# TURTLEPHILIA IN THE PACIFIC: AN INTEGRATED COMPARATIVE ANALYSIS FROM THE PERSPECTIVES OF BIOLOGICAL, CULTURAL, AND SPIRITUAL ECOLOGY IN A PARTICULAR CASE OF BIOPHILIA

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## Abstract

Throughout the Pacific regions of Micronesia, Melanesia, and Polynesia, sea turtles are recognized as culturally significant species. The specifics of human-sea turtle interactions in these regions, however, are not well known, in part because ethnographic and historic reports documenting these interactions are scattered, often consisting of diaries, ships logs, letters and other personal documents, thus requiring extensive archival research. Ethnographic and environmental data collected over a twelve-year period are analyzed to assess patterns of human–sea turtle interactions prior to (and sometimes beyond) Western contact. From the ethnographic data for Polynesia, a region-wide pattern emerges where sea turtle consumption was restricted to special ceremonies where the elites such as chiefs and priests but no one else ate turtle. Only in Tokelau did this pattern differ. Environmental data do little to elucidate explanations for this region-wide treatment of sea turtles as restricted food sources as there is no correlation between environmental variability and the presence or absence of these restrictions. Instead, the results of this research suggest that such practices may have been part of an ancestral Polynesian society, developing well before human settlement into the Polynesian region of the Pacific.

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## Preface

***The Cultural Value of Sea Turtles: A Story from Hawai'i.***

> *"Come to where you see the rooster houses," she said, "Turn right, look for the fifth mango tree, turn left ... go past the horse tied to a post, turn right between the two taro ponds, back in the mud ... that's where you'll find him. Come quick, he's dying!"*

As the title implies, today I am going to tell you a story. This story began in December of 2000, and I will never forget that morning or the piercing sound that began it. It was 5:00 a.m. on a Saturday, and I jumped up, "what . . . what is that noise, is that the alarm, what day is this?" Then I remembered . . . It was my new pager. I dialed the number it displayed and a warm, but tired voice relayed the above quote to me.

Thus began my position as a sea turtle stranding responder.

At the end of the year 2000, I was given a job as a Marine Option Program (MOP) contractor to the Oahu Sea Turtle Stranding Response Team, officially known as the Sea Turtle Stranding and Salvaging Group (SSG) of the Marine Turtle Research Program (MTRP) of the National Marine Fisheries Service (NMFS) Honolulu Laboratory.

Marine turtles are classified as universally "endangered" by the International Union for the Conservation of Nature (IUCN) and are included in the "most endangered" listing (Appendix 1) of the Convention on the International Trade of Endangered Species (CITES), which entered into force in 1975 and has 172 member nations. Marine turtles are also protected by a variety of other international laws. The Convention on the Law of the High Seas includes the concept of "range states" -- nations affected by the depletion of its natural resources at a distant location -- and gives exclusive fishing rights for migratory marine species to the nation of their birth. The Convention on the Conservation of Migratory Species (CMS) prohibits taking endangered species during migrations on the high seas. The CMS entered into force in 1983 and has 110 member nations (Bowen 1995; Murillo et al. 2008). These international laws provide the country of birth a level of jurisdiction over marine turtles at their feeding grounds, even if they lie within the territory of another country, and become more important as the full life histories of marine turtles come into focus (Wilson and Tisdell 2001).

*Turtles represent the spirit of cooperation and collaboration of Pacific Island countries and territories; they are the symbol of Pacific unity, of our traditional and cultural heritage.*

--- Takesy 2006:16

In Hawai‘i, marine turtles, both dead and alive, in whole or in part, are legally protected under the State of Hawai‘i Wildlife Law[1] and are currently listed as endangered or threatened under the US Endangered Species Act of 1973 (ESA)[2]. These laws mean huge sums of taxpayer money go to benefit sea turtles. For example, in 2008, 7.1 million dollars went to the Hawai‘i Sea Turtle Recovery Program (Advertiser Staff 2008).

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[1] Lists the loggerhead, green, leatherback, hawksbill, and olive ridley as indigenous wildlife; the loggerhead, green and olive ridley as threatened; and the hawksbill and leatherback as endangered. No person shall remove, damage, or disturb the nest of any indigenous, endangered, or threatened species. Indigenous listings prohibit any person to, or even attempt to: catch, possess, injure, kill, destroy, sell, offer for sale, export, or transport any such species, or any young or egg, or the dead body or skin thereof. Endangered and threatened listings prohibit any person to, or even attempt to: take, possess, process, sell, offer for sale, export from the state, or transport any such species, or any young or egg, or the dead body or skin thereof within the state (HIHWNMS 2001:22-24).

[2] Provides for monitoring and limited protection of species listed as either Endangered or Threatened as it relates to the use of federal monies or institutions. The act prohibits any person to, or attempt to, import or export any such species into or out of the US, take (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect or attempting to do any of the above) any such species on the high seas or within US or its territorial seas, possess, sell, offer for sale, deliver, carry, transport or ship in interstate, foreign or commercial activity. An Endangered Species is any “species, subspecies, or distinct population of fish, or wildlife, or plant which is in danger of extinction throughout all or a significant portion of its range.” A Threatened Species is “any species, subspecies, or distinct population which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.” Currently there are no marine fish or invertebrates* listed as either Endangered or Threatened Species; although this act may provide some protection for reef ecosystems through the designation of Critical Habitat for the endangered hawksbill sea turtle (*Eretmochelys imbricata*) and the threatened green sea turtle (*Chelonia mydas*) (HIHWNMS 2001:10-11). *Note: Currently about 60 of a proposed 82 species of coral (invertebrates) are now in the final stages for inclusion in the ESA.

The ESA makes it the responsibility of the US Fish and Wildlife Service and the National Marine Fisheries Service (NMFS) to manage, conserve, and if possible, restore the populations of marine turtles under US jurisdiction. Throughout the United States, the importation of turtle products, as well as the killing, harming, harassing, disturbing, handling, riding, or feeding of sea turtles is illegal.

One way that the NMFS is fulfilling its obligations under the ESA is the creation of the SSG. Established by George Balazs, zoologist and leader of the MTRP, the SSG is funded by and is an integral part of the MTRP. The SSG is contracted to respond to all reports of stranded marine turtles during non-office hours of the MTRP. The MOP of the University of Hawai‘i at Mānoa (UHM) has provided student employees for the SSG agent positions on the islands of Oahu, Maui and the Big Island since the inception of the project in 1992.

The objective of the SSG is to increase understanding of the locations, numbers, sizes, state of health, and possible causes of sea turtle strandings. A stranded sea turtle is defined as any ocean turtle found dead, injured, sick, tumored, or otherwise abnormal in appearance, and sometimes even “normal” in appearance, and out of the water, usually along the shoreline. The turtle may also be in very shallow water close to shore. Living sea turtles strand because they want to and need to be out of the ocean (NMFS 1996, NMFS 2000). An SSG agent is on duty twenty-four hours for Saturdays, Sundays, and federal holidays, and Mondays through Fridays between the hours of 1600 and 0700, including state holidays.

As a member of the SSG for nearly a decade, I received almost daily telephone calls from concerned people reporting sea turtles they believed were in distress. These reports came from both residents and visitors alike, some of whom had saved their money for many years -- a few, a lifetime -- for this visit to Hawai‘i. Whether visitor or resident, these people sometimes spent an entire day out in the blazing tropical sun keeping a sea turtle cool and safe from harm until I arrived. The willingness of so many different people to spend their valuable time in the aid of the sea turtle is what prompted my dissertation research.

Born in coastal Southeast Texas, I have lived among sea turtles all my life. I previously volunteered with sea turtle research projects on Grand Cayman Island in the British West Indies, Galveston Island in the Gulf of Mexico, and Puerto San Carlos on Magdalena Bay in the Eastern Pacific. In contrast to what I saw in Hawai‘i, in the Caribbean and Eastern Pacific I saw sea turtle significance determined by economic and consumptive uses. In present day Cayman [pronounced Cay-man, emphasis on Cay], the turtles' significance is illustrated by the role the turtle plays on Cayman's currency, national seal, national flag, and national airline. That significance exists because until the turtles ran out, "turtling" was the basis of the Cayman Islands economy. Today, you can find sea turtle dishes on local style restaurant menus throughout the Cayman Islands. The Cayman Turtle Farm, which supplies the meat to the restaurants and works to replenish the wild population through annual turtle releases, is a huge tourist attraction and receives thousands of visitors a year.

While I was at school in Puerto San Carlos, the School for Field Studies' Center for Coastal Studies was working with the local people to try to replenish the turtle population. The community is very committed to ensuring sea turtles remain in their bay. Although illegal, a black market for turtle meat exists, and the turtles are traditionally served for Sunday dinner, for guests, holidays, and special events. Turtle shells are used as washbasins, planters, and even as sand sleds for the children.

On Galveston Island, the NMFS has a sea turtle research and rehab facility that doubles as a tourist attraction. Guided tours are offered, and entrance to the facility is free.

My point is that each of those locations has people working to protect and conserve sea turtles just as the SSG does. However, in Hawai‘i, with the exception of a limited few with devious intentions, there is a very specific focus -- what we can do *for* sea turtles, on *their* behalf, to *their* benefit.

The people who report stranded sea turtles to me include taro farmers in tiny mud flat houses, policemen in uniform, housewives and teenagers out for an evening stroll, rich and poor, young and old, educated and illiterate, tourist and resident. They all assert that sea turtles are part of our culture, often assigning human roles to sea turtle emotions

and behavior. Newcomers to the region may be wholly unfamiliar with sea turtles but soon hear stories regarding sea turtles as sacred, as gods, as aumakua -- ancestors and guardians -- as sacred and tapu food eaten *only* by high-ranking male royalty.

> *Strictly speaking, the ancient tabu, or kapu, was a prerogative adhering exclusively to political and ecclesiastical rank. It was a command either to do or not to do, and the meaning of it was, "Obey or die." The penalty of violation of all tabus was death ... turtle ... could be eaten only by the priests and tabu royalty.*
>
> *--- Kalakaua 1888:32-35*

As ecotourism increased in Hawai'i, turtle watching became an increasingly popular activity. Over 15 years ago, a survey of tourists found overwhelming interest in information about marine turtles and how to go about seeing them. The Hawai'i Tourism Authority estimated at that time that marine turtles were probably only second to humpback whales as the most popular marine life attraction in the Hawaiian Islands (Balazs 1995; Balazs 1996). The cultural value of turtles for tourism is not only true for Hawai'i, as Murillo et al. (2008) explained:

> Many migratory species, as is the case with birds, sea turtles, and whales, are highly valuable tourism attractions … At Tortuguero beach in Costa Rica, the conservation efforts carried out for more than 50 years by NGOs, the government and the local community, have given rise to tourism based on green turtles and leatherbacks that today generates around 7 million dollars per year. In the Brazilian littoral zone, sea turtle conservation and tourism projects give jobs to more than 1,200 local people, 60% of whom are women (Murillo et al. 2008:6).

In my experience, people who spend their invaluable time and money to "see" and care for sea turtles are from quite different parts of the world. Ranging from children to the elderly, some are well-schooled and well-to-do; others are illiterate or semiliterate and very poor. An interest in sea turtles unites the otherwise extremely different founders of businesses and young people just starting out on their own.

Although differences in birthplace, education, age, gender, and occupation seem to make no difference in the desire to help turtles, dissimilarities exist in knowledge of sea turtle behavior and culture. For instance, take the couple that lived on the North Shore of Oahu for 20 years and had never seen a sea turtle on the beach, whose neighbors down the way stated they sat with and watched over turtles there on a daily basis. Ecologist

Carl Safina wrote eloquently about his own experience helping a stranded Kemp ridley sea turtle:

> *We brought the turtle home and warmed it a bit in the sun. It began to shed tears, a sign of ongoing glandular function and, for us, heightened hope. Soon a flipper waved – a certain signal of persistent life. Shortly thereafter, the [stranding] people arrived to bring our little patient into veterinary rehab. Slowly warmed, within a few hours it was conscious and swimming, safe until release next spring.*
>
> *Whether we help one unlucky creature or wish to save the world, for each of us the challenge and opportunity is to cherish all life as the gift it is, envision it whole, seek to know it truly, and undertake – with our minds, hearts and hands – to restore its abundance. Where there's life there's hope, and so no place can inspire more hopefulness than the great, life-making sea, home to creatures of mystery and majesty, whose future now depends on human compassion, and our next move.*
>
> --- *Safina 2007:4*

Repeatedly during the course of turtle strandings, I have personally seen people cry, fill with joy, scream, fight, and almost come to blows over the health of a sea turtle. These observations led me to consider the "cultural value" of sea turtles for the residents and visitors of Hawai‘i.

How do we know what someone values? I argue we know by answering the questions, "How do they spend their time?" and "How do they spend their money?" If someone says they value family, they spend their time with family, they spend their money traveling to get to family, on helping family, on gifts for family, and so forth. A person's actions can show the truth about what that person values.

Another way we can know what someone values, specifically for sea turtles, is something I call, "I love sea turtles, and I think by letting you know I love sea turtles, I will gain money/status/luck, etc." (See further explanation on aspects of this phenomenon and "the big four" below).

With these ideas about cultural valuation of sea turtles in mind, I conducted a pilot project, which used several methods:

1. On the spot interviews with residents and tourists spending their valuable time and money in the active and intentional caring and conservatorship of sea turtles during

SSG turtle stranding cases. After completing hundreds of these interviews and questionnaires over the years with residents and visitors during sea turtle strandings and outreach presentations and with those visiting my study site -- not one person could ever explain WHY they love turtles – they (we) just do.

> *We came two times on our vacation to see the turtles- we just had to end our last day with the turtles – Fargo*
>
> *Wow this was so awesome! The turtles are so magnificent! I loved it – California.*

2. Five-hundred-fifteen survey questionnaires were opportunistically completed by residents and tourists spending time at a turtle foraging site on the North Shore of Oahu, where adult reproductive-size turtles come close to shore and on to shore, to feed and rest. Three hundred people came specifically to see the turtles; 377 would return just to see turtles again; 308 were personally affected in a positive way by the turtles.

> *RL: You answered, the turtles here personally affect you; will you explain?*
>
> > *I cannot find right words, but I felt like alive! – Nara, Japan*
> >
> > *The turtles seem to tell me the importance of keeping my own pace in life. This will be a good memory – Tokyo, Japan*
> >
> > *I just like to look at them. I just love them – New York City*
> >
> > *They affect me spiritually, because they are like a gift --- Samoa*

3. Numerical counts and surveys of the types and numbers of sea turtle merchandise available for sale as well as humpback whale merchandise (the marine animal that is Hawai‘i’s number one draw for tourism). The total number of items documented was 1,002. Of those, 72% were turtle items, and 28% were whale items. Thirty-seven of the stores had no whale merchandise; zero stores had no turtle merchandise. Eight of the stores had more whale merchandise than turtles -- of interest are the top two stores in that category. Both were Wyland Galleries, where the employees explained more whale items were sold because Mr. Wylands theme is whales. He paints more whales, and people come to him looking for whales. Also of note is Hawaiian Gifts & Crafts, their employees explained that although they currently had more whale than turtle items, turtles were sold out and sell three to one over whales.

*RL: Why did you choose to sell sea turtle merchandise in your store?*

*Anything with sea turtles sells 20 to 1 over anything else --- ABC store*

*10 to 3, more sea turtle merchandise --- Hawaiian Gift Outlet*

*9 to 1 sell more turtle items -- Natural Hawaiian*

*Turtles outsell everything, even dolphins --- Products of Hawai'i Too*

*No one looking for whales or dolphins, they look for turtles --- Shining Star*

4. Structured interviews were also conducted with store personnel to determine turtle merchandise sales figures vs. whale merchandise sales figures. In total, 42 on the spot interviews were conducted in 42 stores. Thirty-one of those employees reported turtle items sold better than whale items, six reported whale items sold better than turtle items, and five reported that they both sold the same.

*Q: How do sea turtles sell in your store? A: Sea turtles sell tremendously well here. Sea turtle stuff sells very well with locals and tourists. Q: Why do you think: A: I think different people have different reasons. I like turtles because the night before the rough water swim, I saw my first sea turtle, and I took that as a good luck symbol. Q: Do turtles sell more than other sea life? A: Probably. There is a lot of photography with turtles. They are a lot more approachable. We have turtle jewelry, and males and females both tend to wear them. Males wear shark jewelry, but females won't. They both wear turtles. Q: Do you guys stock more turtle stuff? A: We just see a lot of it, so we get a lot of it. The artist brings a lot in to us. Turtles sell the best; then geckos, then dolphins. All the pictures are of the happy turtles without the bumps on them. Q: Who picked the turtle mural on the front door? A: We picked the artist, and he picked the turtle.*

*RL: Do your customers talk to you about their purchase of sea turtle items?*

*Many tourists buy the turtle because they see it all over the place --- Beyond the Reef Marine Store*

*Many tourists see turtles in ocean then go looking to buy --- Crazy Shirts*

*We do not sell that many whale items, but the turtles do really well because you can interact with them --- Elephant Walk*

*Tourists are touched by turtles --- Native Hands Jewelry*

*Most people buy the turtle toys over the whale toys. People seem to be attracted to the grace and essence of turtles --- Toy Chest*

*Customers usually ask for turtles if they snorkeled with them and dolphins if they swam with them --- Sand People.*

5. Photographic documentation and surveys of sea turtles used as icons or symbols on what I call "the big four" produced the following information:

    a. Our bodies -- in the form of sea turtle tattoos -- 143 photographed and interviewed to date.

