the resources to collect and sell fins. Moreover, fishers were receiving few, if any, of the economic benefits of the fin trade. As a result, the take of sharks, an animal of cultural significance and small importance as a food fish concerned many Palauans. Sharks exist as figures of myth and are used as symbols of protection on the bai, a traditional structure where male clan leaders meet. Palauans believed that eating shark imparted health, strength and possibly protection against cancer. In one memorable story, a Palauan fishing in his outrigger canoe saw a reef shark jump out of the water and flash its belly, which is how he knew his wife was being unfaithful and why he paddled home early in the day to confront the adulterer.

In 1995, the historic importance and beauty of sharks motivated two men, Dermot Keane, an Irishman, and Ron Leideich, a US-educated marine biologist, of "Sam's Tours" dive shop to begin photo documenting the foreign vessels and their take of fins. Subsequently, Keane and Leideich began to lobby for political support to halt the take of sharks while encouraging other members of the Palauan community to take part in protests against shark finning. In response to what was viewed as destruction of charismatic animals important to the survival of Palau's tourist-based economy and Palau's marine ecosystem, Keane founded Palau

Shark Sanctuary in 2001, a non-profit with the goal of creating a shark sanctuary backed by law. A year later, Micronesian Shark Foundation was founded by Tova Bornovsky of the "Fish N' Fins" dive shop, with the additional goal of understanding more about Palau's reef sharks from a biological perspective through tagging and genetic analysis. Additionally, in 2003, Scottie Kiefer, part of Palau Conservation Society (PCS) began an education/outreach campaign to inform citizens about the importance of sharks.

Starting in 1997, Keane and Noah Idechong, a delegate of Ngiwal state and later Speaker of the House began to discuss a political strategy for outlawing shark finning in Palau's waters. In 2001 the original legislation was written, banning take of 60 species of marine animals; however, it was considered incomplete as it only outlawed foreign fishing vessels and did not stop either Palauans or foreign vessels contracting commercial Palauan fishers.

In 2002, bill 6-36 was passed by the Olbiil Era Kelulau (senate), and included some additional revisions adding more protections. In 2003, under President Tommy Remengesau's administration, all species of sharks, along with rays, turtles, marine mammals and reef fish were listed as protected and steel leaders on fishing gear were outlawed. However, foreign fishing vessels could still apply for and receive permits to fish within Palauan waters. Fines for violators could not exceed \$500,000, but violators were

difficult to catch and prosecute. In 2003, around 2,800 pounds of shark fins

SIXTH OLBIL ERA KELULAU

Fourth Regular Session, October 2001

RPPL No. 6-36
(Intro as Senate Bill No. 6-142,
SD2, HD2)

AN ACT

To amend Chapter 1 of Title 27 of the Palau National Code to prohibit foreign fishing vessels from fishing within a 50 nautical mile radius to the east of the reef entrance to Malakal Harbor; to prohibit foreign fishing vessels from taking reef fish, turtles, rays, sharks, and marine mammals; to prohibit foreign fishing vessels from using steel leaders; to increase the penalties for certain violations of the chapter; to harmonize the scope of the Republic's maritime jurisdiction with the provisions of the United Nations Convention on the Law of the Sea (UNCLOS); to add a new section 174 to 27 PNC to establish a tax on billfish of 40% of the actual revenues derived from the sale of billfish off-loaded and sold in the Republic; and for related purposes.

THE PEOPLE OF PALAU REPRESENTED IN THE OLBIL ERA KELULAU DO ENACT AS FOLLOWS:

1 Section 1. **Legislative Findings.** The Olbil Era Kelulau finds that the
2 Republic of Palau must take bolder steps to protect and develop the Republic's marine
3 resources for the benefit of the people of Palau. The Republic receives a very small
4 percentage of the value of the tuna and other fish harvested from our waters by foreign
5 fishing vessels. At the same time, foreign fishing vessels are depleting the Republic's
6 national waters of fish and other marine life at an alarming rate. Foreign fishing
7 vessels often take "by-catch" including marlin, sailfish, swordfish, and sharks. Some
8 foreign fishing vessels also engage in the mutilation of sharks in a practice commonly
9 known as "finning." This rapid depletion of marine resources endangers the continued
10 viability of some species and forever alters the delicate ecological balance of life in the
11 Republic's waters.

Figure 0. Bill 6-36, a law passed by the Olbil Kera Kelulau (Senate) of Palau banning fishing of notable marine animals,

were confiscated in

Palau, with a

conservatively

estimated value of ~

\$140,000, (\$50 per

pound of fin) One

source said the highest

fine levied on

fishermen for

confiscated fins was

only \$15,000.

In 2003, shortly after

the passage of 6-36,

President Remengesau participated in the public burning of confiscated shark fins to show Palau's commitment to the shark fishing ban. Although serious in principle, in practice the ban was somewhat undermined by a lack of resources for effective enforcement. The Marine Law Enforcement Division employs marine rangers to patrol within Palau's inner reef, but only a single patrol boat with off-shore capabilities is available to patrol the entirety of Palau's territorial waters. Reportedly, foreign fishing fleets no longer dock in Malakal harbor with shark fins aboard. Instead, they will do high-seas



Figure 2. Confiscated shark fins burned by staff of Palau Conservation Society and former President Tommy Remengesau

“handoffs” of fins, passing them to an vessel that will never dock in Palau.

Nevertheless, throughout 2008, patrols were still catching violators of Palau’s anti-shark fishing laws on a regular basis.

However, Paul Ueki, a

senator who believed the shark fishing ban was unenforceable, introduced bill 8-44 to overturn the law. Although he later killed the bill on the senate floor, Ueki’s political motivations are questionable, especially in a country receiving so much aid from two massive shark finning countries (Taiwan and China).

During the 8-44 controversy, in a little publicized move, Pew Environmental Group and its shark conservation team travelled to Palau and pulled together the work of the dive shops, non-profits and politicians. In an unprecedented move, Paul Ueki “killed” his bill after intense pressure from the dive industry and fellow senators. Six weeks after Pew’s intervention, on September 25, 2009, President Toribiong made an announcement to the UN about Palau’s status as a shark sanctuary.

Objectives of the Current Study: Palau's role as an innovator in the field of shark conservation makes this island nation a valuable example to the rest of the world. The accomplishments of their society and government can serve as a best-practices template to other countries looking to implement similar strategies to preserve sharks. By studying Palau's conservation-minded culture and policies, my objective was to understand the cultural, political and economic factors that can foster sound shark protection practices. Accordingly, I travelled to Palau from April 1 to May 5, 2010 to administer a survey and collect data about stakeholder involvement in shark conservation. During this visit, I interviewed the key advocates of shark conservation in Palau, and assessed the attitudes and behaviors of several population groups in order to determine whether other communities can replicate the experience in Palau.

METHODS:

The social survey consisted of nine questions designed to ascertain the respondents' opinions on conservation in Palau, their perception on the importance of sharks for ecosystem function, and their support, if any, of the shark fishing ban. Each facet of the survey (reproduced in the Appendix) was designed to answer one of several key questions:

- Do Palauans think that maintaining a healthy environment is important?

- Within marine conservation, are they aware of the value of shark conservation?
- Why or why not do they value shark conservation and where have they obtained their knowledge about sharks?

Later questions were geared to learn what role, if any, public pressure had in motivating or supporting the ban on shark fishing.

- Did the ban have broad public support or was it an action taken by a small number of informed public officials?
- Are most people aware of the ban?
- Is it viewed as an appropriate action— are they pleased, indifferent, angry
- If pleased, did they support the ban and, if so, how?
- If they are displeased with the ban, why?

Finally, the survey asked what advice would Palauans give to people in other communities who may want to establish a similar ban?