    *RL: Why did you choose a sea turtle for your tattoo?*

    *Because the sea turtle is my whole families' aumakua --- Honolulu*

    *Because I just love sea turtles --- Turtle Bay*

    *I got it after my son's birth. It's a baby turtle inside a mother turtle --- Native Hawaiian, Laniakea*

    *Everyday I goes surfing and see a turtle, thought it was a good luck charm/guardian. My favorite marine animal; makes me feel safer. When I see one, it says don't worry we will be safe, they are protecting us – Samoa*

    *I just love sea turtles – Native Hawaiian, Kailua Kona*

    *Swam with turtles while on Oahu for school and fell in love with them – California*

    *This guy (~26) got this tattoo when his grandmother died. He said she used to tell him "stories of the ancients" that were about sea turtles. So when she passed, he got the tattoo with the family name in the center and two turtles, one on either side. He chose two because when he surfs, he always sees two turtles, and it makes him think of his grandmother's stories – Native Hawaiian, Waikiki.*

    b. Our automobiles -- in the form of sea turtle emblems placed on the body of the vehicle -- Seventy-five percent of vehicles with emblems on them, have sea turtle emblems.

    *RL: Would you tell us again, about why you have so many sea turtle emblems on your car?*

    *Woman: Oh, because I love the ocean and I love the turtle so I have a gold necklace of 5 turtles and I have stencils on my cars and I have like on my spice rack I have turtles. There's little buckets of turtles, purple with white turtles and I just love turtles I think they're the most beautiful things in the ocean – Native Hawaiian, Hawai'i Kai*

*I think people are "falling in love" with sea turtles in Hawai‘i - everyone (at least on the Big Island) has some sort of turtle decal on their car --- Native Hawaiian, Hilo*

*I don't know why really. I think it was the way it moved through the water and and I thought it was looking at me too with its big eyes, watching me just as I watched it – Waimea*

c. Our homes -- in the form of sea turtle images on the external structure of the houses, out buildings, fence, gate, or mailbox – 262 photographed to date.

*Represents our family: my husband, son, and I, which were both born here. I used turtle emblems at my wedding and use turtle emblems on presents. I had a friend who collected sea turtle emblems. She had passed away, and her ashes were let out over the water, and a honu followed us as we did it. They are precious and rare, they need to be protected --- Kailua*

d. Our businesses -- in the form of logos, physical adornment on buildings and vehicles, and in advertisements. Fifty-nine tourist publications were surveyed for examples of Hawai‘i’s businesses presenting themselves to customers as connected to sea turtles, whales, and dolphins. In total, 179 businesses were found to have advertising on the same day that linked them with our target animals. Seventy-nine used sea turtles. Over one-third of the 179 businesses considered our charismatic animals so important in drawing customers to their business that they used them in their business names, logos, or both. Twenty-four of those used sea turtles. A hundred and ten photos of sea turtle business logos have been photographed to date.

*RL: Why did you choose a sea turtle for the logo for your business?*

*About 4 years ago, sea turtle theme was inspired by foraging ground -- used as room feature. Helped sales and advertisement – Manager Sheraton Waikiki*

*Will advertise sea turtles if it means our customers will be happy – O’ahu Dive Center.*

*CQ: Who decided to make the turtle the logo?*

*Woman: It was me.*

*CQ: How’d you decide that?*

*Woman: Just preferred it... it's not like I collect turtles or anything like that… I just knew that would be the best one because that's what people are drawn to some how – Kailua Store Owner*

What did this pilot project show? These methods provided data that suggest visitors and residents in the State of Hawai‘i place an extremely high "cultural value" on sea turtles that conveys a reverent and irrational love that defies logical explanation – "I don't know why I love turtles, I just do."

This pilot project and the dissertation that resulted from it, which is presented below, have become vital to sea turtle advocates in the state of Hawai‘i. The Hawaiian sub-population of green sea turtles' status under the IUCN Red List of Threatened Species was recently changed to 'Least Concern' (Pilcher et al. 2012). Immediately thereafter, NMFS and USFWS were sued in a lawsuit written by the US Western Pacific Fisheries Management Council, under the name of the Hawai‘i Conservation Alliance, to delist the Hawaiian Green from the ESA, remove protection, and allow for harvest.

In the end, the call about legalizing a cultural/traditional take [hunting and killing] will be a political one, and there is no way that it will not take into account a lot more than "dry" scientific facts and arguments. That is where the even more complex social issues and emotions will play out (Frazier 2011). As my colleague and former teacher, Wallace J. Nichols, stated in an email on this subject, "Both use/consumption of turtles and the efforts to protect them are driven by human emotions … emotions aren't outside the realm of science. Turns out they are absolutely necessary for science to happen at all. – J" (Nichols 2001:1).

***Presenting the Dissertation***

*We detail evidence for saying that the 'faces' on Lapita vessels from thousands of years ago and certain stylized designs on historic and modern carved wooden bowls and platters from this coast are historically linked ways of alluding to sea turtles, creatures figuring prominently in the lore and cosmology of Pacific Islanders.*

*--- John Edward Terrell and Esther M. Schechter 2007:59*

This dissertation presents sea turtle life history in Polynesia as it intertwines with the human populations that interact with it. Through this work, I intend to flesh out the

interesting new approaches being considered by archaeologists and paleoecologists working on Pacific peopling (Allen 2007; Terrell and Schechter 2007, 2009; and others) -- approaches that have built on my early research into the cultural and ecological significance of turtles (Luna 2003; Woodrom Luna 2003).

As a graduate student with an interest in archaeology, I read numerous papers that discussed the ways Pacific archaeologists determine a first settlement site in the Pacific. One of the lines of evidence that convinces them that a site is a first settlement site is the presence of an abundance of turtle bones in the earlier deeper layers followed by later shallower deposits with fewer bones (see for example Rolett 1998; Burley et al. 2001; Kirch and McCoy 2007). With my extensive knowledge of sea turtle rituals from the ethnographic literature, as well as from the literature of sea turtle and other marine biologists, I knew that these abundances could be explained in a lot of other ways – particularly by the tremendous number of turtles served at any one feast.

Additionally, I read many archaeology papers that discussed the initial abundance of turtle bones, followed by later reductions in turtle bones, as the result of initial impact on an easily exploitable nesting population of sea turtles (see Kirch and Yen 1982; Kirch 1988). With my knowledge of sea turtle biology, I knew there were other explanations for this as well – particularly, harvesting at sea turtle foraging sites – and from anthropology, just one royal wedding feast could serve hundreds of turtles. For example, the missionary narrative of John Williams (1938) documents a great chiefly feast at Lefuga, Tonga, which involved the consumption of sacred turtle in such numbers that, "in all parts of the settlement numbers of immense turtle were waiting the day of destruction" (Williams 1938:323-324).

Furthermore, I read many 'explanations' for sea turtle tapus -- not only by archaeologists but also by ethnographers, geographers, biologists, linguists, lawyers, and others. Many of these 'explanations' dealt with the concept of liminality – that sea turtles are different/dangerous/misunderstood because they straddle the line between land and sea/deep ocean and the line between air breathers and water breathers (see for example Rolett 1986).

As a sea turtle biologist, I have participated in necropsies of freshly deceased turtles. Therefore, I know the sea turtle's ability to live on land and in the sea or to breath air is not the most amazing thing about them. What stands out to anyone who has ever seen one killed is their ability to continue to make life-like movements long after they are dead. Even after severing their spinal column, removing their brain and all internal organs; leaving nothing but the shell with flippers and tail attached and a bit of fluids, that sea turtle is still 'swimming' over an hour later when you pick up the carcass to properly dispose of it. Now *THAT* is worthy of a designation of 'liminal.' But air breathers? Living on land and in the sea? No, I do not believe those traits would have seemed the least out of the ordinary - not after seeing what turtles can do after they are dead.

Other explanations for why turtles were tapu suggested: reliance on an easily-depleted natural resource base; life on 'large' islands with more turtle predators; islands with limited shallow marine areas (which would in fact be irrelevant to pelagic sea turtle species); or life on 'high' islands with stratified societies (see for example Allen 2007). Here too, I had knowledge that showed the fallibility of these explanations (the Results section below contradicts each of these explanations). I can only assume that these authors suggested these explanations after looking at extremely small data sets (which Johannes (2002) wisely admitted while calling for further study), and usually without considering knowledge from the other fields (see the discussion section for details).

I do not state these facts to repudiate or disparage the scientists mentioned above: scientists are human too, imperfect, and make mistakes. Also, as my advisor, Les Sponsel once wisely stated in an email to the EAnth ListServe, "They are all to some degree products of the historical, social, cultural, economic, and political context of their lives. We should honor and respect their positive contributions, rather than focus exclusively on their negatives" (Sponsel 2009:1). Arguably, if it were not for the scientists I have named above**,** this dissertation might not even exist.

As a graduate student with a Pacific area focus, I also had required readings that abounded with discussions of Lapita pottery (see Burley 1998; Burley et al. 2001; Clark et al. 2001). A style of dentate stamped pottery, stylistic similarities of which is one of

the lines of evidence archaeologists use to trace the initial settlement pattern of people across the Pacific. One of the stylistic characteristics of decorated Lapita pottery is often called the Lapita face.

Recently, two Pacific archaeologists have argued that the faces, previously considered human, are actually sea turtles; reflecting the fact that sea turtle significance (and tapus) developed before people came into the Pacific (Terrell and Schechter 2007, 2009). Terrell and Schechter contacted me, and together we worked through the similarities between the faces and sea turtles. They still see Rolett's idea of liminality as valid, but their interdisciplinary approach was the best I had ever seen. They included material from the ethnographic literature, yet were lacking the perspectives of a sea turtle biologist, so they contacted me.

In summary, I see a great need for all of these researchers, and therefore for myself as well, to work together in interdisciplinary teams. Therefore, I endeavored to create a dataset that encompassed as much of the oral and written history of sea turtles in the Pacific as possible -- from literally any scientific field of endeavor that I could access. I condensed this material as clearly and concisely as possible to allow for a comparative view across the Pacific (see the methods section for more on this). Though I have gathered this information for all three main geographic regions in the Pacific (Melanesia, Micronesia, and Polynesia), due to time and length restraints, the scope of this dissertation is restricted to Polynesia (see my forthcoming book for a similar treatment for Melanesia and Micronesia). My aim is two-fold:

1) to empower the people of the Pacific in the management of their sea turtle resources through the reintroduction and revitalization of traditional management measures; and

2) to educate those Pacific populations, who are requesting exemptions to existing sea turtle conservation laws to allow for a traditional and cultural harvest, about the specifics of what such a harvest would involve – who, what, when, where and how turtles could be captured, killed, prepared, cooked, distributed, and consumed – when following traditional rules.

Due to the interdisciplinary nature of this document, it is organized in a style familiar to most disciplines. The introduction section presents the importance of this work to the cultures of the communities involved, the importance of the study of food to cultural characterization, and introduces the reader to the Polynesian concept of tapu (holy, sacred, forbidden, taboo). The methods section is more anthropological in nature and provides a description of the path I took in my decade-long search for this information. The Result section begins with an overview of the cultural value of sea turtles in Polynesia as a whole -- because some of the reports I found do the same – then is separated into broad categories by country. Within these broad categories are three subcategories, which delineate the three-field approach applied to this project: Cultural Anthropology, Sea Turtle Biology, and Environmental Science.

Country profiles come next, divided into environmental data, sea turtle population data, and ethnographic data. The environmental data come from the fields of geology, geography, ecology, and the other environmental sciences. Here, I aim to address the claims that sea turtle tapus took place only on islands that were "high" "large" or both with abundant resources. Following the environmental data are data from sea turtle science and conservation. This is included to answer any questions that may come up regarding what species of sea turtles populate the region, and whether they are nesting or foraging populations. (Please see the appendix on sea turtle biology for further details on nesting versus foraging populations). The country profiles end with ethnographically rich accounts of the traditional sea turtle-human relationship. The writing in this section is richer and less technical, as I believe it needs to be.

The discussion section begins with an overview of previous theories regarding the reasoning behind sea turtle consumption tapus. Each theory is presented and then discussed in light of my results.

Finally, the conclusion section presents my own views on the results, and the argument that these traditions began in an ancestral Polynesian society and were brought into the various nations of the Pacific by the people who settled there.

One final note: The document you are about to read overflows with references. As scientists, we know that the way a hypothesis moves along the trail to become a theory,

and then a law, is for other scientists to look at it, to consider it, to test it and if they still believe in it after that, to begin to cite it in their own work. It continues to be cited until it becomes a law, like the earth being round. The references in this dissertation act in the same manner to validate information written previously. For example, when Captain Cook tells us in the 1700s that women could not eat turtle in Hawai‘i, and we see that fact repeated by different authors for over two hundred years, it provides as much support for that being a ‘true’ fact as science can ever give.

# Chapter 1: Introduction

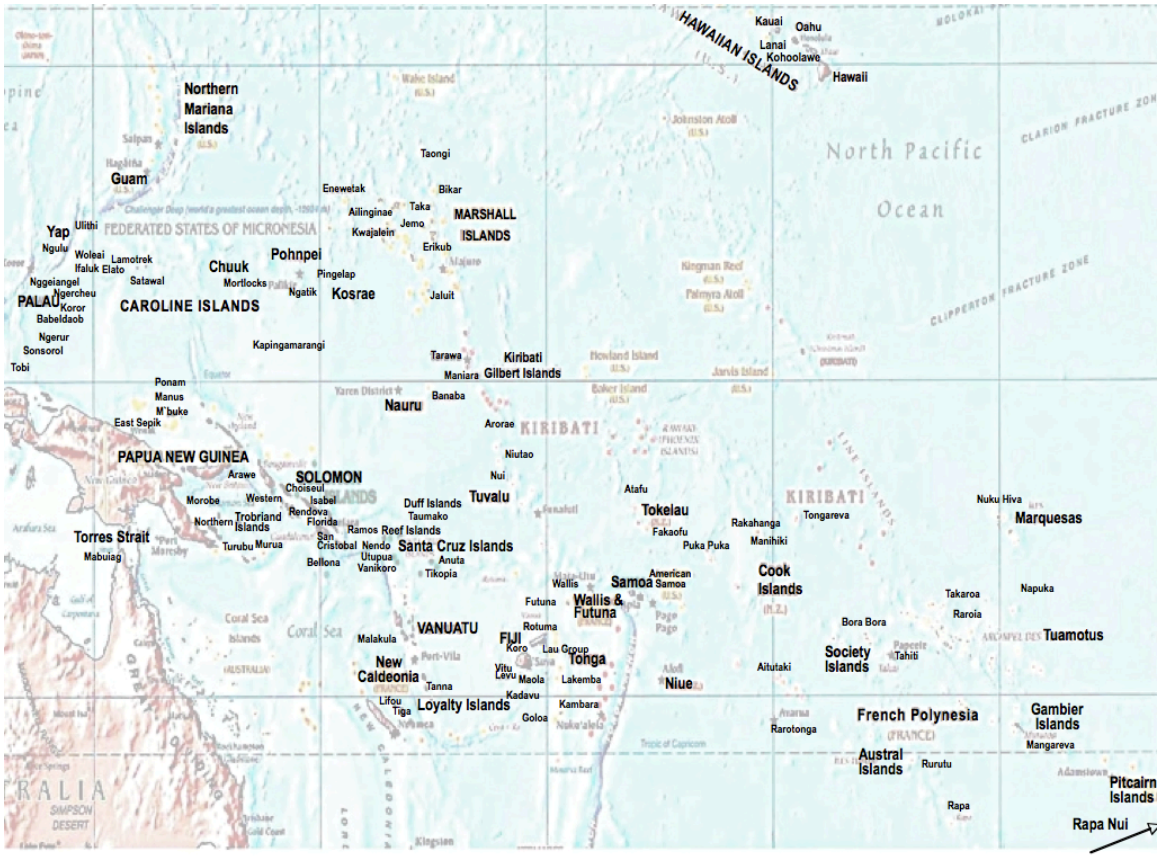


Figure 1: Map of the Pacific and locations mentioned in text.

The study of sea turtles as restricted food sources examines cultural constructions and implications of diet across time, space, society, and culture. Nina Etkin, one of the great medical anthropologists of our time, talked about the importance of the study of food in the depiction of cultural traits, describing foods as speaking to both tradition and continuity and to modernity and change. As fostering identities at the same time they create and enforce boundaries – among social classes, genders, ages, and so on (Etkin 2008). She wrote:

> An integrated bio-cultural perspective comprehends that foods have both tangible (physical) and intangible (meaning-centered, symbolic) realities, and that a particular cuisine is best understood in the specific cultural-environmental-political matrix in which it has developed (Etkin 2008:1).

Revered as sacred animals, desired as prestigious forms of ceremonial food and iconized in Pacific Islands'[3] symbolism, visual art, narratives (legends, stories, folklore), ceremonies, and rituals -- as well as in various cultural restrictions on take and consumption -- sea turtles' cultural valuation in Pacific society is far above that of other marine animals and food sources (Woodrom Rudrud et al. 2007).