In addition to the survey, in-depth interviews were conducted with key stakeholders involved in developing or lobbying for the ban. These interviews provided important context for the survey results and were helpful in understanding Palauan culture and traditions.

Along with survey data and in-depth interviews, a general idea of the overall abundance of sharks in the waters surrounding Palau was calculated, but the accuracy of these data suffer from a lack of baseline population data. During my time in Palau, diving performed under the constraints of the American Academy of Underwater Scientists (AAUS) was not possible as there were no others on Palau certified under the protocol, and funding did not cover the cost of traveling with an additional AAUS diver. Instead, photo documentation, anecdotal evidence provided by professional fishermen, and

information from Palau Conservation Society served to sketch a simple picture of shark populations around the island.

Human Research Protection Program Protocols: Consistent with UCSD Human Research Protection Program protocols (Project #100612), survey respondents were not identified by any personal information such as their name or job title. Instead, respondents were assigned an identification number and grouped into general categories: the general public, government workers, professional fishers, and dive industry personnel. Age was recorded within brackets, 18–24, 25–45, 46–65 and 65+.

Individual interviews were conducted with 16 members of the Palauan community instrumental in developing the ban, but their names will not be used or linked to particular types of information.

Survey Respondents: Survey respondents were a convenience sample of 300 people selected by visiting the major population centers for each of the four respondent categories. Respondents were surveyed (1) in or around the dive shops, (2) at commercial fishing docks, (3) at government offices and (4) in department stores, schools, hospitals, on the street and in houses. As a nonprobability sample, survey respondents are not representative of their larger populations. Nevertheless, given the size of the survey population and the qualitative nature of the inquiry, the survey yielded useful—albeit only suggestive—results. Moreover, with the possible

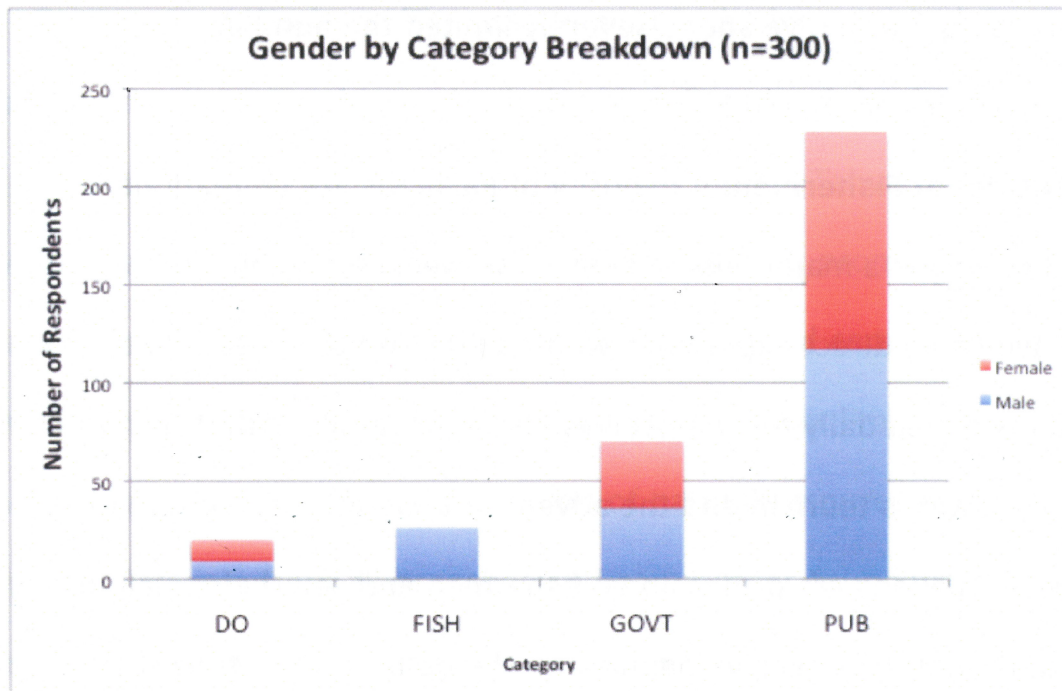


Figure 4 The gender breakdown of each of the four categories, dive industry workers (DO), professional fishermen (FISH), government workers (GOVT) and the general public (PUB).

exception of fishers, there are no strong reasons to believe that the characteristics and responses of the populations surveyed would differ dramatically from a random sample. Each of the populations surveyed is described briefly below.

Dive Industry Workers: There are eight major dive shops catering to tourists, with two specifically geared towards Taiwanese and Japanese tourists. Dive guides are a mix of locals and expatriates, and boat drivers are often full-time fishermen who contract out to the dive shops for additional income. Dive guides were particularly willing to take part in the survey, but were notoriously difficult to find as their schedules were often decided at the last minute and they left the docks early and came back after dark.

Scheduling conflicts, coupled with the language barriers present at the

Taiwanese and Japanese dive shops severely limited the number of respondents within the dive industry.

Professional Fishermen: A majority of Palauans are recreational fishers and fishing is a major leisure activity on weekends. Thus, most Palauans have some direct experience with fishing and the ocean. In the past, Palauans fished daily for themselves and their family. With the shift of the economy towards tourism and the advent of a lucrative foreign market for fish, more Palauans are professional fishermen and sell their catch locally and abroad, though they receive pennies on the dollar for the tuna they catch which is then bought by Asian brokers. Although some Palauans still fish daily for their own consumption, many purchase fish at markets. Surveying fishermen was informative and occasionally difficult. Many were distrustful, convinced that my results would be used against them. Some were hesitant to talk, afraid they wouldn't give the "correct" answers. A large group of fishermen would depart from the docks late at night and return around 6 AM; despite traveling to the docks at 5 AM, those fishermen were tired and didn't want to speak. Other fishers were intrigued by the survey and were most accommodating and helpful—though their interest may mean their responses were biased. Nevertheless, once assured that the survey only focused on their opinions, they were willing to talk about killing sharks and participating in dynamite fishing. The candor of their responses suggests that response bias was not a serious problem.

Government Workers: The government is the largest employer in Palau, outstripping even the service industries. Because Palau is so well funded by other countries (including the United States, Taiwan, China, Japan and Australia), money reaches government offices first, promoting a large bureaucracy and many different departments structured comparably to the United States government. Survey respondents were not limited to departments concerned with conservation of natural resource management, but included people from all branches and committees found within Koror State Government and Melekeok, the official seat of government.

The General Public: Those grouped into the general public stratum consisted of students, retirees, service industry workers, retail workers, teachers, hospital staff members and others. They were generally not coastal workers and for the most part, their relationship to the ocean was purely recreational or limited to fishing off of docks. Many had elderly family members who educated them about the sea and Palauan customs concerning the “bul,” or traditional bans on certain kinds of fish.

RESULTS:

Three hundred people grouped into four categories completed the survey, with 158 women responding and 142 men, which is slightly skewed from Palau's true demographic in which males outnumber females 1.065/1. Respondents represent approximately 1.5% of the Palauan population of ~20,000, and the majority of survey respondents came from Koror, the

commercial capital of Palau where ~15,000 people live (CIA World Factbook 2009).

Twenty of the respondents were dive industry workers; 26 respondents were professional fishermen; 72 were government workers and 182 were part of the general public. 51 respondents were classified as unemployed, which included retirees and full-time students. 61 respondents were aged 18–25, or 20.3%; 133 were aged 26–45, or 44.33%; 100 were aged 46–64, or 30%; four were aged 65+, or 1.3%.

Willingness to Pay: Question one (see full survey in Appendix) posed a willingness-to-pay scenario for different public service improvement

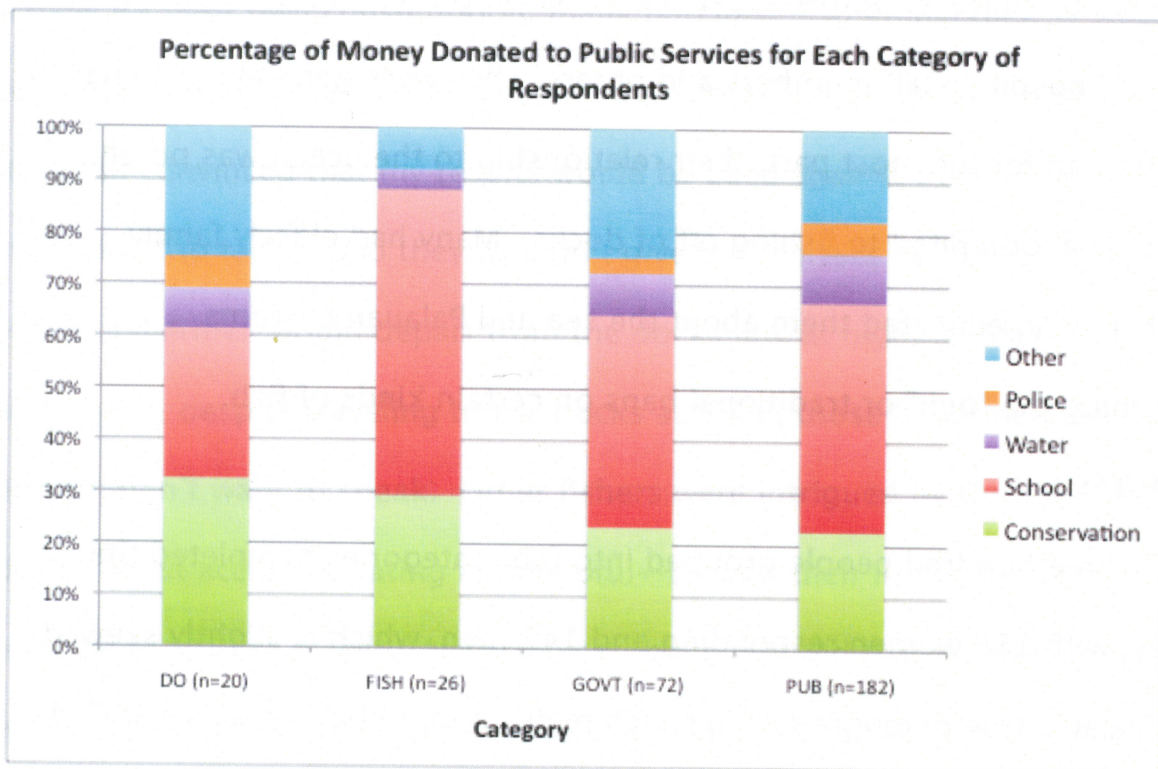


Figure 5 Donations by the dive industry (DO), professional fishermen (FISH), government workers (GOVT) and the general public (PUB) to five different possible public service improvement schemes.

projects, including environmental conservation. Respondents had to decide how to allocate their \$10-- to the police, schooling, conservation, drinking water or something else. Respondents could split the money, or give the full amount to one initiative.

The dive industry was most willing to spend their money on environmental conservation, donating 31.66% of their funds. Respondents were quick to point out that a well-maintained environment would greatly benefit their profession, as the dive industry would be severely damaged by poor reef condition, or too few animals. Dive industry workers were also the most sympathetic to conservation, with many pointing out that they worked in the industry to be close to nature and animals. Compared to other categories, the dive industry highly favored the "other" category as well, predominantly choosing to donate to the Belau National Hospital.

Fishermen were next most likely to donate money for conservation, giving 29.4% of their funds. Most were aware of the fact that without conservation, fish catches would decrease. Some fishermen related stories about Palau's history of conservation and traditional dedication to sustainable fishing. No fishermen donated to the police, citing their inefficiency, and inability to patrol ocean waters, particularly off-shore where foreign vessels were still taking Palauan's fish illegally. They also donated disproportionately to schooling, with a few citing Palau's poor school system

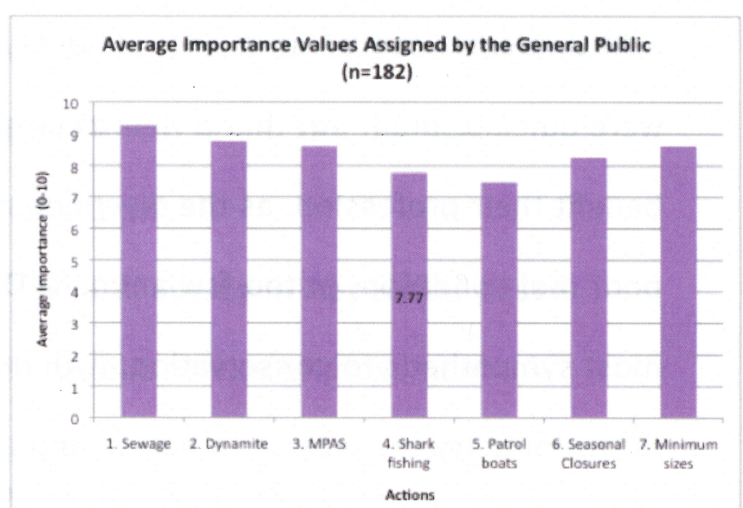
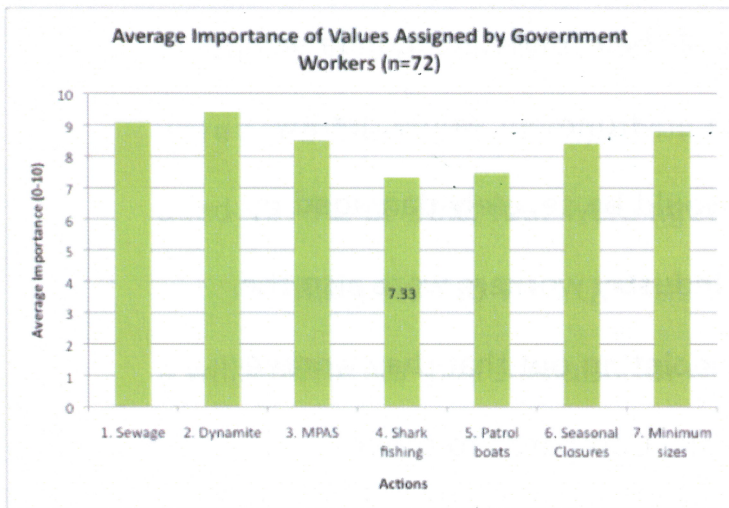
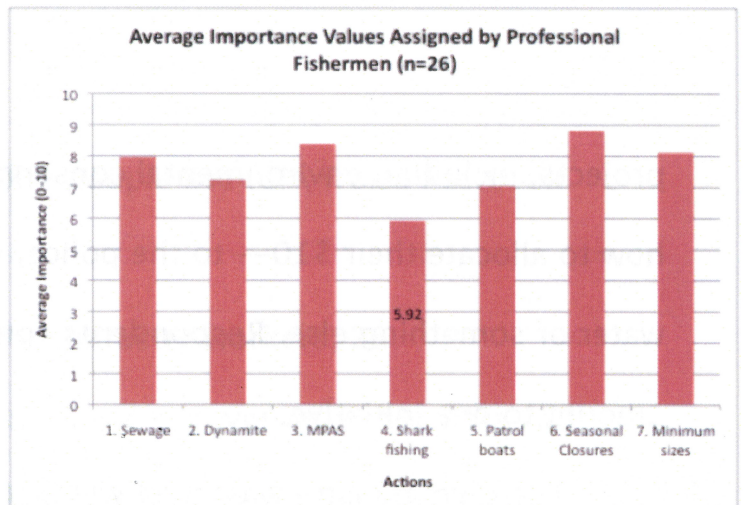
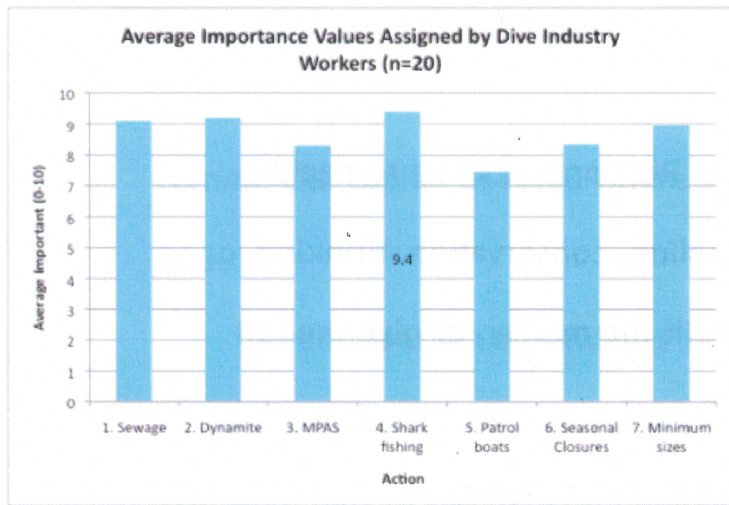