> *Sea turtles are everywhere in the creation stories, sacred carvings and rich ceremonial life of the Pacific.*
>
> *--- Davidson 2001*

In the past, these practices often manifested through the development of various food taboos (tapus), or traditional laws, that demonstrated a 'cultural valuation' that elevated sea turtles above other food sources (Luna 2003). The taking or eating of turtle and turtle eggs was forbidden completely or restricted to particular locations, events, clans, castes, age groups, and genders. Turtle consumption was reserved for the highest chiefly class and involved quite elaborate ceremonies and rituals. Tapu rituals were involved with turtle net making, capture, preparation, and eating (Woodrom Luna 2003).

The word "tapu" (tabu, kapu, taboo) had various meanings in traditional Pacific societies. One Tahitian dictionary defines it as "an oath or a certain solemn engagement to perform, or not to perform certain things" (Davies 1851:253). It has also been translated simply as 'forbidden.' E. S. Craighill Handy (1927) defined tapu as a signal that something was "psychically dangerous, hence restricted, forbidden, set apart, to be avoided, because: (a) divine, therefore requiring isolation for its own sake from both the common and the corrupt; (b) corrupt, hence dangerous to the common and the divine, therefore requiring isolation from both for their sakes" (Handy 1927:43). Tapu referred to an entity, whether a person, object, or place, or even an event or condition "that was inviolable to the extent that violations of it were in some way punishable. And in perhaps most cases the inviolability was sanctioned by and its violation punished by some god" (Oliver 2002:52).

[3] For the purposes of this dissertation, the word "Pacific" refers to the geographic regions of Melanesia, Micronesia, and Polynesia.

Tapu most often meant, “sacred or consecrated to a god” (e.g., sacred turtle), as well as “prohibited or forbidden” (e.g., to eat the sacred turtle). Tapu could be applied “to the thing prohibited,” “to the prohibition itself,” and “(when it is in sacred matters), to the person who breaks the prohibition” (e.g., those who ate the sacred turtle) (Mariner 1817:231-233; Dillon 1829:59-61). Hawaiian scholars suggest that there were two broad meanings of tapu (kapu in Hawaiian), which were actually quite distinct from each other -- kapu of the gods (i.e., sacred or consecrated to a god) versus kapu of the ali‘i [Hawaiian elite] (i.e., the right by royal birth to forbid or prohibit) (Levin 1968).

S. Percy Smith (1892), writing about Wallis and Futuna, further elucidated the tapu of the gods:

> This form of interdiction was very common, as with all Polynesians … They go so far as to tapu the day—e.g., to interdict all work in order to please the gods, or to avert the hurricanes. The King has the right to establish a tapu on various objects, and no one dare violate it on pain of the anger of the gods (Smith 1892:40).

The introduction to His Hawaiian Majesty King Kalakaua’s, *The Legends and Stories of Hawai‘i*, enhances our understanding of the tapu of the ali‘i and the gravity of its application:

> Strictly speaking, the ancient tabu, or kapu, was a prerogative adhering exclusively to political and ecclesiastical rank. It was a command either to do or not to do, and the meaning of it was, “Obey or die.” It was common to the Polynesian tribes and was a protection to the lives, property, and dignity of the priesthood and nobility. The religious tabus were well understood by the people, as were also the personal or perpetual tabus of the ruling families … The tabu, or kapu, as it is sometimes written, was strictly a prerogative of the high chiefs and priests of olden Hawai‘i. They were fixed tabus of custom and declared tabus of limited duration by the temporal and spiritual rulers. The penalty of violation of all tabus was death (Kalakaua 1888:32).

Priests were vessels for the gods, spirit mediums through whom the gods could speak, and were sometimes chiefs themselves. Activities related to the gods took place on the sacred ‘marae’ (malae; tu-ahu in Aotearoa), at times with turtle bones hung from the nearby trees (Scarr 2001). Te Rangi Hiroa (1935) discussed the three main types of marae in Polynesia.

> (a) Stone structures…a paved or graveled court usually rectangular in ground plan and a raised platform at one end …The unroofed court accommodated a select congregation, and the raised platform provided a sacred place about which the priests officiated. The thatched buildings that were erected on some courts for the housing of drums, sacred objects, images, and even priests, were accessory to the fundamental stone structure.
>
> (b) Wooden structures … which stood on stone platforms … wooden fences were erected around the house to define a taboo area … The fundamental element of the religious structure was the house in which sacred objects were kept and in which the priest might reside.
>
> (c) No specialized structure … an unpaved social court before the village meetinghouse … consisted merely of a cleared space, a wooden post, an upright stone, or even of as many as five stones set upright by human agency. More often however, the tuahu was represented by a selected outcrop of rock, which the hand of man had no part in providing (Hiroa 1935:49-50).

Some tapus were permanent, while others could be removed by making an appropriate sacrifice to the gods (Dillon 1829). Peter Dillon (1829), writing about Tonga, articulately explained one method of tapu removal.

> If a person touches the body of a dead chief, or any thing personally belonging to him, he becomes taboo, and time alone can relieve him…If any one touches a superior chief or superior relation, or any thing immediately belonging to him, he taboos himself; but this is not supposed to produce any bad consequence, unless he feeds himself with his own hand without first removing this taboo, which is to be done by performing the ceremony of móë-móë directly to be explained … This ceremony consists in touching the soles of any superior chief's feet with the hands, first applying the palm, then the back of each hand, after which the hands must be rinsed in a little water; or, if there is no water near, they may be rubbed with any part of the stem of the plantain or banana tree, the moisture of which will do instead of washing. He may then feed himself without danger of any disease, which would otherwise happen, as they think, from eating with tabooed hands; but if any one thinks he may have already (unknowingly) eaten with tabooed hands, he then sits down before the chief, and taking the foot of the latter, presses the sole of it against his own abdomen, that the food which is in him may do him no injury, and that consequently he may not swell up and die (Dillon 1829:60-61).

Tapu practices regarding sea turtles may have begun or been promoted for any number of reasons, but the result was often the further elevation of sea turtles' significance and value in the culture involved.

Presently, despite national, regional, and international protections as endangered species, sea turtles remain prestigious, desirable, and ceremonially important sources of food for Pacific populations. The relatively new and international science of sea turtle conservation does not counter or diminish traditional valuation and uses of sea turtles (Woodrom Rudrud et al. 2007).

The emergence of sea turtle consumption tapus (restricting the food source to the elite) is arguably one of the most important adaptive shifts in the traditional conservation of sea turtle species in the Pacific, but their origins in time and space are debated. Using archival materials such as ships logs, missionary reports, personal letters, textual evidence from ethnographies, and other published records, this dissertation examines five hypotheses for the origins of sea turtle tapus. I compare the supporting points that each theorist uses to support his or her claims. Based on my examination of these claims and the supporting data being used, I construct an argument for the reason sea turtle tapus emerged where and when they did. This dissertation documents such human-turtle relationships in the cultural area of the Pacific commonly referred to as Polynesia, and considers the question: What are the cross-cultural, ethnographic, and historical understandings of sea turtles and how do they compare to various theories regarding the creation of sea-turtle consumption tapus in the Pacific?

This dissertation is part of a larger project exploring alternative explanations for the widespread restriction and reverence of turtles, not only in Polynesia, but also throughout the Pacific Islands (including Micronesia, Melanesia, and elsewhere). From the larger project of which this dissertation is a part, Table 1 presents a list of 30 island groups with cultural ideologies demonstrating sea turtle reverence. Reverence is defined here as the outward manifestation of a feeling or attitude of deep veneration tinged with awe.

Table 1: Sea Turtle Reverence in the Pacific.

| | Island Groups | |
|---|---|---|
| Austral Islands | Marquesas | Society Islands |
| Chuuk | Marshall Islands | Solomon Islands |
| CNMI | New Caledonia (Loyalty Islands) | Tokelau |
| Cook Islands | Niue | Tonga |
| Fiji | Palau | Torres Strait |
| Gambier islands | Papua New Guinea | Tuamotus |
| Guam | Pitcairn islands | Tuvalu |
| Hawaii | Pohnpei | Vanuatu |
| Kiribati (Gilbert Group) | Rapa Nui | Wallis and Futuna |
| Kosrae | Samoa | Yap |

This dissertation is important to the field of anthropological study because it is cross-cultural, ethnographic, and comparative, is for the benefit of the Pacific Islanders it discusses, demonstrates the importance of culture and tradition to policy-making, and stresses the need for natural scientists to include anthropologists in an interdisciplinary framework when conducting research that involves human use of natural resources.

Three sources of quite different published data are utilized. The first, ethnographic studies and historical accounts, supplies information on the rich social context of turtle consumption as well as the traditional laws and management practices that regulated that consumption.

The second source of data is environmental, which is utilized to give an approximation of what living in Polynesia may have been like at the time these traditional laws were in place. An effort is made not only to outline regional patterns but also to examine if these two types of data can be correlated as previously proposed (Johannes 2002; Allen 2007). For example, do certain types of environments lead to more or less the same consumptive restrictions on sea turtles as food?

A third source of data comes from sea turtle biology and conservation literature, and provides an overview of sea turtle population dynamics within each country. Here information on resident sea turtle species is compiled, along with foraging, mating, nesting, and resting habitat locations.

Finally, this analysis will assist ongoing efforts to conserve and restore Pacific turtle populations and inform those involved in determining the outcome of requests by

Pacific Island nations for a ‘cultural’ or ‘traditional’ take of sea turtles (McCoy 1997; Kinan and Dalzell 2005; Chaloupka and Balazs 2007).

## Chapter 2: Methods

### *Ethnographic Data and Historical Accounts*

> *Sea Turtle stories define cultural rules that have allowed these island societies to live in harmony with the ocean and its living beings.*
>
> *--- Ovetz 2005:15*

To gather ethnographic and historic data on traditional laws and management measures regarding sea turtle consumption, I conducted an extensive literature review over a twelve-year period. As much as possible, primary sources were studied. Since use that was purely consumptive in nature, such as hunting techniques and number of turtles taken has been extensively discussed and analyzed in sea turtle biological and conservation literature, such aspects were not included.

The data acquired from these sources was reported by the various authors using a wide variety of spatial scales – some presenting their data as representing cultural traits for entire regions, some as traits for an island group or nation, some for only one island or atoll, and some for just an individual village or province on a particular island. Therefore, I collated the data to represent the island groups that currently make up the geographic area of Polynesia: the Cook Islands, French Polynesia, the Hawaiian Islands, Niue, the Pitcairn Islands, Rapa Nui, Samoa (American and Western), Tokelau, Tonga, Tuvalu, and Wallis and Futuna.

Due to space and time limitations, I excluded the Maori of Aotearoa (New Zealand), though Polynesian, from specific consideration. It is important to note that the late settlement date of Aotearoa by Polynesians suggests similar cultural traits to the rest of Polynesia, and the cool sea temperatures that far south greatly restrict sea turtle occurrences in these islands.

Each section of ethnographic data begins with a brief mention of the prominent place of sea turtles in the mythology and cosmology of the region. Such stories are significant to an anthropological depiction of Polynesia -- a model for everyday behavior and embodiment of basic values, ideals and aspirations. Additionally, under the surface of accounts of sea turtles as gods and humans, and as relatives of chiefs and rescuers of legendary figures, may be found basic elements of the Polynesian value system -- those

values accepted on faith (Stimson 1957; Terrell and Schechter 2007; Bobis 2008). Writing as editor of John Stimson's (1957) famous treatise on Polynesian literature, "Songs and Tales of the Sea Kings," Donald Marshall gave an eloquent explanation of some of the basic values that are presented through traditional stories:

> … the personification of natural phenomena, the need to nominalize all things of interest, the nearness of the supernatural world, the importance and individuality of women, and the unique value of such disparities as ships, birds, and body oils—as well as aspects of Love. Seemingly contradictory patterns, which startle those of us accustomed to different value-systems, are in fact the dramatic portrayal of essentials to Polynesian character (Marshall 1957:137).

Also important to note is that Polynesians have always been "great travelers and avid collectors of the literature of other lands" (Marshall 1957: xxii). Their voyaging spheres covered thousands of square miles of ocean area, as evidenced by archaeological and geological studies recording tools and materials traded across great distances (see Barry Rolett's extensive work on Taiwan and China as sources for Polynesian adze blades). As such, the fact that a certain story is listed for a particular island group "cannot guarantee the correct placement of its origin in time or space … to one particular island or locality, or to any one period of time" (Marshall 1957:xvi).

***Sea turtle population data***

According to a recent publication by Michael White (2012:22), "The total number of green turtles nesting annually in Oceania is 17,399-37,525 females. Over half of all nesting in Oceania occurs at a single island: Raine Island in the Northern GBR NA [Great Barrier Reef]." To see what White's figures might mean for the total number of green nesters in the rest of Oceania (excluding Australia where half the nesters are), the Exclusive Economic Zones (EEZs) of the nations addressed in this dissertation were summed (Table 1). Dividing that sum (~32,484,006) by each nation's individual EEZ results in the percentage of the sea area of the region that belongs to each nation. Multiplying a given nation's percent of sea area by half the total number of green turtles from White's report (8699.5-18,762.5) presents a rough estimate of the possible number of female green turtles of reproductive age nesting within these nations. For example, the number of nesters based on Hawai‘i's sea area is 578 (Table 2). In the NMFS report,

*Annual Trend for 37 seasons of green turtle's nesting at East Island French Frigate*, the 2009 figure is just under 600 (Tiwari et al. 2010). From the closeness of these two figures (578 and just under 600), we can see validity in White's number.

Table 2: Estimates of total number of reproductive female green sea turtles in Oceania.

| **Country (Reference for Sea Area of Country)** | **Approximate Sea Area (sq km) of the Country** | **Percent of Total Sea Area of the Region** | **Number of Nesters at high extreme** | **Number of Nesters at low extreme** |
|---|---|---|---|---|
| American Samoa (PIOOS 2011) | 390,000 | 1.20% | 225 | 104 |
| CNMI (PIOOS 2011) | 758,121 | 2.33% | 438 | 203 |
| Cook Islands (SPREP 2012) | 1,800,000 | 5.54% | 1,040 | 482 |
| Federated States of Micronesia (PIOOS 2011) | 2,978,000 | 9.17% | 1,720 | 798 |
| Fiji Islands (SPREP 2012) | 1,260,000 | 3.88% | 728 | 337 |
| French Polynesia (SPREP 2012) | 2,980,000 | 9.17% | 1,721 | 798 |
| Guam including Cocos (SPREP 2012) | 218,000 | 0.67% | 126 | 58 |
| Hawai‘i (Holcomb and Robinson 2004) | 1,000,000 | 3.08% | 578 | 268 |
| Kiribati (SPREP 2012) | 3,600,000 | 11.08% | 2,079 | 964 |
| Marshall Islands (PIOOS 2011) | 2,131,000 | 6.56% | 1,231 | 571 |
| Nauru (SPREP 2012) | 320,000 | 0.99% | 185 | 86 |
| New Caledonia (SPREP 2012) | 1,740,000 | 5.36% | 1,005 | 466 |
| Niue (SPREP 2012) | 390,000 | 1.20% | 225 | 104 |
| Palau (PIOOS 2011) | 629,000 | 1.94% | 363 | 168 |
| Papua New Guinea (SPREP 2012) | 3,100,000 | 9.54% | 1,791 | 830 |
| Pitcairn islands (SPREP 2012) | 800,000 | 2.46% | 462 | 214 |
| Rapa Nui including Salas Rolett Gomez (Leonard 2006) | 1,934,433 | 5.96% | 1,117 | 518 |
| Samoa (SPREP 2012) | 120,000 | 0.37% | 69 | 32 |
| Solomon Islands (SPREP 2012) | 1,600,000 | 4.93% | 924 | 428 |
| Tokelau (SPREP 2012) | 290,000 | 0.89% | 168 | 78 |
| Tonga (SPREP 2012) | 700,000 | 2.15% | 404 | 187 |
| Tuvalu (SPREP 2012) | 757,000 | 2.33% | 437 | 203 |
| US: Wake, Johnston, Howland & Baker, Palmyra, Jarvis (PIOOS 2011) | 2,066,007 | 6.36% | 1,193 | 553 |
| Vanuatu (SPREP 2012) | 680,000 | 2.09% | 393 | 182 |
| Wallis and Futuna (Bell et al. 2011) | 242,445 | 0.75% | 140 | 65 |
| Totals | 32,484,006 | 100% | 18,763 | 8,700 |

Sea turtle biology, management and conservation literature continue to document the presence of sea turtles within each of these nations. In order to consider the types of sea turtle resources available to the island populations discussed in this dissertation, I conducted an extensive review of this literature to document the species present in each country, along with foraging, mating, nesting, and resting habitat locations. As much as possible, primary sources were studied. These reports were collated to bring together the separate pieces of information for each nation and to allow for comparative detail.

***Environmental Data***

To collect the necessary data to provide a picture of the environments, where the creators and maintainers of these traditional laws were living, I conducted an extensive literature review. I began with the United Nations Environment Programme (UNEP) database of islands and small-island states (UNEP 1998-2006). The database gives information on: island type (atoll, high volcanic, low coral, and so forth), maximum elevation, land area, and types of ecosystems present, as well as special indicators, such as:

- Isolation Index (the sum of the square roots of the distances to: the nearest equivalent or larger island, group or archipelago, and continent);
- Natural Catastrophic Threat Indicator (hurricanes, volcanic eruptions, earthquakes, droughts, fires, etc.);
- Number of Ecosystems (terrestrial and marine); and
- Species Richness (terrestrial and marine).

This information was input into a data matrix with each row representing a different location, and each column representing a different type of information.

Because the island data in the UNEP database were sometimes incomplete, I supplemented this information by conducting a thorough review of all documents in the *Pacific Environment Information Network (PEIN) Country Profiles Directory* on the webpage of the Secretariat of the Pacific Regional Environmental Programme (SPREP) (PEIN 2010). Information obtained from the SPREP review included land area, sea area, highest elevation, types of ecosystems present, number, and types of documented species,

biodiversity, and exposure to natural disasters. In addition, the *Environmental Vulnerability Index - Country Profiles* (EVI) contained several special indices that were also added to the data matrix (EVI 2010). These indicators include:

- Lowlands (percent of land area less than or equal to ten meters (m) or less above sea level)
- Land Area (the richness of habitat types and diversity, availability of refuges if damage is sustained or for protection, and species and habitat redundancy)
- Relief (highest point subtracted from lowest point)
- High Winds (likelihood of damage from frequent and severe wind)
- Dry periods (vulnerability to drought, dry spells, stress on surface water resources)
- Wet Periods (vulnerability to floods, cyclones, wet periods, stress on land surfaces and ecosystems subject to flooding and disturbance)
- Hot Periods (vulnerability to heat waves, desertification, water resources, temperature stress, bleaching)
- Cold Periods (vulnerability to cold snaps, unusual frosts, effects on water resources, temperature stress, pollution attenuation rates, affect on reproductive success)
- Sea Temperatures (fluctuations in productivity, fisheries, currents, eddies, ENSO, cyclones and storms, blooms and coral bleaching)
- Volcanoes (eruptions, landslides, geysers, gas, fires, ash, dust, marine kills, biodiversity of habitat and species, potential for repeated and long term habitat disturbance)
- Earthquakes (habitat disturbance through movements of land, water and slides)
- Tsunamis (loss of shorelines, coastal ecosystems and resources, and loss of species due to catastrophic run up of seawater onto coastal lands)
- Slides (habitat disturbance and persistence of ecosystems and species from catastrophic shifts in the land surface)

All this additional information was added to the data matrix. Furthermore, information from both sets of environmental data (UNEP and SPREP) were extrapolated

to determine the value for any missing special indicators as follows: types of Ecosystems Present were used to determine the number of Terrestrial and Marine Habitats; Number and Types of Documented Species were used to determine a number for Described Terrestrial and Marine Species as well as Species Richness; and the EVI special indices relating to vulnerability from disasters (Land Area, High Winds, Dry Periods, Wet Periods, Hot Periods, Cold Periods, Sea Temperatures, Volcanoes, Earthquakes, Tsunamis, Slides) were combined into one column under Total Vulnerability.

## Chapter 3: Results

*In the Pacific, the turtle is a key figure in many traditions and cultures: it symbolises longevity, stamina, tranquility, and strength.*

--- Bell 2006:17

### *Polynesia*

*All the world knows that the turtle is royal food in Polynesia.*

--- Audran 1918a:27

Throughout Polynesia, a very strict tapu surrounded consumption of sea turtles. Restricted as embodiments of gods, turtles could not be eaten -- even by the king who owned them (as the gods' representative) -- until the tapu was lifted by an offering of the consecrated turtle to the gods (Hedley 1896; Hedley 1896-1900; Audran 1918a; St. Johnston 1921; Handy 1927; Stimson 1957; McConnaughey 1957; Craig 1989; Oliver 2002; Resture 2008a; Frazier undated).

As food, turtles were sacred, taboo to women, consumed only by elites who were themselves considered sacred; and as prey to the turtle fishers who kept their sexual organs as trophies, turtles were accorded prestige "equal to that of warrior heroes" (Marshall 1957:32; McConnaughey 1957; Stimson 1957). Common features of Polynesian legends include turtles as sons and daughters of gods, as humans who can change back again at will, as possessors of wisdom and magical powers, and as great warriors and ancestors of royal blood lines (Stimson 1957; Craig 1989).

That statements such as those above can be true across such a broad and diverse region of our planet is substantiated by a recent study on initial human settlement into the region (Wilmshurst et al. 2011). This study used many lines of evidence to show that Polynesian archipelagos, including New Zealand, Hawai‘i, and Rapa Nui, were the last habitable places on earth colonized by prehistoric humans. The results demonstrate Polynesia was settled from the West in two phases of immigration. The first took place between ~ 987 - 891 years ago and involved settlement from Tonga, Samoa and the Southern Cooks into the Society Islands and the Gambiers. The second took place between ~812 - 722 years ago and involved settlement into all the rest of Polynesia, including Hawai‘i. Therefore, the first settlers arrived in Hawai‘i 700-800 years ago,

making a brief stop along the way in the Southern Cooks and Societies for only ~75 years -- not enough time for significant culture change to take place. Wilmshurt et al. concluded:

> Our empirically based and dramatically shortened chronology for the colonization of East Polynesia ... offers a robust explanation for the remarkable uniformity of East Polynesian culture, human biology, and language (Wilmshurst at al. 2011:1816).

Throughout the years, writers, including shipwreck survivors, blackbirders, beachcombers, early explorers, missionaries, colonists, historians, ethnographers, and most important, the islanders themselves, continued to document the restricted status and high "cultural value" of sea turtles. Detailing specific laws for the island groups that make up the region, these reports are presented below, along with general information regarding the geology and environment of these groups, and the sea turtle species and activities that have been reported within them. Together, these reports document human-turtle relationships in the cultural area of the Pacific commonly referred to as Polynesia and answer the first half of my question: What are the cross-cultural, ethnographic and historical understandings of sea turtles?

*Cook Islands*

Figure 2: A Rarotongan chief with turtle tattoos on his knees, placed there upon the death of his 9th child. Source: Williams 1838:463.

## Environmental Data

The Cook Islands consist of low coral atolls in the north and volcanic hilly islands in the south. Six of the islands have a surface area less than 100 square kilometers ($km^2$) and nine less than ten $km^2$. The country covers approximately 252 $km^2$ of land and a sea

area of about 1,830,000 $km^2$. The highest point, which lies on the volcanic island of Rarotonga, is 652 meters (m) above sea level (UNEP 1998-2006). The climate is tropical with an average temperature of 26 degrees Celsius (°C) and average rainfall of 2,076 millimeters (mm) per year (UNEP 1998-2006, MRCI undated). Sources of freshwater include springs and streams, rainwater and well water, freshwater marshes and swamps (Rarotonga, Mangaia, Atiu, Mitiaro and Mauke), permanent freshwater lakes (Mangaia, Atiu, Mitiaro), and mountain streams on Rarotonga (SOPAC 2008; UNEP-WCMC undated).

The terrestrial ecosystems include montane forest, montane-slope forest, *Fagraea-Fitchia* ridge forest, *Metrosideros* cloud forest, lowland limestone rainforest on several of the high islands, atoll forest and beach forest on atolls and reef islets. The non-forests include coconuts and scrub on coral islets, scrub and grassland formations, *Dicranopteria* fernlands, and limestone caves. All the Cook Islands have extensive coral formations, generally as fringing (e.g., Rarotonga) and lagoon reef (UNEP-WCMC undated). Marine ecosystems include windward and leeward atoll reef, closed and open lagoons (the largest at 233 $km^2$), reef flat, sub-surface platform reef (Tema between Pukapuka and Nassau), shallow platform reef (Winslow 150 km NE of Rarotonga), patch reef, fringing reef, barrier reef, outer reef slope, lagoon on Aitutaki, and tidal salt marsh on Rarotonga. Flying Venus Reef is separated from Tongareva by a deep >500 m deep channel (Spalding et al. 2001 cited in White 2011; UNEP 1998-2006; MRCI undated; CIBD 2007).

## Sea Turtle Population Data

Four species of sea turtles have been reported in the Cook Islands: green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), leatherback (*Dermochelys coriacea*), and loggerhead (*Caretta caretta*). The presence of greens and hawksbills throughout the year, the fact that most hawksbills encountered have been juveniles, as well as the prevalence of commercial fishing interactions with leatherbacks, suggest a resident foraging-ground for these three species. Researchers and community members have documented nesting by greens on Aututaki, Manuae (Hervey), and Rarotonga Atolls; Cooks islet on Palmerston; Moananui islet on Tongareva Atoll (Penrhyn); and on

Mangaia, Nassau, Suwarrow, Takutea, and Turtle Islands. Nesting by both greens and hawksbills has been reported on Manihiki (Minihiki, Tauhunu, Tukao), Mauke, Palmerston (where most green nesting occurs), Pukapuka (Motu Ko, Motu Kotawa and Motu Wale), and Rakaanga (Rakahange, Rakahanga) Atolls, Mangarongaro islet and others on Tongareva Atoll; and on Atiu, Nassau Islands. Nesting has been reported, but species not identified, for Matunga, Painko, Patanga, Ruahara, Temata, Tepuka, Tokerau, and Atiati islets on Tongareva. Greens have been reported as present in the Ngaputoru Islands; greens and hawksbills on Atiu and Mauke (Parry). Hawksbills' presence has been documented on Nassau Island, Rarotonga, and Suwarrow Atolls (Suvorov, Suvarov), and loggerheads have been reported at Palmerston (White 2012 and references therein, 2011, 2011c; Trevor 2009; CIBD 2007; UNEP 1998-2006 and references therein; MRCI undated; Pulea 1997; Groombridge and Luxmoore 1989 and references therein; Balazs 1982c).

## Ethnographic Data

In the Cook Islands, sea turtles feature in the creation story of Rarotonga, were family gods on Rakahange, rescuers of mythical figures (Hina) on Aitutaki and Puka Puka, objects of religious ceremony on Tongareva, and belonged to a god on Rarotonga (Williams 1837, 1838; Hedley 1892; Smith S.P 1898a, 1898, 1899; Williamson 1933; Hiroa 1932a, 1932b; Rolett 1986). The most sacred fish and emblem of "supremacy in religious affairs," "royalty alone partakes of his flesh" (Williams 1838:196; Gill 1885:221). "… To this day no ordinary native dares eat turtle. To be an eater of turtle is to be a big chief" (Gill 1885:221). Interestingly, R. G. Hedley (1896) and S. Percy Smith (1889) cite Gill (1885), who reported turtles as tapu to all but the elite; however, Hedley and Smith stated the prohibition was against women rather than against all commoners.

Reports of traditional regulation of sea turtle consumption in the Cook Islands change through time. Early reports discussed turtles as sacred offerings to the gods, consumed only by the male king, high or head chief. Unauthorized consumption was a sin against the gods. Illness and death was the result (Williams 1837, 1838; Hedley 1892; Smith S.P 1898a, 1898, 1899; Hutchin pers. com. in Mackenzie 1931; Williamson 1933; Hiroa 1932a, 1932b; Rolett1986; Resture 2008c).

Additional early sources writing about Aitutaki, Rakaanga, and Tongareva atolls, as well as the island of Rarotonga, supported consumption by only the king or head chief. Priests were additionally able to eat turtle on Tongareva, Rakaanga, and Rarotonga (Williams 1837; Lamont 1867; Gill 1885; Pakoti 1895; Hedley 1896, 1896-1900; Smith S.P 1889, 1898a, 1898b, 1899, 1903, 1904; Large 1903; Ariki-tara-are 1919; Hiroa 1927, 1932a, 1932b; Goldman 1970; Rolett 1986; Davidson 2001). Writing specifically about Tongareva, Hiroa (1932b) stated, "lesser male chiefs would be offered shares of the turtle meat, but never the women" (Hiroa 1932b:91).

At Pukapuka Atoll, later reports indicated consumption by all people, but only through special ceremony (Beaglehole and Beaglehole 1938; Kirch 1994). Consumption by high-ranking males continues to be recorded through to contemporary times (Crocombe 1961).

*French Polynesia*

Environmental Data

French Polynesia includes five archipelagos (4 volcanic, 1 coral). The Islands vary in size with surface areas ranging from between 1,000 and 10,000 $km^2$ (one), to less than 1,000 $km^2$ (five), less than 100 (21), less than ten (12) and less than one $km^2$ (one). The country covers approximately 3,932 $km^2$ of land and a sea area of 5,030,000 $km^2$. The highest point, which lies on the island of Tahiti, is 2,241 m above sea level. The climate is tropical with an average temperature of twenty-six °C and average rainfall of 2,813 mm per year (UNEP 1998-2006). Rain is the only source of freshwater (UNEP-WCMC undated).

Interior rainforests characterize the higher islands, while the atolls have ground covers, such as *Sesuvium* and salt-hardy trees like coconut palms. Terrestrial ecosystems in French Polynesia include lowland and montane rainforest, cloud forest with tree ferns and epiphytes, limestone forest, forest remnants in ravines, and casuarina. Non-forest ecosystems include grassland, fernland on upper slopes, and coconuts on reef islets in the Austral Islands. Atoll forest and scrub and reed grassland cover most areas in the Gambier Islands. Terrestrial ecosystems in the Marquesas include montane rainforest,

rainforest and cloud forest above 1000 m, tree ferns, intermediate rainforest on plateaus, *Pisonia* forest, grasslands and dwarf scrub. Tropical and subtropical moist broadleaf forests, which occur in three general forms (lowland rainforest, montane rainforest, and cloud forest), dominate the Society Islands. Additional ecosystems include bamboo forest, swamp forest, atoll scrub, grassland and fernland on upper slopes, and freshwater habitats including streams, rivers and lakes (UNEP 1998-2006, Fosberg 1992 cited in WWF 2001). In the Tuamotus, mixed broadleaf forests are the dominant vegetation throughout the region. Less dominant habitats in the Tuamotus include atoll forest and scrub, limestone forest, dry scrub, remnant beach scrub and a narrow swamp inside the lagoon shore on Niau (WWF 2001).

The Austral, Gambier, and Marquesas island groups contain very few corals, have fringing reef in some bays, relatively poor barrier reef, and lagoons with poor lagoon fauna -- though the Gambiers have a lagoon with rich coral fauna on pinnacles, and there is a coralline algal bank on Motu One in the Marquesas (WWF 2001). Much of the rest of French Polynesia contains barrier reef and lagoons with rich coral fauna. Windward and leeward atoll reef, fringing reef, patch reef, and closed and open lagoons characterize the Society Islands' marine environment, which also contains barrier reef and coral communities on submarine slopes. The Tuamotus feature windward and leeward atoll reef, fringing reef, patch reef with relatively rich coral fauna, closed lagoons with low coral diversity, but high abundance of *Porites mordax* and *Acropora Formosa,* and high density of *Tridacna maxima*, open lagoons, and large seagrass beds.

## Sea Turtle Population Data

The most abundant species of sea turtles in French Polynesia are greens and hawksbills. Juvenile green turtles are seen frequently at many atolls throughout the year, suggesting a resident foraging-ground for this species. Olive ridley foraging has been reported for French Polynesia. Green turtles nest at several sites in the Marquesas. The sand island of Motu One has been specifically identified as a green turtle nesting area. In the Society Islands, green turtle nesting occurs on Bellinghausen (Motu One, Papa-iti, Temiromiro), Bora Bora, Manuae (Scilly, Fenuaura, Fanua Ura), Mopelia (Maupihaa, Mopihaa, Maupihoa, Mapetia, Howe), Maupiti, Rangiroa, Tahiti (Cyterre, Kahiki,

Otahiti, Sagittaria), Tetiaroa, and Tupai (Motu Iti, Motouiti, Tubai, Blake, Franklin) Atolls. Nesting on the most important nest site, Manuae is concentrated on Motu Papai (Rahi), Motu Otue Oia, and Motu Honu islets. There is also green nesting on most atolls in the northern Tuamotu Group (including Manihi, Tikehau and Pukapuka). Hawksbills nest in the Tuamotus as well, though no specifics are available. Several other areas in the region are known for turtle nesting, though reports do not indicate the species. These include: Apaataki (Apataki, Hagenmeister) in the Pallisier Islands, Kauehi (Kawehi, Vincennes) in the Centre West Group, Napuka (Whytoohee) in the Iles du Desappointement, and Paraoa (Pararo, Gloucester) in the Centre East Group (White 2012 and references therein; Mason et al. 2010 and references therein; Trevor 2009; Craig et al. 2004; UNEP 1998-2006 and references therein; Groombridge and Luxmoore 1989 and references therein).

## Ethnographic Data

Jacques Fretey and others (Tatarata and Fretey 1995; Dupre`and Fretey 2000; Fretey 2006; Anon 2010) have written extensively on the cultural importance of the sea turtle in French Polynesia. As in the Cook Islands, a sea turtle features in the creation story -- a turtle carrying a white cross guided the first people to the islands. The turtle was the link between the living and the dead, the mediator between heaven and earth, and a gift from deceased ancestors. It was forbidden to kill a sea turtle, except when performing certain rituals on the marae aimed at reconciling man with nature and the gods. The turtle was sacred, “since the beginning of time until the present day” (Tatarate and Fretey 1995:1). Consumed only by male elites -- chiefs and priests – after appropriate ceremony and offerings to the gods, the sacred turtle was accorded rituals for its capture, death and consumption. The head of the turtle was given to the priest. The penalty for not following these strict rules was death (Emory 1947, 1971; Stimson 1957; McConnaughey 1957; Conte 1988; Balazs et al. 1995; Tatarate and Fretey 1995; Dupre`and Fretey 2000).