Figure 7. The average importance assigned to seven different marine conservation actions: 1. Treating sewage, 2. Stopping dynamite fishing, 3. Making more marine protected areas, 4. Controlling shark fishing, 5. Having more patrol boats, 6. Seasonal closures of fishing grounds and 7. Minimum fish size limits.

as the root of many troubles, particularly ignorance of Palau's traditional cultures.

Government workers and the public donated nearly equal amounts, at 22.4% and 22.7% respectively, to conservation. Police officers were the least popular recipient of funds in all response categories.

Marine vs. Terrestrial Conservation: Question two was designed to ascertain if, as an island with a high dependence on marine resources, Palauans would value marine conservation more than terrestrial conservation. Respondents answered on a 0–10 scale (0 = completely

disagree, 10 = complete agree) indicating how much they agreed or disagreed with one of the following statements: (1) "Palau needs to conserve the land more than the ocean," or (2) "Palau needs to conserve the ocean more than the land." To minimize survey bias, respondents were presented with either version (1) or (2) of the question based on an a priori randomization scheme. All categories to some degree believed that marine

	Land>Ocean	Ocean>Land
DO	4.00	6.00
FISH	3.92	6.08
GOVT	4.32	5.75
PUB	4.78	5.25

Figure 3 The average scores of respondents on a 0-10 scale to two statements: "Palau should protect the land more than the ocean" (Land>Ocean) and "Palau should protect the ocean more than the land" (Ocean>Land)

conservation was more important than terrestrial.

Fishermen, followed by the dive industry, more heavily supported marine conservation over terrestrial. Government workers, at 57%, still favored the marine, even including respondents from departments outside of the Ministry of Natural Resources. The general public was nearly even, with 52% favoring marine conservation. Such a close split between the two choices is probably due to the fact that many people cited the need to preserve both land and sea in tandem, and thus scored the question a "5," regardless of which version they were asked. Upon discussion with officials from the Nature Conservancy's Palau office, the workers were impressed that so many

respondents understood the links between land and sea, and that protection of both was necessary for the health of the ocean.

Importance of Conservation Actions: Question three was designed to assess the value of shark conservation in the face of other actions that could also be valuable to preserving ocean health. Respondents were asked to rank the importance of seven actions on the same 0–10 scale (0 being completely unimportant, 10 being completely important). Cards depicting the various actions were given to respondents so they could go through one at a time and visualize each action. The order of the cards was changed for each respondent in order to limit sampling bias through placement of the

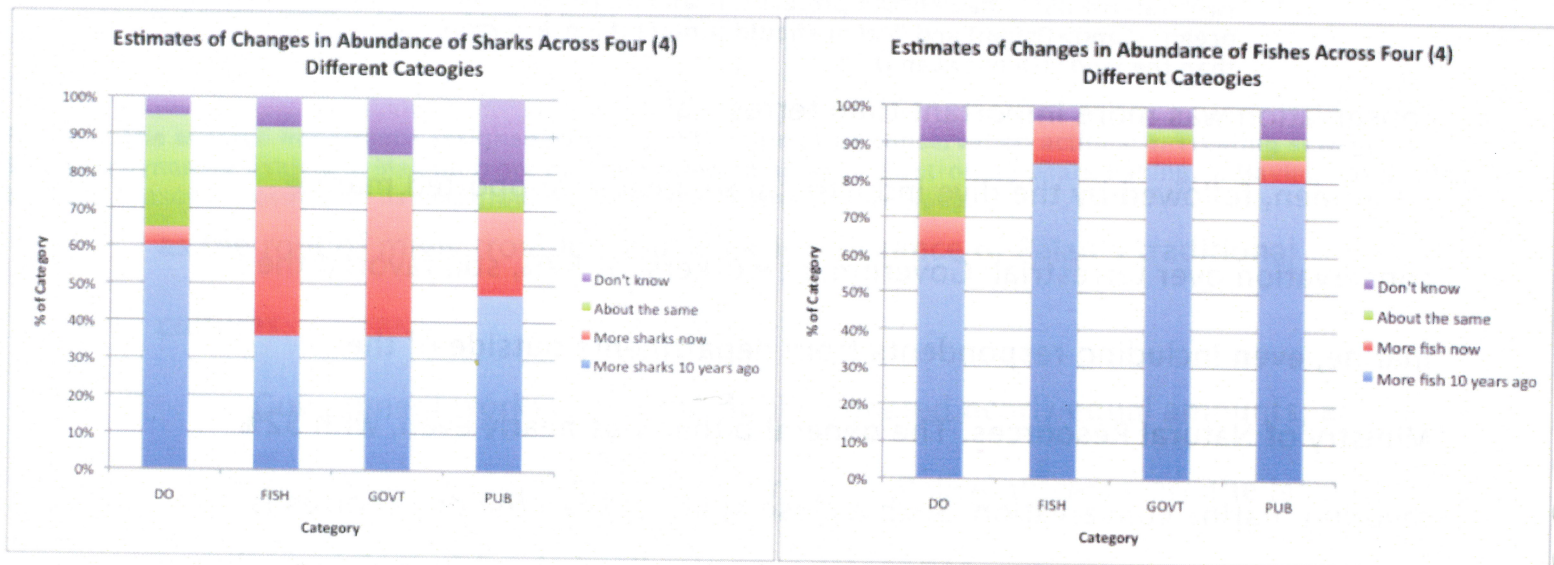


Figure 8. The estimates in abundances changes of sharks and fishes over a ten-year period across four different categories, dive industry workers (DO, n=20), professional fishermen (FISH, n=26), government workers (GOVT, n=72), and the general public (PUB, n=182).

shark conservation card.

The dive industry ranked “controlling shark fishing” as the most important action for assuring ocean health, with an average of 9.4/10. Dive

industry professionals were once again vocal about the importance of large animals to the health of their industry, but were also cognizant on some level of the interactions between sharks and other fishes, and how fewer sharks seemed to result in an overall decline of diversity.