The archaeological record provides support for the high cultural status of turtles, recording turtle images carved into marae, house platforms of the elite, and other ceremonial centers (Henry 1928; Emory 1933 cited in Davidson 2001; Emory 1947, 1971; Rolett 1986; Tatarata and Fretey 1995; Balazs et al. 1995; Dupre`and Fretey 2000;

Scar 2001; von Schmidt 2001; Handy undated). As could be expected in such a large region, slight differences in traditional law within the country have been reported.

The Austral Islands

On Rurutu (Ohetetoa) in the Austral Islands, turtles were sacred and eaten only by the king on 'the sacred spot.' Others risked being instantly destroyed by the gods of their ancestors or devoured by 'the Evil Spirit' (Ellis 1831, 1832, 1959; Mortimer 1838; Montgomery 1841; Wood 1870; Hutton 1874).

The Gambier Islands

On Mangareva, in the Gambier Islands, sea turtles were rescuers of mythical figures (Hina) and necessary offerings for the most important of the priests' ritual activities. T. R. Hiroa (1934) discussed the turtle as property of the high priest. Subsequently, Hiroa (1938) again reported on the turtle tapu, recognizing them as the fish of the king, eaten at royal feasts, after ritualistic capture by the king's own fishermen, and "counted singly like men and houses, because they were very important" (Hiroa 1938:417; Kirch 1994:283).

The Marquesas

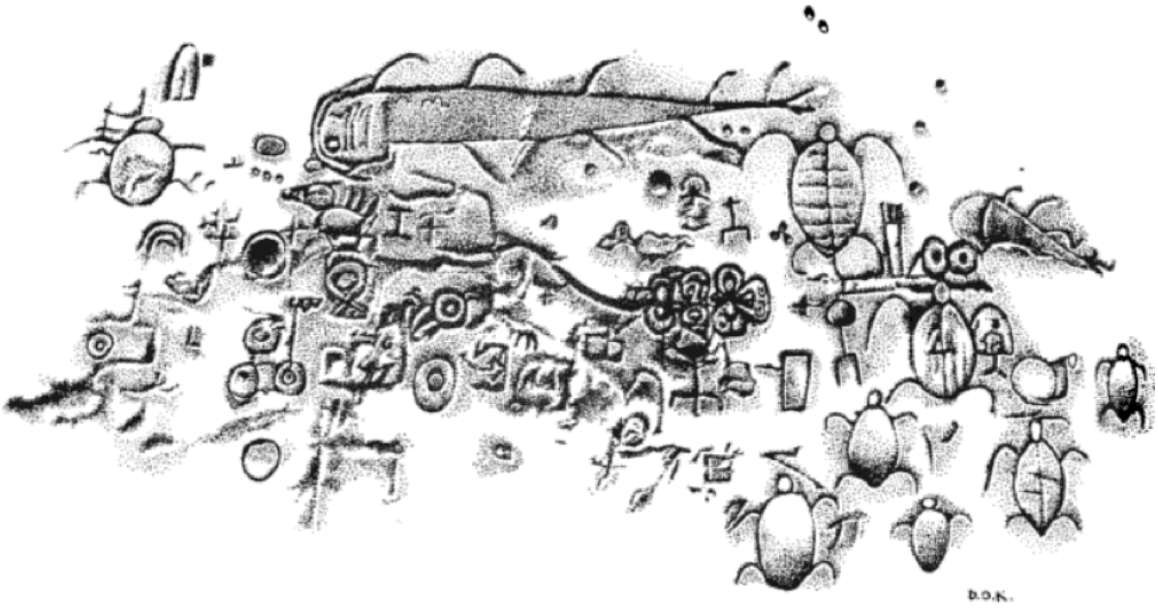

Figure 3: Sea turtle petroglyphs from the Marquesas. Source: Rolett 1986:80.

The sea turtle features in the Marquesan "Chant of the Deluge" -- the Marquesan creation story of the world (Fornander and Stokes 1878, 1880, 1885; Spence 1932; Beckwith 1940). Seldom eaten, turtles were used in rituals to ask for victory in war, vengeance against an enemy, and to aid passage from earth to the afterworld (Handy 1930; Rolett 1986; Terrell and Schechter; Frazier Undated). As sacred sacrifices for the gods, turtles were eaten only by chiefs and priests during special feasts on the marae. Turtles could be caught for the gods only after the king performed a special ceremony, and after the special turtle-fishers were forbidden to go around women. The implements used to prepare foods to be eaten with the turtle could be used for no other purpose. The penalty for disobeying these laws was the supernatural eruption of deep ulcers (Wilson 1799; Porter 1822, Jardin 1862, Crook undated, and Dening 1974 all cited in Rolett 1986; Pua Mau`u pers. com. in Handy 1923; Williamson 1924; Handy 1927; Hanson 1982; Kirch 1994; Frazier Undated).

As an appropriate sacrifice to the gods, the sacred turtle could be used in place of a human sacrifice, which was sometimes needed as a gift to the victor to end a war (Jardin 1862 cited in Rolett 1986; Fornander and Stokes 1878, 1880, 1885; Handy 1923, 1927; Spence 1932; Rolett 1986 cited in Frazier undated).

The Society Islands

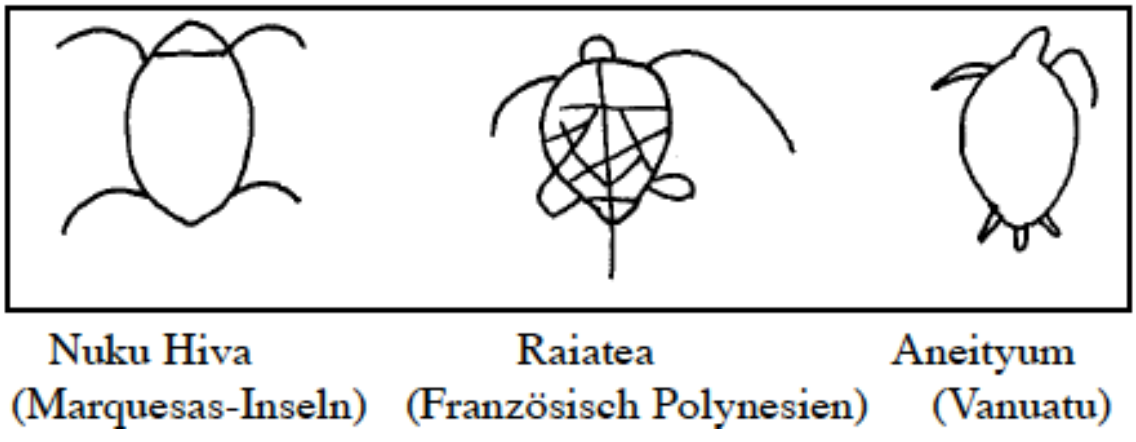


Figure 4: Comparison of Raiatean turtle petroglyph motifs with those of the Marquesas and Vanuatu by von Schmidt 2001. The similarities suggested to von Schmidt that turtles had importance across Oceania. Source: von Schmidt 2001:15-16.

In the Society Islands, a sea turtle features in the creation story of Bora Bora as the mother of the island (Emory 1933 cited in Davidson 2001). The turtle was closely connected to the gods and belonged to the great king or high chief. Consumption was restricted to these high-ranking males and priests during special ceremonies on the marae (Banks 1768-1771; Cook 1768-1771; Cook and King 1784a, 1784b; Williams 1837, 1838; Mortimer 1838; Banks 1896; Handy 1927; Oliver 1974; Rolett 1986; Balazs et al. 1995; Turnbull 2004). Reports from the islands of Tahiti and Rai‘atea, where turtles were believed born of human parents, substantiate the turtle's sacred nature; its use as offerings to the gods, and its consumption only by the king once the offering was complete. The penalty for failing to obey these laws was supernatural punishment. Several reports stated that the sea turtle was a form of the gods of the ocean (Hawkesworth 1773; Ellis 1831, 1833a, 1833b, 1859, 1890; Williams 1838; Montgomery 1841, 1907; Smith S.T. 1841; Russell 1852; Wood 1870; St. Johnston 1921; Handy 1927; Henry 1928; Emory 1947, 1971; Ferdon 1981; Rolett 1986 and references therein; Davidson 2001). Associated with burial rites, the heads and bones of turtles were hung from the trees above gravesites (Hawkesworth 1775). In the Societies, as in the Marquesas, the turtle was used along with humans for sacrificial purposes. Ben Finney (2003) discussed the use of the sacrifice of the turtle at Raiatea to lift the tapu on voyaging canoes.

### The Tuamotu Archipelago

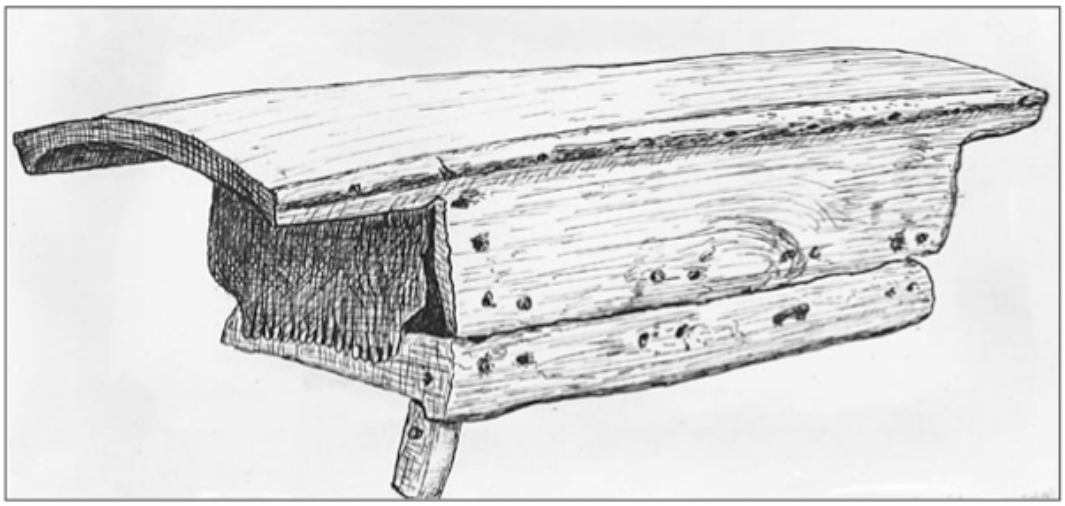

Figure 5: Drawing of Tuamotuan god house (fare atua) with sea turtle shell ‘door.’ Source: Kaeppler 2007:1009.

*The tern twitters, the gray-black tern from Hiti.*
*From the god Tamarua of Hiti,*
*Shadow of the god; carry off [the food]!*
*Here comes the flesh of the turtle,*
*For you gods,*
*Partake…*

*--- Emory 1947:76*

A sea turtle features in the Tuamotuan creation story as Ru-honu, a form of the great god Ru, and in the stories and adventures of the god Hiro -- in the death of his son and as a rescuer of the legendary figure Hina. In a legend from the atoll of Anaa, the Belt of Orion and the star Pleides were the parents of a turtle and responsible for the sacred nature of all turtles. Connected to the spirit world, turtles at Napuka Atoll were brought to land by ancestral spirits and protected by the singing of songs that express grief, lest the spirit allow them to escape. Purified by the supreme god Kio, sacred turtles were royal food, reserved for the male chiefs, and tapu to women (Audran 1918a; O'Brien 1922; Emory 1940, 1947; Stimson 1957; Stimson and Marshall 1964; Hanson 1982; Balazs 1983; Craig 1989).

*Of all the food, none-except perhaps human flesh-was held in higher esteem than the turtle.*

*--- Emory 1975:40*

Sacred, ritually consecrated with the sacred stone from the god-house and killed by high priests of royal blood, turtles were ceremonially cooked on the marae in special ovens, portioned into 32 traditionally recognized parts, and eaten after appropriate offerings to the gods. The head of the turtle, believed to hold the mana (and evidence of life after death), as well as the neck, heart and flipper, were given to the high chief or high priest. The turtle was then divided between the sanctified males (Montiton 1874 cited in Emory 1947; Audran 1918a, 1918c, 1919a, 1919b; Hiroa 1938; Emory 1940, 1947, 1975; Danielsson 1954, 1955; Stemson 1964 cited in Craig 1989; Montiton 1874 cited in Rolett 1986; Kirch 1994; Davidson 2001; Craig 2004; Kaeppler 2007; Frazier undated). Montiton reported that when turtle was "*abundant* . . . boys as young as nine or ten years . . . were *sometimes* allowed . . . to share in the *scraps*" (Montiton 1874:370

cited in Emory 1947:87; Montiton 1874: 378-379 cited in Rolett 1986:85 emphasis added).

*Hawaiian Islands*

Figure 6: Sea turtle petroglyph, Lanai Island. Source: Crinella 2007:1.

Environmental Data

The Hawaiian Islands are volcanic in origin. Several of the islands in the northwestern portion of the chain have eroded to form atolls: French Frigate Shoals, Maro Reef, Laysan, Lisianski, Pearl and Hermes Reef, Midway, and Kure (Ziegler 2002) The Hawaiian archipelago covers 16,688 $km^2$ of land and a sea area of 1,629,545 $km^2$. The highest point, which lies on the island of Hawai‘i, is approximately 4,169 m above sea level. The climate is tropical with an average temperature of twenty-six °C and average rainfall of 2,076 mm per year (UNEP 1998-2006; TGOH 2009). The islands have large tracts of fertile alluvial and colluvial soils. Ample freshwater is supplied by precipitation in the form of orographic rain, which stores as dike-confined ground water in lakes and perched water in numerous permanent streams and wells (Kirch 1985; Ziegler 2002).

Terrestrial ecosystems include dryland forest, open forest, mixed mesophytic forest (woodland or scrub), pen *Acacia* forests, lowland rainforest, montane rainforest, upper montane rain or cloud forest and subalpine forest. Non-forest ecosystems include

lowland savannah and dry grassland, scrub, mountain parkland and mountain savannah, sparse alpine scrub, windward and leeward beach dune and rock-substrates, cliffs, low- and mid-elevation bogs, montane bogs, lava tubes, coastal brackish and marine ponds (Stone and Scott 1985).

All of the Hawaiian Islands have rich marine ecosystems with abundant coral reefs and high biodiversity. A great variety of reef flats, atolls, fringing and emergent reefs, fossil and coral-algal reefs, calcareous and barrier reefs can be found on the islands. Lagoons are also present (Kirch 1985; Stone and Scott 1985; Ziegler 2002).

## Sea Turtle Population Data

Five species of sea turtles are found in Hawaiian waters. They are, in estimated order of abundance, the green, hawksbill, leatherback, loggerhead, and olive ridley (*Lepidochelys olivacia*) (NMFS 1998). Foraging sites of green turtles have been identified at many locations within the Main Hawaiian Islands (MHI). These include: Aki's Cove, Haleiwa Beach Park (juveniles, subadult, adults), Hanauma Bay Nature Preserve, Here to Eternity Beach, Kaneohe bay, Kawainui Canal, Laniakea Point (juveniles, subadult, adults), Makaha Beach Park (offshore cleaning station), Pupukea Marine Conservation District, Rainbow Bridge, Sheraton Waikiki, Turtle Bay Resort, and West Maunalua Bay on Oahu Island; Honaunau National Historic Park (juveniles and subadults), Hualalai Resort (feeding and resting), Kahaluu Beach Park, Kaloko-Honokohau National Hisotric Site (juvenile and subadult, offshore resting and cleaning), Kapoho (adults resting), Kawaihae (juvenile and subadult, feeding and resting), Keawanui, Kiholo bay (juvenile and subadult feeding and resting), Mauna Lani Bay (juvenile and subadult, feeding and offshore resting), Puako Fisheries Management Area (juveniles and subadults, feeding and resting), Pui Bay, Punaluu, and Richardson's Beach Park on the big Island of Hawaii; Blackrock, Kahekili Beach, and Konokawai on the island of Maui; Anahola Bay, Ka Lae Kiki Point, Moloaa bay, Prince Kuhio Park and Spouting Horn on Kauai; Containers, Federation Camp and White Rock on Lanai; and Southwest Molokai (Palaau). Green and Hawksbill foraging has been reported off the Hilton Waikoloa (resting area for juvenile and subadult greens) and in Kiholo Bay on the Big Island. Hawksbill foraging is most common along the east coast of the island of

Hawai‘i near Hawai‘i Volcanoes National Park, off Halawa Valley at the east end of Molokai, and is also reported along the reef at Kahekili Beach and Puu Olai on Maui (Balazs et al. 1987, 1998, 2002; Brill et al. 1995; Brock 1989; Rice et al. 2000; Davis et al. 2000; Anderson 2002; Harrington 2002; personal observations during SSG strandings 2000-2008). Nesting by green turtles takes place predominantly in the Northwetern Hawaiian Islands (NWHI) at East Island and its neighboring islets, collectively known as French Frigate Shoals. Layson, Lisianski, Pearl and Hermes, and Midway in the NWHI, as well as Kauai, Lanai, Maui, Molokai, and Oahu in the Main Hawaiian Islands (MHIs) also have green nesting. Hawksbill nesting occurs in the MHIs on several small sand beaches of Hawai‘i, Mau‘i, Moloka‘i, and O‘ahu Islands. Ninety percent of hawksbill nesting takes place at Kamehameha on the Ka‘u Coast of Hawai‘i Island and those turtles use the waters off the Hamakua coast as foraging grounds (Balazs 1995; PWF undated). There is also scattered hawksbill and olive ridley nesting reported on Kaua‘i and O‘ahu and a Leatherback hatchling was caught by a fisherman in Kauai Harbour (Paty 1857 in Resture 2012b; Mason et al. 2010 and references therein; pers. com. Don Heacock DLNR 2009; pers. com. George Balazs NOAA 2008; Groombridge and Luxmoore 1989).