Fishermen ranked “controlling shark fishing” as the least important action for continued ocean health, giving it an average score of 5.92/10. Fishermen said that sharks were a nuisance and should be killed or culled to prevent them from stealing catches, and that shark overabundance was become particularly problematic. While some claimed that sharks are a delicacy and should be eaten to maintain health, others said that no Palauan eats shark, so protections are unnecessary in the first place. In an two independent sample t-test, the difference between the values given for controlling shark fishing by fishermen and dive operators was extremely significant ($p < .001$).

Government workers gave “controlling shark fishing” a higher overall average than the fishermen at 7.33, but still ranked it as the least important action among the seven, while the general public ranked it as the second-least important action with an average of 7.77, behind “having more patrol boats” at 7.47.

Sharks and Fish Populations: Question four was designed to provide an anecdotal baseline for populations of fish and sharks according to casual observations. Respondents were asked if they thought fish and sharks were

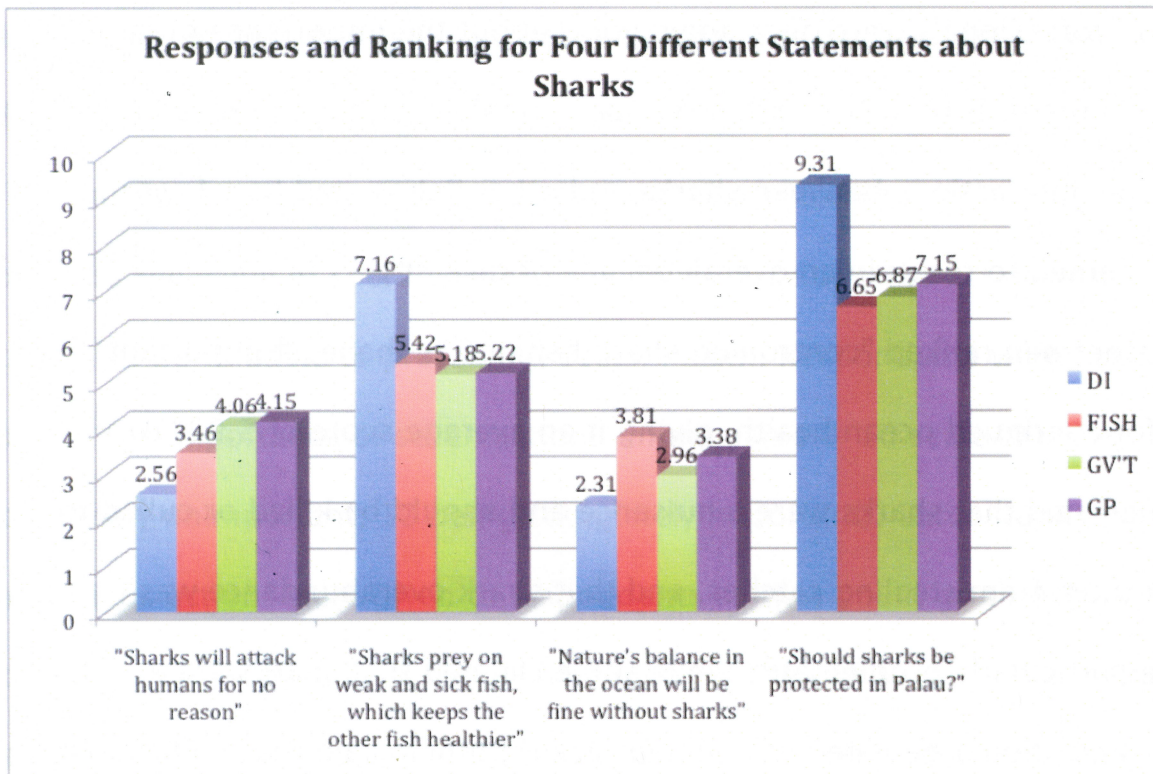


Figure 9. Responses and average rankings of four different statements about sharks. Groups were dive industry workers (DI), professional fishermen (FISH), government workers (GOVT), and the general public (GP).

more abundant ten years before, more abundant now, about the same, or if they didn't know. The majority of every stratum claimed that there were more fish ten years ago, with more than 80 % of fishermen, government workers, and the general public agreeing. The majority of the dive industry thought there were fewer fish in present times, but 19% thought that the fish abundance hadn't changed within the past ten years. This may be due to the fact that dive operators spend a majority of their professional life diving within marine protected areas, where more fish are present. For the most part, it was younger dive industry workers (aged 18–44) who estimated that there were fewer fish now, and it was the older (aged 45–65+) workers who believed that the fish abundance hadn't changed, which is the opposite

finding of a “shifting baselines” scenario. One potential explanation for these findings is the rawness of youth, who haven’t experienced as much so each small change looks larger in comparison.

Fishermen were almost split down the middle in answering whether there were more sharks ten years ago or more sharks now. As mentioned before, some fishermen considered sharks a nuisance and a one or two mentioned killing them when they approached to make it easier for fishers to get their catch aboard. One possibility is that the perception of fewer fish went hand in hand with the perception that sharks were competing more with humans for the remaining fish. It is also possible that dive shops’ practice of drawing sharks closer to groups of people by chumming the water was decreasing shark’s fear of humans, causing sharks to swarm around fishers and prompting the perception that there were actually more in present times. Of course, it is also possible that there are actually more sharks in present times because of the additional protections offered to sharks.

Beliefs about Sharks: Question five was designed to assess how respondents viewed sharks in terms of the danger they posed to humans, and what role respondents thought they might play in ecosystem function. Respondents were also asked if they thought sharks should be protected in Palau on a scale of 0–10, 0 being no protection whatsoever, and 10 being complete protection from all fishing. The dive industry had the lowest

average response value to the statement “Sharks will attack humans for no reason.” Their score, 2.85, fell between “strongly disagree” and “mostly disagree” on the scale used. Dive industry workers, particularly dive guides, felt very strongly that sharks did not attack unless provoked; this viewpoint extended to the large pelagic sharks, like tiger and bull sharks, often considered dangerous by recreational divers. Fishermen “mostly disagreed” with the statement “sharks will attack humans for no reason;” they often volunteered that if there is activity in the water, particularly spear fishing, sharks will swarm and may attack. They were quick to point out, however, that any bites humans received were incidental and probably due to the fact that a speared fish was too close to a human hand.

Government workers “disagreed” for the most part that “sharks will attack humans for no reason,” and the general public did as well, although their overall average was higher at 4.19.

According to coastal workers, there has not been a fatal shark attack for decades; however, fishermen and dive operators voiced a lot of concern about the practice of chumming for sharks with divers in the water to provide “close encounters.” There was a rumor that a Chinese diver and a dive guide had been bitten, and that feeding the sharks was one of the main reasons that sharks were more abundant and less afraid when fishermen were in the water. Shortly after I left Palau, chum dives were outlawed (Allard 2010).

One particular event was often cited when discussing the danger of sharks. During World War II, Palau was the site of one of the worst shark attacks in history. The USS Indianapolis was struck by a torpedo and rapidly began to sink. Close to a thousand members of the Indianapolis crew ended up in the water for four days. Tiger sharks and oceanic whitetips began to school, leaving only 317 survivors (Finneran 1994). The story of the USS Indianapolis was mentioned several times by people in each category when discussing the danger of sharks.

Each stratum was more or less “neutral” on the statement “sharks eat weak and sick fish, which helps keep other fish healthy,” which seemed to confuse many participants. It was the most complex statement presented, and the phrasing may have been unclear, promoting uncertainty. The dive industry was most likely to agree that sharks had an effect on the ecosystem by eliminating weak and sick fish.

When asked if “nature’s balance in the ocean will be fine without sharks,” all categories agreed to varying degrees that it would not. The dive industry had the lowest average value with 2.4, while government workers averaged 2.92. Fishermen were the most likely to believe that the ocean would be fine without sharks, averaging 3.81.