## Ethnographic Data

*The sacred turtle holds up the island of Moloka’i.*

--- Johnson 2004:1.

Hawaiian creation stories are full of sea turtles. The land of god rested on two giant turtles that when destroyed became the islands. Turtles are lesser gods, guardian gods, gods of the ocean, belong to gods; and are protected by gods. They are supernatural beings, humans, shapeshifters, good luck omens, guardian ancestors, and rescuers of voyagers and legendary figures (Hina, Laukaimanuikahiki daughter of Hina) (Kalakaua 1888; Whitney 1890; Liliuokalani 1897; Thrum 1907; Johnson 1913; Westervelt 1915; Emerson 1915; Fornander and Thrum 1916-1917, 1918-1919, 1919-1920; Kuamanu pers. com. in Green 1923; Rice 1923; Green and Pukui 1936; Colum 1937; Beckwith 1940, 1970, 1981, 2003; Handy and Pukui 1958, 1972; Kamakau 1961; Handy and Handy 1972; Balazs 1978a, 1984, 1993; Markrich 1983; Valeri 1985; Thompson V. 1986; Johannes 1986; Stasack and Lee 1994; McNamee and Urrea 1996; Akaka 1998 pers.

com. in Davidson 2001; Mailly 1998; Fullard-Leo 1999; Ching 2001; Ka`ai pers. com. in Davidson 2001; Kupihea 2004; Caruso 2005; Taylor 2007; McGregor 2007; Aranda 2008; HTA 2009; Resture 2010a; Suzuki 2010; Jokiel et al. 2011; Watson undated; Yee undated).

Many are the marks of sea turtles on the Hawaiian landscape. Creation stories say Kaluahonu on Kauai was once a turtle cursed by a chief and turned to stone. At Polihua on Lanai, a god transformed a magical stone into the first turtle of Hawai‘i. The hills Hoku-‘ula, Halai, and Anuanu-Kulua on Hawai‘i Island; the “Rocks of Kana” at the mouth of Waikolu Valley on Molokai; and Kahonunuimaeleka (Ha-upu) Hill near Pele-kunu valley on Kauai -- were all created by sea turtles -- the supernatural turtle that was Ha-upu still alive and moving, raising the hill periodically up to heaven, until he is broken up, and his pieces become the first turtles (Musick 1898; Malo and Emerson 1898; Fornander and Stokes 1878, 1880, 1885; Thrum 1900, 1901; Kahaulelio 1902; Nakuina pers. com. in Thrum 1907; Westervelt 1915; Fornander and Thrum 1916-1917, 1918-1919, 1919-1920; Rice 1923; Wahiako pers. com. in Beckwith 1940, 1970, 2003; Pukui et al. 1974; Pukui 1983; Balazs 1984; Thompson V. 1986; McNamee and Urrea 1996; McNamee and Urrea 1996; Davidson 2001; Manu 2006; Forbes 2006; Gibson 2006; Aranda 2008; Resture 2010a).

One of the signs that connect fishers with the spirit world, turtles were the property of the king and chiefs because they are air breathers; and were kapu because they were “aspects of the male gods, Ku, Lono, Kane and Kanaloa, or were used as sacrificial offerings to the aforementioned deities” (Meares 1791; Malo and Emerson 1898; Green and Beckwith 1928; Pratt 1933; McAllister 1933 cited in Handy and Handy 1972; Handy and Pukui 1953; Alona pers. com. Handy and Handy 1972; Handy and Pukui 1958, 1972; Levin 1968:412 (quotation); Valeri 1985; Johannes 1986; Kirch 1994; Corum 2000; Ching 2001).

“The fish which owns the earth” (Pratt 1933:unpaginated), the sea turtle was part of the mark of sovereignty and some of the women wore wood or ivory figures of turtles tied on their fingers (King and Clerke 1784; Cook and King 1793; Cook 1821). The archaeological record provides support for the high cultural status of turtles, recording

turtle petroglyphs at many sites around the islands (Emory 1924; Kirch 1985; Stasack and Lee 1994; Lee and Stasack 1999; von Schmidt 2001; Lundhold 2007; Crinella 2007; Kona Village Resort 2012; Egan and Burley 2009).

Traditional regulations regarding sea turtle consumption in Hawai‘i have been reported at several different periods. In 1778, Captain James Cook wrote the earliest report that could be found by this author. He stated that turtle was taboo to women, and no matter how much persuasion was used, women refused to touch it (Samwell 1778-79; King and Clerke 1784; Cook and King 1793; Cook 1821b).

As aspects of the male gods (Ku, Lono, Kane and Kanaloa), turtles belonged to the chiefs, were tapu to the use of the gods, used as sacrificial offerings to the aforementioned deities, and consumed only by men. For women, the penalty for breaking this tapu was death. A female king or high chief was likewise prohibited from eating turtle -- except in extreme circumstances -- such as when the pregnant chieftess about to give birth to Kamehameha the Great demanded it (Ellis 1782, 1783; Beresford 1789; Meares 1791; Campbell 1822; Arago 1823; Ellis 1826, 1827, 1831, 1832, 1859; Jarves 1843, 1844; Hutton 1874; Alexander 1874; Kalakaua 1888; Blackman 1906; Montgomery 1907; Bryan 1915; McAllister 1933 cited in Handy and Handy 1972; Pratt 1933; Bryan 1938; Malo 1951; Handy and Pukui 1953; Linnekin 1969, 1990; Alona pers. com. Handy and Handy 1972; Tuggle and Griffin 1973; Freycinet 1978:89 cited in Linnekin 1990; Markrich 1983; Johannes 1986; Kirch 1994; Corum 2000; Chambers 2006; Loubser 2009).

His Hawaiian Majesty King Kalakaua’s book, "The Legends and Stories of Hawai‘i," published in 1888 contains a foreword by Dagget, an American minister working in Hawai‘i, who wrote, "squid, turtle, and two or three species of birds could be eaten *only by the priests and tabu royalty*" (Kalakaua 1888:32 emphasis added). The fact that King Kalakaua allowed this to be written into Hawaiian history as part of his book, makes it the final word on traditional laws regarding sea turtle consumption in Hawai‘i. Other reports substantiate turtles as property of the king or high chiefs, kapu (sacred) as aspects of male gods, eaten only by male priests and tapu royalty (the children and servants of the gods); to be consumed by others under penalty of death (Ellis 1826, 1831,

1859; Root 1895; Malo and Emerson 1898; Jordan and Evermann 1902 cited in Johannes 1986; Handy 1927; Pratt 1933; Malo 1951; Hiroa 1957; Handy and Pukui 1958, 1972; Levin 1968; Handy and Handy 1972; Balazs 1980, 1983; Balazs pers. com. in Markrich 1983; Valeri 1985; Johannes 1986; Linnekin 1988; Eckert 1993; Ching 2001; Pryor 2003; Chambers 2006 cited in Jokiel et al. 2011; Richardson 2008; Pryor 2003; Jokiel et al. 2011).

The only reports that differ from those already mentioned are by the late Robert Johannes (1986), who interpreted the traditional laws as restricted to the green turtle, writing: "in his introduction to King Kalakaua's "The Legends and Stories of Hawai'i," published in 1888, … eating green turtle was forbidden to all but priests and chiefs" (Johannes 1986:30-31). Additionally, Johannes (1986) and Mike Markrich (1983) quoted Hawaiian scholar, Abraham Piianaia, as believing that turtle was not limited to the upper classes but was common food for both sexes writing, "He [Piianai] states that Daggett was an "outsider" writing about customs *that had disappeared two generations earlier*" (Markrich 1983 cited in Johannes 1986:30-31 emphasis added). This author notes that Piianaia is stating that in the past turtle consumption was restricted to the elite.

*Niue*

Environmental Data

Niue is a raised coral island consisting of a raised coral platform with terraced coastal cliffs. It is one of the largest coral islands and the largest raised coral atoll in the world (UNEP 1998-2006; Butler 2001; PBIF undated). The island covers 264 $km^2$ of land and a sea area of 390,000 $km^2$. The highest point is 73 m above sea level (UNEP 1998-2006). Niue's climate is tropical with an average temperature of 28 °C and average rainfall of 2,180 mm per year (UNEP 1998-2006; SOPAC 2008). There are distinct hot/wet and cool/dry seasons (Nemaia 2004). The island has a thin generally fertile shallow soil partly of volcanic ash origin, partly unconsolidated sedimentary materials, abyssal clay, and deep-sea sediments with high natural radioactivity. The island is composed of pure limestone of three types — reef rock, beach conglomerate and cemented or loose coral sand (Schofield 1959 cited in Butler 2001; Lane 1994 cited in

Government of Niue 2001; Richmond-Rex et al. 2001). Standing freshwater in caves and a permanent freshwater table located approximately 60 m below the rim of the central plateau are the main sources of freshwater (Butler 2001; Nemaia 2004).

The principal terrestrial ecosystems on Niue are lowland rainforest on raised coral substrate (limestone rainforest); coastal forest on terraces with *Sysygium richii* and *S. inophylloides*, *Dysoxylum forsteri*, *Planchonella torricellensis*, *Pometia pinnata* and *Macaranga seemanii*; open scrub on the seaward margin dominated by salt-resistant trees like *Barringtonia asiatica;* shrubs; secondary forest dominated *Hibiscus tiliaceous, Baccaurea seemanii;* and fern-scrub barrens (Butler 2001; UNEP-WCMC undated). Several less common types of ecosystems are also recognized including littoral shrub, littoral forest, mature forest dominated by tree species similar to those found in the coastal forest, as well as a range of other trees and ferns, limestone rainforest and caves. The marine ecosystems include inshore fringing reefs, fringing coral reef surrounding the island with rich coral growth, reef flat, and terraced coralline algal pools with a great variety of fish. Beveridge Reef is rich in biodiversity and surrounds a sandy lagoon (Smith S.P. 1903; WWF 2001; Butler 2001; Nemaia 2004; Division of Fisheries undated and references therein).

## Sea Turtle Population Data

Two species of sea turtles have been reported for Niue, the green and the hawksbill (Butler 2001; Government of Niue 2001; Division of Fisheries undated and references therein). The majority of information for visitors to Niue specifies the locations sea turtles frequent. Examples include: Ana Mahaga (Limu Twin Caves), offshore of the Matavai Resort in Alofi, the reef pool at Hikutavake, and Namoui below Coral Beach Motel. The wealth of such information suggests a resident population of sea turtles (Dive Niue undated; Gowealthy 2010; Matavai Resort 2011; Lonely Planet 2012).

## Ethnographic Data

The turtle was a sacred fish in Niue, featuring in the earliest god chants (His Highness the King of Niue in Tregear 1900), and as rescuers of mythical figures (Hina). The sea turtle was the forbidden food of the gods. It was in fact the most tapu of all native

animals, eaten only by tapu males. When a turtle was eaten by anyone else, the perpetrator would turn into a turtle (Smith 1903a,b, 1902-1903, 1983; Loeb 1926; Admin. 2010).

*Pitcairn Islands*

Environmental Data

The Pitcairn Islands are comprised of four volcanic islands, one of which is less than 100 $km^2$, one less than ten $km^2$, and two that are less than one $km^2$. They encompass a land area of approximately forty-three $km^2$ and a sea area of approximately 800,000 $km^2$. The highest point, which is on Pitcairn Island, is 347 m above sea level. The climate is subtropical with an average temperature of 23 °C and average rainfall of 1,250 mm per year. There is little to no surface water (UNEP 1998-2006).

Many terrestrial ecosystems have been described for the Pitcairn Islands: atoll forest, lowland and montane rainforest, scrub forest, littoral and rocky coast, limestone plateau, strand vegetation, beachridge/backbarrier on sand, *Miro* woodland, limestone glade woodland, limestone cliffs, cliff top/margin, pinnacled limestone, *Timonius* scrub, dense limestone scrub, and grasslands and fern slopes in rocky littoral areas. Marine ecosystems include raised patch reef communities, windward and leeward atoll reef with extensive algae and coralline algae in shallows, coral on deep reef, productive lagoon with poor circulation but fair coral cover on pinnacles, and fringing reef (UNEP 1998-2006).

Sea Turtle Population Data

Local government regulations for the country of Pitcairn Islands include rules protecting endangered species. The green, leatherback, hawksbill, loggerhead, and olive ridley are specifically named, suggesting they are residents in the country (Government of Pitcairn 2010). Both the green and the hawksbill have been specifically reported at Pitcairn and Henderson Islands. No sea turtle research has been conducted on Ducie or Oeno Islands. The green turtle is reported to nest on Henderson (UNEP 1998-2006 and references therein; Groombridge and Luxmoore 1989 and references therein).

## Ethnographic Data

As in most of Polynesia, sea turtles are legendary rescuers of mythical figures (Hina) in Pitcairn (Hiroa 1938b, 1964; Resture 2010b). Pre-contact turtle consumption patterns for the Pitcairn Islands are unknown. However, archaeological remains suggest Polynesians inhabited Pitcairn Island about 600 years ago, probably arriving from Mangareva some 490 km away in the Gilbert Group of French Polynesia (Sharp 1963). Therefore, it can be inferred that traditional laws concerning sea turtle consumption would be the same as on Mangareva, with only chiefs allowed to eat turtle.

*Rapa Nui*

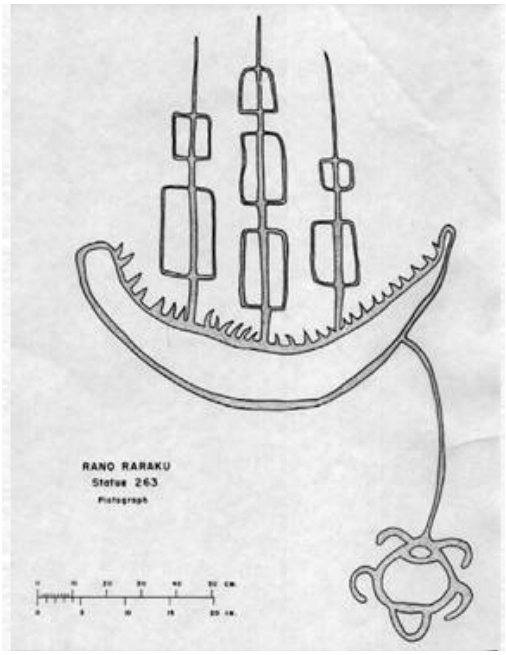


Figure 7: Sea Turtle Anchor and vessel carved upon Maoi No. 253 on Rapa Nui. Source: Heyerdahl et al. 1961.

## Environmental Data

Rapa Nui consists of four islands formed on top of a large volcanic mountain: one less than 100 $km^2$, one less than ten $km^2$, and two less than one $km^2$. The main island has scattered volcanic cones, low coastal cliffs, and three small beaches. The country covers 173 $km^2$ of land and a sea area of 2,930,000 $km^2$. The highest point, located on Rapa Nui Island, is 511 m above sea level. The climate is subtropical with an average temperature

of 23 °C and average rainfall of 1,250 mm per year. Moderate, even rainfall all year long supplies the need for freshwater. There is little surface water. The terrestrial ecosystem was originally dominated by subtropical moist broadleaf forest, with a range of grasses, ferns, shrubs and trees including the toromiro tree (*Sophora toromiro*), *Paschalococos disperta* palms and grassland with Stipa, Nasella, *Sporobolus indicus*, *Cynodon dactilon*. The crater lakes of Rano Raraku and Rano Kau Tatora contain nga'atu or bulrush (*Schoenoplectus californicus)*. The marine ecosystem has abundant corals in some places, shallow algal turfs and deep-water algae beds (UNEP 1998-2006; McAlester undated).

## Sea Turtle Population Data

The four species of sea turtles reported for Rapa Nui are the green, leatherback, loggerhead, and olive ridley. Green turtles have been documented at Hanga Roa and Hanga Piko. The presence of these animals year round suggests a foraging habitat for green turtles. Nesting is reported to occur on sheltered beaches, but species have not been identified (Harrisson 1971; Groombridge and Luxmoore 1989; Alvarez et al. 2012).

## Ethnographic Data

On Rapa Nui, the turtle was sacred, a guardian god, and features in the origin story of the islanders. Traditional laws restricted consumption of sea turtles to the king during ritual turtle feasts. The archaeological record provides support for the high cultural value of turtles. They are well represented in the petroglyphs and rock carvings of the island's spiritual centres and locations within the domain of the high-ranking tribe (Harrison 1874; Thomson W. 1891; Carroll 1892; Barthel 1923, 1978; Lavachery 1939 cited in Rolett 1986; Metraux 1940, 1957 cited in Kirch 1994; Lee 1992 cited in Kirch 1994; von Schmidt 2001; Rackl 2006; Von Tilburg 2007; Tuki 2011; Resture 2012a). St. Johnston (1921) argued that Rapa Nui gets its name from the sea turtle, explaining the Peruvian name for turtle is Rapa. He also suggested that petroglyphs of turtles demonstrate a connection between turtles and the 'Sky People' (who created Rapa Nui). Additionally, some archaeologists and historians have interpreted one of the petroglyphs – this one carved on the body of Moai No. 263 -- as an ancient Polynesian voyaging

vessel whose anchor is a sea turtle (Heyerdahl and Ferdon 1962; Kenny-Johnson 2012; Capelotti undated.)