All categories agreed that there should be at least some protection for sharks in place in Palau, with values ranging from 6.65 by fishermen to 9.31 for dive industry workers.

Knowledge of the Ban: Question six asked whether or not the respondent was aware that Palau had instituted a commercial shark fishing ban.

Fishermen had the highest level of awareness and most had learned about the ban through the newspaper; no fishermen supported the ban in any way.

One in four dive industry workers knew about the ban and supported its passage at least in thought or through sales of shark merchandise. In contrast, 74% of government workers were cognizant of the ban. Some government workers were directly responsible for passing legislation

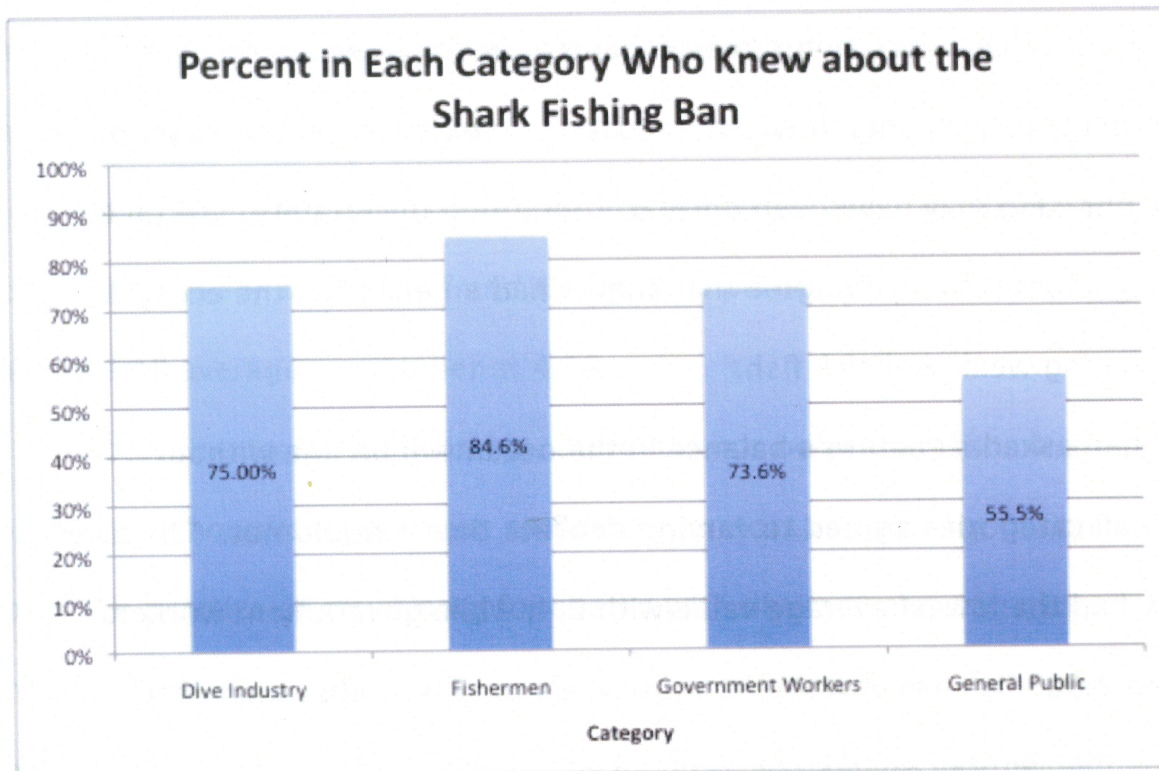


Figure 00. The percentage of people in each category who knew that Palau had a shark fishing ban.

through various offices, but no government workers supported the ban in any way outside of their workplace.

Almost half of the general public was unaware of the shark fishing ban. Those that had heard about it had done so through the media, or by the re-broadcasting of President Toribiong's United Nations address on TV. Only eight people both knew about the shark fishing ban and didn't support any kind of shark conservation; the other 91 members of the general public who were knowledgeable of the ban gave shark protection a minimum of a "6."

Sources of Information about Sharks: Question eight focused on where the people of Palau were getting their information and how they were learning about sharks. Palauan's sources of information about sharks were

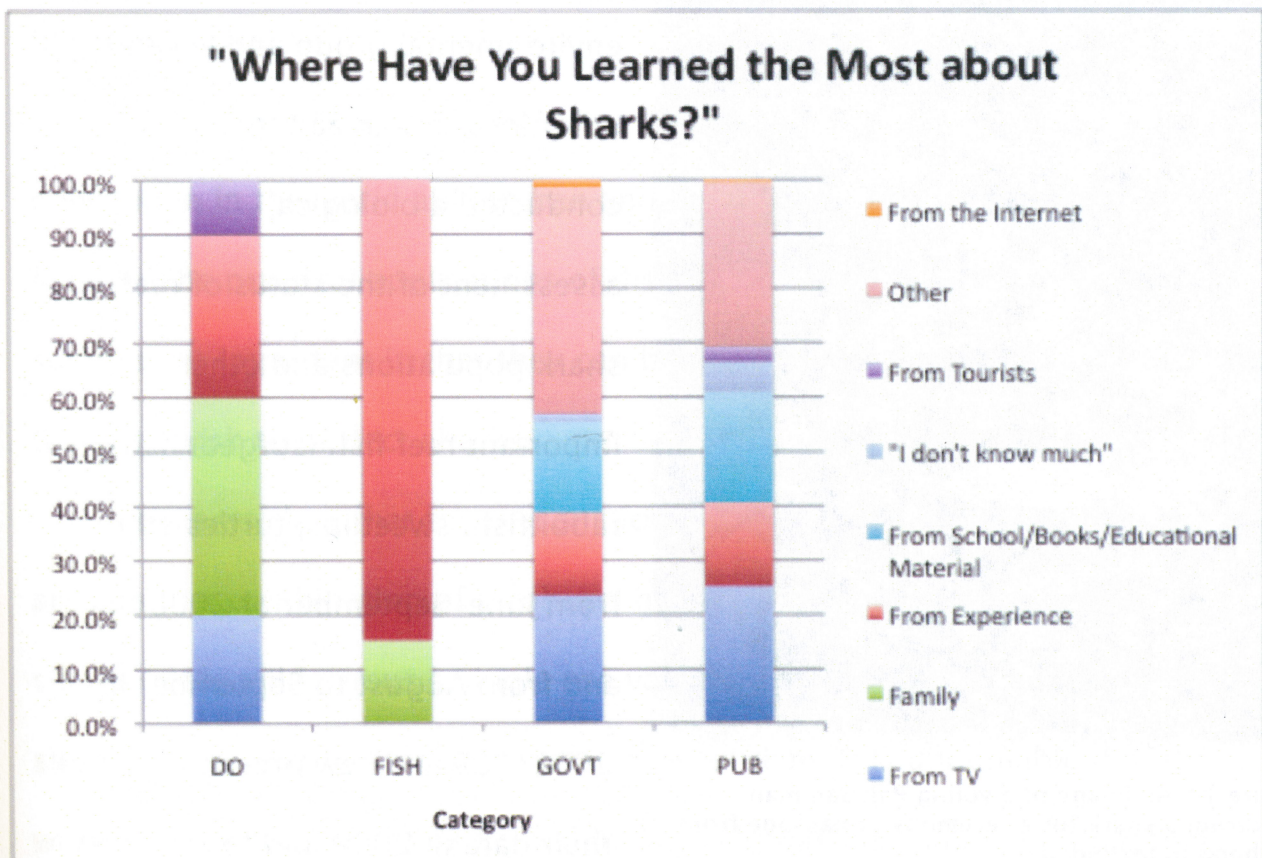


Figure 11. Sources of knowledge about sharks in each category, dive industry workers (DO), professional fishermen (FISH), government workers (GOVT), and the general public (PUB).

varied and included many resources not originally listed on the survey. Popular responses included learning from family members and elders or through Palauan culture and myth. Other responses included learning from stories in newspapers, and “Shark Week,” an educational initiative run out of the Fish N’ Fins dive shop. Many people had learned the most about sharks from their job, especially in the dive industry and government worker categories. The Discovery Channel was often cited as a popular information source. Only one woman had learned the most about sharks from church.