*Samoa (American and Western)*

Figure 8: Tutuila the Bay at the village of Vaitoga, where turtles are supposd to appear when the native women chant. Source: Bryan Jr. 1924:7.

Environmental Data

Samoa consists of seven high volcanic islands with rugged peaks and limited coastal plains (Savai'i, Upolu, Tutuila, Aunu'u, Olosega, Ofu, Tau), two coral atolls (Rose and Swains), and several smaller islands and uninhabited islets (PBIF undated). There are 14 main islands: two less than 10,000 $km^2$, one less than 1,000 $km^2$, one less than 100, six less than ten, three less than one $km^2$, and one island for which this author could find no data. The country covers 3,100 $km^2$ of land and a sea area of 510,000 $km^2$. The highest point, on the island of Savai`i, is approximately 1,857 m above sea level. The climate is tropical with an average temperature of 27 °C and average rainfall of 2,000 mm per year (UNEP 1998-2006; Tuato'o-Bartley et al. 1993). Soils are formed from eroded basalt and ash deposits and are generally poor (WWF 2001). Surface water and groundwater reservoirs of freshwater exist across almost the entire country. The exception is Apolima where natural freshwater resources are limited (UNEP-WCMC undated). Freshwater ecosystems include saltwater and freshwater swamps and marshes,

crater marshes, mangrove swamps, mangrove lagoon, streams, crater lakes, streams and other freshwater habitats (Whistler 1980; WWF and IUCN 1995; Schuster 2001).

The principal terrestrial ecosystems in Samoa are tropical and subtropical moist broadleaf forests (WWF 2001). Additional ecosystems include coastal forest, forest on slopes, fragments of lowland rainforest (below 300 m), lowland and montane rainforest, cloud forest, atoll forest and scrub, montane swamp forest, mangrove forest, montane scrub, *Pandanus* scrub, littoral scrub, summit scrub, scrub fernland and grasslands on lava flows and uplands, and sand strand vegetation.

Samoa is very rich in marine ecosystems. The volcanic islands are surrounded by fringing reef. Rose Atoll has a lagoon with a sandy bottom and algae. Seagrass beds range from very small to extensive broad fringing reef and shallow lagoons with seagrasses along most of the coast. Fringing reef occur on most islands as well as coralline algal reef flat with abundant corals on vertical surfaces, windward and leeward atoll reef, closed brackish lagoons, and submerged coral banks (UNEP 1998-2006; Wilkinson C. 2008; SMNRE undated).

## Sea Turtle Population Data

Sea turtles are widely distributed throughout the Samoan Islands. Four species have been identified: green, hawksbill, leatherback (south of Swains Island), and olive ridley. Greens and hawksbills are the most commonly occurring. Juvenile, sub-adult and adult greens have been reported for Western Samoa and around Ofu, Olosega, Swains (Olosenga), Ta'u, Tutuila and Upolo Islands. Hatchling, juvenile, and sub-adult hawksbills are reported for Western Samoa, around Tutuila and the Manua Islands. These locations are probable foraging grounds for these two species. Olive Ridley and leatherback foraging have also been reported for Samoa. Greens nest on Pago Pago and Swains Island. There is nesting by both greens and hawksbills on Sand and Rose Islets of Rose Atoll, the Aleipata Islands (principally Nuutele and Nuulua), and a few beaches on Savaii, Tutuila and in the Manu'a Group. Additionally, hawksbill nesting occurs on Namua and Nuulua beaches of Upolu Island, on Nuutele and Vini beaches of Nuutele Island, and on Saaga Beach, Siumu. Nesting is also reported for Nuusafee Island, though

turtle species were not identified (Johannes 1986; Groombridge and Luxmoore 1989 and references therein; Tuato'o-Bartley et al. 1993; UNEP 1998-2006 and references therein; Schuster 2001; Utzurrum 2002 cited in Fenner et al. 2008; Momoemausu et al. 2006; Wilkinson C. 2008; Trevor 2009; Bell et al. 2009; Mason et al. 2010 and references therein; White 2012).

## Ethnographic Data

Tabakea, the turtle, features in the creation story of Samoa -- the islands float upon the backs of giant sea turtles (Davidson 2001; Resture 2008b, 2009b). Sea turtles were 'holy fish,' 'sacred fish' (*I`a sa*), and supernatural beings, the embodiment of multiple gods (Long Moso, Salevao, Taisumalie, Apelesa, Samani, Soesai). Created by a god from an offending mother and child, sea turtles were rescuers of fishermen and of legendary figures (Hina), vehicles for transportation of the high chief, and able to perform miraculous healing of the sick. The penalty for eating a god (made physical in the turtle) was a slow death, as the god grew inside the person until it (the god/turtle) burst through the offender's body (Turner 1861, 1884; Greenwood 1863, 1864, 1865; Stair 1896 cited in Craig 1989; Krämer 1902; Tyler 1903; Schultz 1906a, 1906b, 1950, 1953; St. Johnston 1921; Nelson 1925; Collocott 1928; Mackenzie 1931; Hiroa 1935; Grattan 1948; Johannes 1986; Craig 1989; Craig 1993; Tuato'o-Bartley et al. 1993; Beckwith 1940, 1970, 2003; Barnes and Hunt 2005). "They heard the god saying from within the body: 'I am killing this man; he ate my incarnation'" (Turner 1884:51). An oven used to cook turtle for such an offender had to be cleansed by sacrificial burning of the offender in the unheated oven. If this mock ceremony was not performed, it meant death to anyone consuming food cooked in the oven. At times, the offender was also required to drink rancid oil (Turner 1861, 1884; Greenwood 1863, 1864, 1865).

Since turtles belonged to the king or high chief, keeping a turtle for oneself meant a heavy fine payable in food or banishment from the village. Everything having to do with turtles was ceremonial. When the king called for a turtle-catch, the people of the village remained silent and still, until the turtle-hunters were out into the deep ocean. Once cooked, the sacred turtle is ceremonially presented on the Marae, and then ritually divided. Upon death, the turtle-spear of the king's turtle-hunter was buried with him

(Turner 1861, 1884; 1863, 1864, 1865; Willis 1889; Stevenson 1890a, 1890b; Grattan 1948; Johannes 1986; Tuato‘o-Bartley et al. 1993)**.** The archaeological record provides additional evidence for the high cultural value of turtles. Turtle petroglyphs are seen at Leone and at Faga’itua (Kikuchi 1964, 1957 cited in Egan and Burley 2009).

Reports of traditional laws regarding sea turtle consumption in Samoa change through time. The earliest report by George Turner written in 1861 stated, “*occasionally all,* but especially persons of rank, regaled themselves on . . . turtle . . . The turtle, too, the best joint, and anything choice, is sure to be laid before the chief” (Turner 1861:192, 282 emphasis added). In a later writing Turner stated, “The turtle and the mullet were . . . eaten *only by the priest*” (Turner 1884: 38 emphasis added). Other early writers substantiated consumption restricted to the chiefs and priests (Willis 1889; Stevenson 1890a, 1890b). Robert Lewis Stevenson wrote, turtles were used as “royal presents for 'the chief of great powers’” (Stevenson 1890a, 1890b [there are no page numbers in the Stevenson documents]).

The most comprehensive later source is the work of the German anthropologist, Augustin Krämer. He reported that in later time periods consumption was restricted to the chiefs during special ceremonies, with the exception of the hindquarters, which went to the village maid, and the back, which went to “the young men who did the work” (Krämer 1902:163-164 cited in Hiroa 1930:123). He also included a footnote that reads: “a turtle is considered a fish; as a dish for chiefs it is called *I’aså ... I‘asā* – normally the turtle ... taken to a king” (Krämer 1902:188, 422). Additionally, Te Rangi Hiroa provided an account where a Samoan was exiled for “the theft of a turtle belonging to the *Tui Manua* [high chief or king]” (Hiroa 1930:522).

In reporting the ritual division of the turtle, Grattan (1948) confused the issue somewhat. He stated, “When the personal catch includes any of the i’a sa, these must be set aside and presented formally to the leading chief for distribution by the orators *to the whole village* as represented by each family.” Yet, when he discussed the pieces of the turtle and to whom each belongs, only the elite are mentioned as receiving a part of the turtle:

> The major divisions in cutting up are the head (ulu), the forequarters (sagamua), the hindquarters (sagamuli), and the rest of the carcass (tua) that remains. If it is not cooked before being presented, it will be cooked before it is divided and distributed. The important parts are the flippers ('apa'apa) from both the forequarters and hindquarters, presented to the chiefs. The head is allotted to the taupou [ceremonial virgin] and the aualuma [unmarried daughters of chiefs and orators]. The remaining parts of the forequarters and hindquarters, together with the rest of the carcase, are divided and distributed amongst the chiefs and orators [talking chiefs] (Grattan 1948:105).

Grattan claimed the exception of "the juice that collects in the shell during cooking which is highly prized, being dipped out and consumed by the chiefs and orators *or* divided amongst all the families of the village" (Grattan 1948:105 emphasis added). This author notes that this does not describe distribution to the whole village.

Johannes (1986) also described the ritual division of turtles, but hindered by his limited knowledge of Samoan, he misinterpreted taupou and aualuma as chiefs of the highest rank:

> The important parts, the front flippers and rear flippers are reserved for the chiefs with the head allotted to chiefs of the highest rank (the taupou and the aualuma), and the remaining parts are divided amongst the chiefs and orators. The juice that collects in the shell during cooking is highly prized, being dipped out and consumed by the chiefs and orators or divided amongst all the families of the village. According to Finsch (1983), " the blue black fat on the inner side of the upper thigh, called vivi, is considered especially tasty and has a flavor somewhere like that of veal or venison, but is much richer. It is, like a part of the intestines called medjinal, a favorite dish of the chiefs and always served to them (Johannes 1986:28-29).

As late as 1980, greens and hawksbills were still eaten primarily by village chiefs on special occasions (Witzell and Banner 1980; Bell 1989).

*Tokelau*

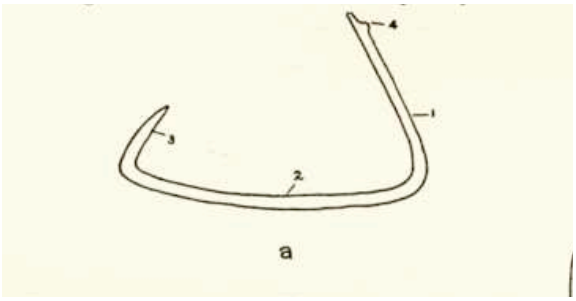


Figure 9: Tokelauan one-piece turtle-shell hook (matau sumi); 1: shank 1/16" long; 2: point leg ¾" long; 3: point ¼" long. Source: Macgregor 1937:101.

## Environmental Data

Tokelau consists of three low coral atolls, Atafu, Falcaofo, and Nukunonu, each with a lagoon surrounded by a number of reef-bound islets of varying length. The country covers 10 $km^2$ of land and a sea area of 290,000 $km^2$. The highest point is three meters above sea level. The climate is tropical with an average temperature of 28 °C and average rainfall of 2,500 mm per year (UNEP 1998-2006). Much of the shoreline is composed of limestone and coral shingle; fine coral sand beaches comprise one-quarter of the ocean-side coast. Rain is the only source of freshwater (UNEP-WCMC undated). The principal terrestrial ecosystems are beach scrub and coconuts. Windward and leeward atoll reefs and lagoon are also present, and remnants of atoll forest are found on Tokelau and Long Islets in Nukunonu Atoll (UNEP-WCMC undated). There are some tiny brackish pools on two of the atolls, all have atoll reef ecosystems, and reef flats exposed at low tide (Groombridge and Luxmoore 1989 and references therein; UNEP 1998-2006; UNEP-WCMC undated).

## Sea Turtle Population Data

Three species of sea turtle have been reported in Tokelau: green, hawksbill and loggerhead. Immature green and hawksbill turtles are frequently seen foraging in the lagoons and along the outer reef, suggesting use of these atolls as year round foraging grounds. Nesting by all three species occurs at each of the three atolls (Balazs 1982b; Groombridge and Luxmoore 1989; UNEP-WCMC undated).

## Ethnographic Data

Sea Turtles feature in the creation story of Tokelau; the great turtle having brought people to the three atolls on its back. Some speculate this legend may be related to the Tokelauan belief that women, who were connected with the spiritual realm, could command turtles to do their bidding and commanded the great turtle to do so (Huntsman and Hooper 1975; Hanson 1982; Balazs 1983; Davidson 2001). Ceremonially divided upon the sacred marae, turtles were the embodiment of gods, rescuers of legendary figures (Sina, Hina), sacred fish, and ritual food; often the heart of religious ceremony and legend (Burrows 1923; Mika, an elderly native in Atufu, pers. com. 1932 in Macgregor 1937; Huntsman 1977; Balazs 1983; Toloa and Gillett 1989; Davidson 2001; Hooper 2010).

A Tokelauan would not arbitrarily eat his god. The penalty for doing so was a slow death, as the god entered the offender who in time changed into a turtle. The offender thus became, "the mouthpiece of his spirit, revealing secrets of the past and future. In each family one member had the power to communicate with the transformed spirit" (Thomson A. undated:31 cited in Macgregor 1937:63; Balazs 1983). Also prohibited, was a man with a pregnant wife joining the turtle hunt (Balazs 1983).

After capture by certain highly-respected master fisherman, all turtles were given to the king or high chief who gave thanks to the high god. To protect the turtles from the bush spirits who desired them, the turtles were guarded by old women, who sang throughout the night. The turtle could be divided only by the *tauvaenga*, a specially appointed man. The head went to the king or high chief. The remainder, as well as any eggs, was divided among the people; a larger portion to the man who first saw the turtle. The young men ate the carapace (top shell) and the elderly ate the plastron (bottom shell). The punishment for keeping a turtle for one's own was the destruction of one's house, the burning of one's property and the breaking up of one's canoe (Macgregor 1937; Perez, elder at Nukunonu, pers. com. in Huntsman 1977; Balazs 1983; Toloa and Gillett 1989; Davidson 2001).

*Tonga*

Figure 10: During their double wedding, the royal princes of Tonga wear the mats used to carry the shell of the sacred turtle Sangone to Tonga. Source: Kaeppler 1999:180.

Environmental Data

The Kingdom of Tonga is an archipelago of 169 islands. The islands are of volcanic and coral origin, with high and low volcanic as well as raised and low limestone islands. Generally, the limestone islands formed from uplifted coral formation, though some have limestone overlying a volcanic rock base (PBIF undated). The country covers 715 $km^2$ of land and a sea area of 700,000 $km^2$. The highest point, on the island of Kao, is approximately 1,056 m above sea level (UNEP 1998-2006; PBIF undated). The climate is tropical with an average temperature of 25 °C and an average rainfall of 2,000 mm per year (UNEP 1998-2006). The sources of freshwater for Tonga are rainwater harvesting or extraction from a thin freshwater lens. The exception is 'Eua where freshwater originates from springs in caves high above sea level (UNEP-WCMC undated).

Terrestrial ecosystems in Tonga are abundant. They include lower slope forest, tropical moist forest, subtropical rainforest, lowland rainforest, coastal forest and scrub along cliffs, interior rainforests on the higher islands, cloud forest on summits, and mangrove forest on many small atoll islands and along lagoon shores of the larger

islands. The atolls have ground cover such as *Sesuvium*, and salt-hardy trees (WWF 2001; PBIF undated). Tropical grasslands, scrub, a tropical volcanic crater zone, volcanic crater lakes on Niuafo'ou, Tofua, Kao and Late, swamp, brackish lagoons on Nomuka and 'Uta Vava'u, a freshwater marsh near Tu'anuku on 'Uta Vava'u, and sandy beaches round out the terrestrial environment (Folaumoetu'i 2006).

Marine ecosystems include fringing reef (sometimes poor but in other areas fairly well developed), barrier and submerged reef types, patch reef, salt lagoon reef with coralline algae, wave-cut raised reef, windward and leeward atoll reef, detached reef shelf, steep east coast cliffs with terraced pools ringed by coralline algae, seagrass beds, rocky shore with shallow coral patches, and lagoons (Bell et al. 1994; WWF 2001; Lovell and Palaki 2002; UNEP-WCMC undated).

## Sea Turtle Population Data

Four species of sea turtle have been reported in Tonga: green, hawksbill, leatherback and olive ridley. Green foraging sites include Alakipeau, Atata, Paloa, Kauval lagoon and off Nuualofa on Tongatapu, and Tufata. Green turtle nesting has been reported on Ha'afeva, Malinoa, Nomuka, Nukulei, O'ua, Tungua. Green and hawksbill nesting have been reported on Fetoa, Kelefesia, Luanamo (Luamana, Luanamu), Mango, Manoiki, Nukufaiva, Nukulai (Nukulei), Nukufalau reef and Tonumea. Hawksbill nesting has been reported on Fetokopunga, Fonuaika, Ha'ano, Hakauata, Kelefesia, Kito, Lalona, Lekeleka, Limu, Luahoko (Luahoku, Luaheka), Luangahu, Mangoiki, Meama, Niniva, Nuku, Nukufaiau, Nukutula, Nukupule, Putuputua, Tatafa, Telekitonga, Telekivava`u, Tofanga, Tokuluand, `Uiha, Uonukuhahake, and Uonukuhihifo. Other nesting reports exist but do not specify the species. These include reports from Fangasito, Felemea, Foeata, Folifuka, Fonua'one'one, Fouaika, Late, Maninita, Matuku, Taula, and Uonuku. Turtles are additionally reported for Fonoifua, Holopeka, Koulo, Niuatoputapu, and Pangai; though activities and species are not included in those reports (Ellis 1783; Wilkinson W. 1979; Kirch 1988; Groombridge and Luxmoore 1989 and references therein; Bell et al. 1994; Prescott and Folaumoetu'i 2004; Patisepa Folaumoetu'i 2006; Mason et al. 2010 and references therein).