Figure 12. An image of a young Palauan man capturing a shark for a ceremony of passage from boyhood to manhood.

Biological Surveys: PCS, in collaboration with Pew environmental group and several other local organizations, conducted a biological assessment of the status of reef shark populations and other important reef fish (surgeonfish, rabbitfish, sweetlips, turtles etc) from June–September of 2006 and from August to September in 2008. PCS and Pew presented their data in 2009 and found

that there were approximately 80 reef sharks every 100 kilometers (Pew

Charitable Trusts, PCS 2009). Although there is no population baseline data to compare this to, this may be a normal number considering reef shark's territory size (Papastamatiou 2010).

While in Palau, I completed twenty-two dives in 11 of the most popular dive locations (Blue Corner, German Channel, Coral Gardens, Ulong Channel, Sias Corner, Sias Tunnel, Big Drop Off, Virgin Blue Hole, Iro Maru Wreck, Turtle Cove, Buoy #6). White tip reef sharks, black tip reef sharks and grey reef sharks were abundant, although some sites, such as Blue Corner, had a much higher abundance of sharks than anywhere else. Averaged out across 22 dives, I saw approximately four sharks per dive.

CONCLUSIONS:

The goal of this research was to determine how and why Palau was the only nation in the world able to ban and, to some degree, reduce shark fishing. The practical applications of discovering the reasons for Palau's success are important in that they can be used to help other island nations that also wish to protect sharks.

It seems clear that the reasons for Palau's shark sanctuary successes are due to a combination of a cultural history of conservation which values sharks in the wild versus a single use value of their fins, and an economy supported by large animal encounter dive tourism. It is undeniable that the work of a small group of dedicated individuals was instrumental in passing

the ban, and the creation of the sanctuary was due in no small part to luck and good timing.

Particularly in the original format, the inclusion of sharks was an easy add to bill 6–36. Because Palauans do not have a large local market for sharks and revenue from their capture was lost to foreign countries, it was easy for most stakeholders to accept that sharks should and would be protected. Interviewees often expressed surprise that the shark protection movement gained so much momentum. Of course, the dive industry had a markedly vested interest in protecting sharks and their livelihood, and therefore they were natural advocates. One source reported that even fishermen became involved with the ban, writing letters to encourage its passage, although that was later contradicted by a prominent boat captain and is not supported by the survey results.

Sharks are also an important part of Palauan culture. At one time, it was necessary for boys to go out to sea in dugout canoe and rope a shark in order to be considered men (see image below). Additionally, black tip reef sharks were part of the bul, or taboos of Airai state, meaning residents of Airai were not allowed to eat them and had to monitor their population levels. Such conservation measures extended to many different animals, each state having its own particular buls, some incredibly complex and comprehensive. Roots in traditional views on marine conservation, which was mentioned frequently when speaking to survey respondents, no doubt

made the protection of sharks (and other marine animals) more straightforward.

One of the most remarkable discoveries was that even when respondents expressed their fear of sharks, a majority also thought that sharks had a role in keeping the ocean healthy and should be protected. Only 10 respondents, or 3.3%, ranked question 6, “should sharks be protected in Palau?” as “0” and also gave the statement “Nature’s balance in the ocean will be fine without sharks” a score below a “5.” Respondents’ notions about the importance of sharks were particularly intriguing, and suggested a major focus for the public awareness campaign.

Although the sample of dive industry workers was small, respondents were most knowledgeable about sharks, most aware of their value to the ecosystem, most concerned about spending money to protect the marine environment and most invested in its protection. This clearly suggests the obvious importance of this sector to shark conservation efforts and without the impetus provided by the workers of Sam’s Tours, the ban may have never come to be.

In contrast, fishers were the least hospitable to shark conservation efforts, assigning the least importance among all respondent groups to the value of controlling shark fishing, the highest level of agreement with the statement that nature’s balance will be fine without sharks, and the least support for the ban on shark fishing. This suggests that without an active

dive industry, efforts to regulate shark fishing would do well to create a fuller understanding of the value of sharks to the economy of the fishing industry.

That said, it should be noted that all respondent groups generally understood the importance of sharks to the health of the ocean, an understanding they appeared to derive from Palauan culture and myth often transmitted through families. This confirms the powerful effect of local culture on attitudes and beliefs toward sharks and the consequent need to understand the cultural antecedents for shark conservation prior to mounting any public education effort.

Kiribati: Palau and Kiribati have much in common and are also very distinctive nations. Palau is a wealthy country with a small population that relies heavily on foreign aid, its tourist industry and fishing exports to support its economy. Palau is lush, with crops of taro and cassava supplementing readily available fish. On the other hand, Kiribati also relies heavily on their tourism industry and foreign aid (up to 50% of their GDP comes from aid), but their economy is crippled by infrequent plane service, a lack of exportable goods and arable land (Fairbairn 1992). Despite their differences, Palau still has lessons to impart to Kiribati.

Kiribati, like Palau, has a history rich in respect for marine life. Similar to the bul of Airai State, members of Kiribati society who were going through rituals of strength and power were barred from eating shark meat, as were

people who worshipped the gods Tabuariki and Auriaria (Teiwaki 1988). In Palau, this innate respect for marine life has remained in the cultural memory while in Kiribati, traditional viewpoints have become more muddled, at least in part through Britain's deliberate overturning of traditional practices to promote quick exploitation of Kiribati's valuable phosphorus and fisheries resources (Teiwaki 1988, Thomas 2001).

After the phosphate was depleted in 1979, Kiribati was left with neither colonialism nor a readily exportable good. In the 1990s, Kiribati's exports were focused primarily on copra, a dried coconut product (27.8% of exports in 1990), fish (26.2% in 1990), with other miscellaneous products taking up smaller percentages. Shark fins were .9% of total exports in 1990, but newer figures suggest that current exports of shark fins are closer to 4% of export total (Fairbairn 1992, Walsh & McCormick 2009). The paradox of Kiribati is found in the disparity between their fairly traditional day-to-day culture, and the bizarrely advanced-yet-failing economy, brought on by rapid, careless Westernization (Thomas 2001). To succeed in protecting sharks in Kiribati, the I-Kiribati's traditional culture and conservation practices must be allowed to fill in the gaps caused by exploitation. Promisingly, Kiribati is part of the Phoenix Islands Protected Area (PIPA), the largest marine park in the world, although protections for the marine ecosystem are limited thus far, and shark finning is still ongoing

(www.phoenixislands.org). Participation in PIPA gives Kiribati an excellent framework for furthering shark conservation measures.

One of the most obvious ways to further shark conservation in Kiribati is simply to make it illegal to fin sharks. While this is not the final solution in and of itself, knowledge that one is breaking the rules can, in and of itself, be a deterrent. A handful of Palauans suggested exactly this when asked what advice they would give other islands who wished to ban shark finning. The first step for stopping shark finning is enforcing strict penalties for those who are caught shark finning; even without a large division of marine law enforcement officers, one posted on the docks could be a disincentive. If Kiribati is able to outlaw shark finning and actually enforce violators and prosecute them, they will be well ahead of the curve of most nations.

In order to steer fishers away from shark finning, is it vital that other methods of income be provided. This may be as simple as switching the targets of the fishery. Instead of finning sharks, I-Kiribati can revert to traditional fisheries of reef fish to generate food and income. Walsh & McCormick (2009) suggests that a shark finning ban and subsequent shift of fishing activities in Kiribati would be economically viable on a long-term horizon given the use values of sharks provided over their lifetime. Changing livelihoods from fishing to conservation is a difficult process, but it has succeeded elsewhere (such as with whale sharks in the Philippines, or

Palauan fishermen becoming boat drivers for the dive operators). Having a reliable plane service will be crucial to this effort.

The success of any of these suggestions depends heavily on educational materials that can show, briefly and effectively, why sharks are valuable and why they should be preserved. To this end, I have created posters to be distributed in Kiribati to educate fishers about the importance of sharks in the ecosystem. The design relies on the finding that—whether the result of cultural tradition or effective public education—respondents in Palau recognized that sharks were important to maintain a healthy ocean. If the same respect for the value of sharks can be promoted in Kiribati, it will represent an important step toward shark conservation and ultimately a ban on shark fishing.

Appendix:

1. You have \$10 dollars to donate to improve public services. How much money, if any, would you give to each? You can give all your money to one cause, or split it among many.
 - a. More police officers \$ _____
 - b. Improve education for preschool kids \$ _____
 - c. Improve the environment \$ _____
 - d. Better drinking water \$ _____
 - e. Other \$ _____

2. How much do you agree or disagree with this statement? 1 is completely disagree and 10 is completely agree. "Palau needs to protect the land more than the ocean" SWAP EVERY OTHER: "Palau needs to protect the ocean more than the land." _____

3. (Cards) On a scale of 0-10, (0- not important, 10 - very important), how would you rank each of the following actions for keeping Palau's oceans healthy?
 - a. Treating sewage _____
 - b. Stopping dynamite fishing _____
 - c. Making more ocean sanctuaries _____
 - d. Controlling shark fishing _____
 - e. Having more patrol boats _____
 - f. Seasonal closures of fishing grounds _____
 - g. Minimum fish size limits _____

4. Were there more fish in the ocean 10 years ago, or are there more fish now?
- More 10 years ago
 - More now
 - About the same
 - Don't know
- i. Were there more sharks in the ocean 10 years ago, or are there more sharks now?
- More 10 years ago
 - More now
 - About the same
 - Don't know
5. Do you agree or disagree with the following statements about shark's functions in the oceans? (0 –strongly disagree, 10– strongly agree)
- Sharks will attack humans for no reason _____
 - Sharks prey on weak and sick fish, which helps keep other fish healthier _____
 - Nature's balance of the ocean will be fine without sharks _____
6. On a scale of 0–10, (0 means no protection, 10 means completely protection), do you think sharks should be protected?
- If yes, why?
 - Because they're God's creatures
 - Because they bring tourists
 - Because they help keep the ocean healthy
 - Other _____
 - If no, why not?
 - They're dangerous
 - Scary
 - Eat the good fish
 - Other _____
7. Did you know that on September 25th of 2009, Palau outlawed shark fishing in its waters?
- Yes, I knew
 - No, I didn't know
- i. If you knew, how did you find out? (probe)
- Word of mouth?
 - Newspaper
 - Other

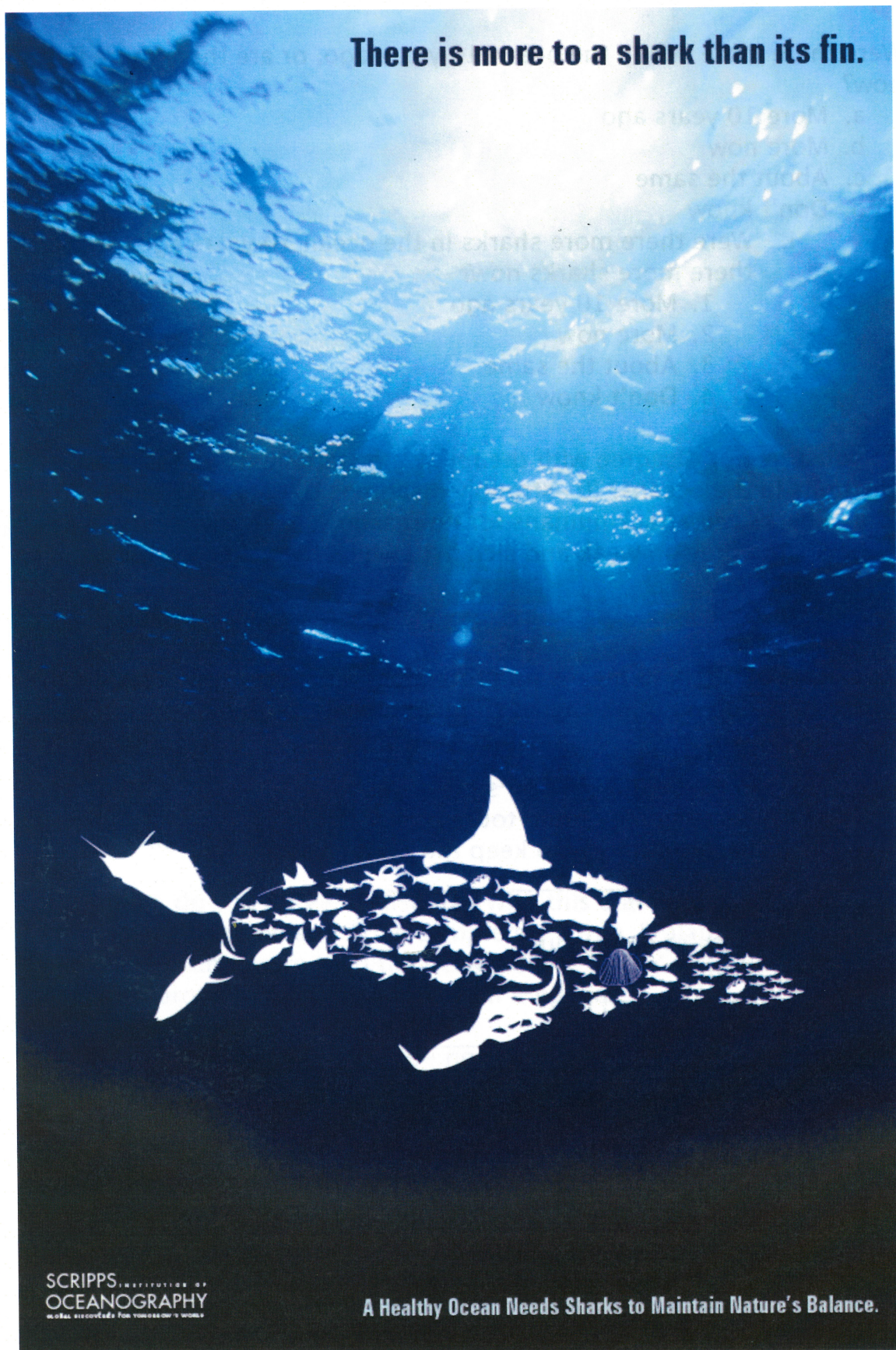


Figure 14. An example of what a potential poster for Kiribati's shark conservation campaign could look like.

ii. Did you do anything to support the ban?

8. Where have you learned the most about sharks?

- a. From TV shows
- b. From experiences with them
- c. From school/books/educational materials
- d. From tourists who come to see sharks
- e. From the internet
- f. I don't know much
- a. Other

9. What advice would you give to other islands that want to ban shark fishing?

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