## Ethnographic Data

Sea turtles feature in the Tongan creation story of the known world as the children of the great gods (Reiter 1907 cited in Craig 2004; Collocott 1921). The first turtle, the source of all turtles in the world, according to Tongan legend was once the head of a goddess turned into a turtle when angrily thrown into the ocean by her father (Mariner 1817; Martin 1818; Bain 1967 cited in Taufa 1999; Edith and Branham 1975; Bataille-Benguigui 1988). In still another legend, the sacred turtle Sangone is the goddess of the underworld and mother of the legendary figure Hina (St. Johnston 1921; Gifford 1924, 1929; Beckwith 1944; Bain 1967 cited in Taufa 1999; Kaeppler 1999; Calder et al. 1999). As embodiments of the sacred power of the Tu'i Tonga (son of the great god Tangaloa), one of the finely-woven mats used to wrap Sangone's shell was used at the funeral of the Tu'i Tonga, both were used at the funeral of Her Royal Highness Queen Salote, and several Tongan princes and princesses have worn them on their wedding day. In 1929, Prince Tungi possessed a fishhook made from Sangone's shell, in 1967, the shell was held by the Tupou College Museum, and in 1993, the shell was made into an elaborate comb for Princess Pilolevu of Fiji (Gifford 1929; Bain 1967 cited in Taufa 1999; Kaeppler 1999).

Sea turtles were sacred food, occupied by and set apart for the gods, used as ritual offerings, and only rarely eaten -- as food for great chiefs (Cook 1821a; St. Johnston 1921; Collocott 1928 cited in Beckwith 1944; Gifford 1929 cited in Bataille-Benguigui 1988; Hiroa 1935; Williams 1837; Edith and Branham 1975). After offering to the gods, and presenting some to the chief, only a limited few of less than chiefly rank ate turtle or dared not to send it to the chief. These were the bravest of men because, though great chiefs were considered immune, these men of lesser rank risked a supernaturally enlarged liver or other ailment of an internal organ (Mariner 1817; Dillon 1829; Hedley 1896-1900). The archaeological record provides support for the high cultural status of turtles because the appearance of turtle petroglyphs is widespread (Egan and Burley 2009).

Reports of sea turtle consumption laws in Tonga change through time. Consumption is reported as restricted to the chiefs, then to both chiefs and priests, and finally as only certain parts going to chiefs and priests (Cook 1821a; Williams 1837;

Hutton 1874; St. Johnston 1921; Gifford 1923; Thompson L. 1940a; Latukefu 1980; Kirch 1988). Early reports from the island of Lifuga in the Hapai Group support ritual consumption of sacred turtles by chiefs (Williams 1838; Hutton 1874). By 1975, these restrictions had been lifted, though only males could eat turtle (Edith and Branham 1975). Now, turtle killing is tightly controlled, and the meat is considered a special delicacy (Fua et al. 2011).

*Tuvalu*

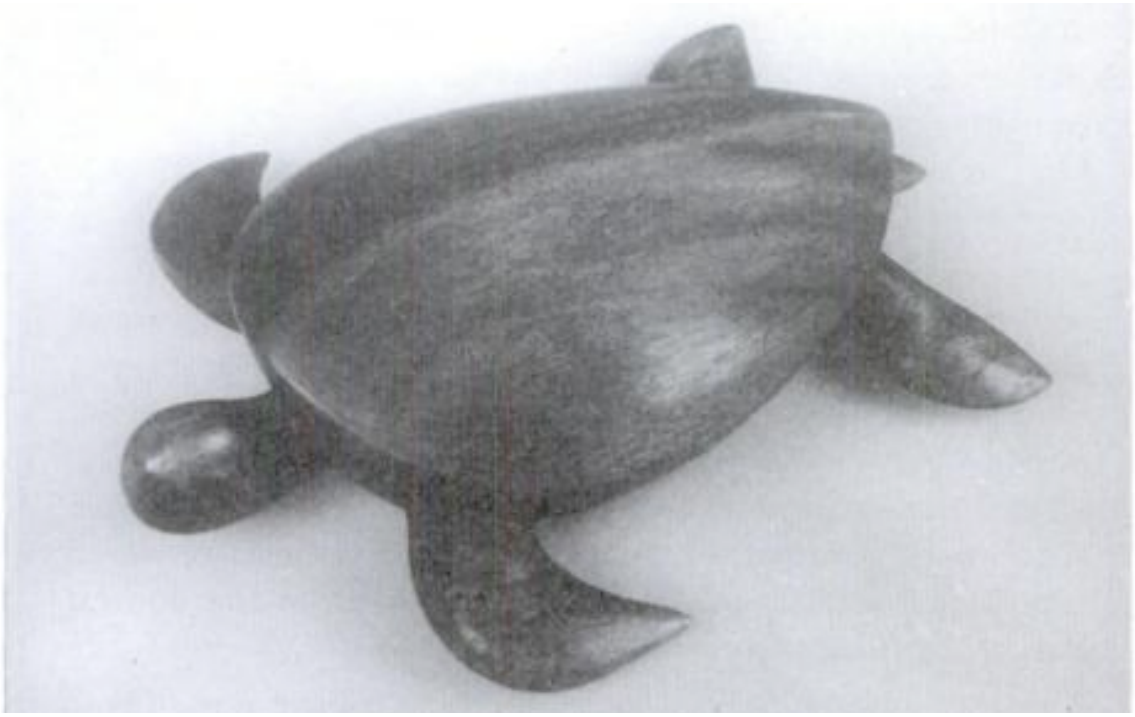

Figure 11: Wooden symbol of the goddesss Kulu, made by Saipele (born about 1910), tufuga fai fale (master house-builder) of Niutao, in October 1960. Source: Kosh and Slatter 2000:61.

Environmental Data

Of the ten islands that make up Tuvalu, five are considered true coral atolls (Nanumea, Nui, Nukufetau, Nukulaelae and Funafuti), while three are considered table reef islands (Nanumaga, Niutao and Niulakita) (TDOE 2006). Eight of the islands have a surface area less than ten $km^2$ and two less than one $km^2$. The country covers 26 $km^2$ of land and a sea area of 1,300,000 $km^2$. The highest point is approximately four meters

above sea level (UNEP 1998-2006). The climate is tropical with an average temperature of 30 °C and average rainfall of 2,500 mm per year (Rodgers 1991 cited in WWF 2001; UNEP 1998-2006). Tuvalu is characterized by an immature and infertile soil, unsuitable for subsistence agriculture (TDOE 2007; MNREAL 2007). Rainwater harvesting is the primary source of freshwater, and groundwater is available on all islands (Mongabay 2005; SOPAC 2008).

Tuvalu has a marine environment rich in coral cover and diversity with a higher ratio of sea to land area than any other nation (Morris and Mackay 2008; MNREAL 1007). There are six major marine ecosystems: oceanic, outer reef, lagoonal backreef, lagoon floor, bommies or patch reefs, and natural channels between the ocean and lagoon (TDOE 2006). Shallow marine environments are dominated by fringing and patch reefs. Other habitats include small stands of mangroves; lagoons open to the ocean, and landlocked lagoons (Morris and Mackay 2008).

## Sea Turtle Population Data

Turtles are widely distributed throughout Tuvalu. Green foraging sights exist in the lagoon shallows and near outer reefs on three of the outer islands. Hawksbill foraging has been reported in reef areas. Green nesting is reported for Funafuti Atoll and other unspecified islands; hawksbill nesting has also been reported (Hedley 1896-1900; David 1899; Morris and Mackay 2008; Groombridge and Luxmoore 1989 and references therein).

## Ethnographic Data

In Tuvalu sea turtles were the embodiments of Kulu, the goddess of Niutao, and feature in the creation story of Nui Atoll. Tabakea the turtle was the ‘First-of-things’ and the god of the original inhabitants. Turtles also feature in the creation story of Niutao where, while magic was being practiced (to calm the seas, kill enemies or drive them insane, summon the spirits of ancestors, or bring rain), sea turtle heads were brought to the chiefs as special offerings (Roberts 1958; Saipele 1960 pers. com. in Kosh and Slatter 2000; Grimble 1972; Pita 1979; Resture 2009c,d).

Throughout Tuvalu turtles were required at traditional feasts, and on Niulakita were kept in ponds and harvested for those occasions. Turtles were taboo to all except male kings, chiefs and priests; commoners could not eat one. Pregnant women could have nothing at all to do with turtles. Until the introduction of Christianity, the head of the turtle (holder of mana and evidence of life after death) was always presented to the island chief. After Christianity, the head went to the island pastor (Hadley 1896; Grimble 1933; Pita 1979; Zann 1985; Kaay and Semese 1993; Resture 2009c,d, 2012c).

Reports from the Island of Funafuti substantiate the turtle as the king's property, taboo to all others, and consumed only by the king. It could only be killed, dressed, and cooked by males during elaborate rituals. The sacred turtle, after being brought at once to the king, was ceremonially laid upon its back, where the king wrapped it in fine mats, turned its head towards his own door, and spoke an ancient incantation (Hedley 1896, 1896-1900; David 1899). The heads of sea turtles were the symbol of supremacy for the king or paramount chief, and the dancing and gifting of the heads signified the people's belief that all the land belonged to him. This was followed by an elaborate ritual, where female descendants of the legendary figure Telematura were presented the fore-flippers, the priest the hind-flippers, and the warriors the body. Common people were forbidden from touching any part of the turtle. If anyone else 'tasted a morsel thereof,' a heavy fine was the result (Hedley 1896; Hedley 1896-1900; Roberts 1958). Caroline David (1899), resident on the island for three months, wrote the only report that varies from all the others above, claiming after the ceremony the turtle was "divided among the people" (David 1899:190).

*Wallis and Futuna*

Environmental Data

The country of Wallis and Futuna consists of three main islands each with a surface area of less than 10 $km^2$ (Ile Uvea, Ile Futuna, Ile Alofi) and 20 low coral or small volcanic islets. The islands are volcanic with low rolling hills. The country covers 177 $km^2$ of land and a sea area of 300,000 $km^2$. The highest point, which lies on the island of Futuna, is 765 m above sea level. The climate is tropical with an average temperature of

27 °C and average rainfall of 2,750 mm per year. Soils are mainly volcanic with some coral limestone. Futuna's freshwater sources include many small creeks flowing down the hills in deep gorges and many springs, along with permanent and intermittent streams. Uvea has several small lakes of volcanic origin and a few springs along the coast (UNEP 1998-2006; PBIF undated; Doumenge et al. undated; UNEP-WCMC undated).

Terrestrial ecosystems in the country include wooded valleys, fernland on ridges, grasslands, montane rainforest, pockets of lowland rainforest, some secondary forest and scrub, and a crater lake. Marine ecosystems include a lagoon rich in algae and barrier reefs. Futuna is surrounded by a narrow fringing reef, and there is a small patch of fringing reef on the northwest coast of Alofi (UNEP 1998-2006).

## Sea Turtle Population Data

The green turtle has been documented in Wallis and Futuna, and green foraging areas are present, though no specific locations have been noted (Trevor 2010; Fourmy undated).

## Ethnographic Data

As agents of the turtle god Fonu, sea turtles in Wallis and Futuna were sacred, and their sanctity "emanated directly from the gods" (Burrows 1936; Goldman 1970:333; Craig 1989). Sacred to the king and used as offerings to the gods, only the paramount chief could kill a turtle, which was cooked and eaten in a lengthy and elaborate ceremony lasting more than 12 days where the king strikes each piece of turtle individually to lift the taboo. This procedure was followed by an offering of turtle to appease the 'evil god of Futuna' who was responsible for natural disasters (Smith S.P 1892; Hedley 1896-1900; Burrows 1936, 1937; Rozier 1960 cited in Kirch 1994). The missionary records of Père Pierre Chanel documented no less than four such turtle ceremonies per year (Rozier 1960 cited in Kirch 1994). Ritual sea turtle consumption in Wallis and Futuna was restricted to the atua chiefs, who could at times merge with the gods they represented (Smith S.P 1892; Burrows 1936, 1937; Goldman 1970; Kirch 1994; Pollock 2001).

*Although all things might from time to time become tapu at the will of the King or great chiefs, "there is one thing only, which is always tapu. No one but the King, who rejoices in the title of Malo, or conqueror, has a right to the turtles (fonu) caught off the coast, or may even kill one. Near to each royal residence is a place set apart especially for the killing of them, and it is an occasion of great ceremony when one is dispatched. This is a custom common to most of the Polynesians*

*--- Smith S.P 1892:40-41*

## Chapter 4: Discussion

Now that I have presented cross-cultural, ethnographic, and historical understandings of sea turtles in the Pacific, I will discuss how they compare with various theories regarding the creation of sea-turtle consumptive tapus in the Pacific.

A fundamental question for numerous disciplines is what drives and directs humans to do what they do (Gragson and Blount 1999). For sea turtles in the Pacific, the crux of this question is in understanding how and why people interact with certain species as beings of great value, elevated through culture into more than just a food source. What are the cultural and other social constructs that hold these species in such high regard?

As stated previously, many theories have been promulgated regarding the presence or absence of sea turtle tapus. Here, I discuss those that are most frequent and oft repeated.

1. Tapu development was determined by the geography and environment of the island.
2. Tapus developed due to the sea turtle's designation as a 'liminal' creature.
3. Tapus were simply tools used to enhance social solidarity.
4. The tapus came about due to indigenous stories and legends, which originated from Southeast Asia.
5. The tapus came into the region with the initial settlers, who originated from Southeast Asia and entered the region through Papua New Guinea.

### *Previous Theory 1: Tapus developed based on geography and a poor resource base*

The cultural model of the "ecologically noble primitive" living in perfect harmony and sustainability with their environment is a common idea in Western thinking (Kempton 2001:57; Crumley 2001:viii). Though this may aptly apply to many indigenous cultures (McCay and Acheson 1987), this model has been questioned with regard to the impact of prehistoric peoples on island environments. Studies have shown that because of the consequences of isolation and limited size, island ecosystems are more vulnerable to the effects of human impacts than continental systems (Fosberg 1963 cited in Kirch 2000; Kirch and Hunt 1997). Furthermore, traditional peoples have not always lived in a state of harmony with nature, and though their impacts were minimal in comparison with

subsequent Western colonizers (Sponsel 2001), "some of their abuses of natural resources have been substantial" (Johannes 1989:7). "Virtually every corner of the biosphere . . . has been touched in some way by human action. The long history of human occupance [sic] has left few, if any, ecosystems in a pristine or fully natural condition. So large has our overall impact been that we may speak of an Earth transformed" (Turner and Meyer 1993:40 cited in Sponsel 2001).

Jeremy Jackson and others (Bjorndal and Jackson 2003; Jackson 2001; Jackson and Johnson 2001; Jackson et al. 2001; Jackson 1997) wrote a series of articles from 1997 to 2003 regarding the hypothesis that humans have been disturbing marine ecosystems since they first learned how to fish. They argued disturbance due to overfishing occurred worldwide over many centuries changing the function and structure of these ecosystems, "as early as the late aboriginal and early European colonial stages," and these changes drove many species to ecological extinction (Jackson et al. 2001:636). They concluded that overfishing of large vertebrates and shellfish always preceded all other major human disturbance, arguing the "historical magnitude of losses of large animals and oysters were so great as to seem unbelievable, … *fantastically large*" (Jackson et al. 2001:636 emphasis added).

Humans first appeared in the Pacific towards the end of the Pleistocene era, about 40,000 years BP (Irwin 1992). While subsequent settlements were more recent, archeological and paleo-environmental evidence suggests human colonization of these islands dramatically transformed them -- initiating extinctions, extirpations, and a complex array of ecosystem changes. Once human settlements were established, additional environmental changes were often seen, usually marked by changes in numbers of marine species. Jackson and others (Bjorndal and Jackson 2003; Jackson 2001; Jackson and Johnson 2001; Jackson et al. 2001; Jackson 1997) suggested animals with large body sizes; attracting the most attention - such as sea turtles, marine mammals, large fish and sharks - were the first to feel the impact of human activities.

Indeed, human colonization of the Pacific left concrete and archaeologically detectable evidence of the immediate devastation of easily exploitable species like land nesting seabirds and reef and lagoon species such as sea turtles. Handy and Handy (1972)

in their study of the economy of early Hawai`i reported, "These early traveling parties are expressly stated to have found the island uninhabited . . . For the first three months they subsisted entirely upon fish, turtle, and the nuts of a creeping-plant found growing along the ground . . . " (225). David Burley et al. (2001:100-103) provided evidence that in Tonga, as elsewhere in the Pacific, the initial colonizers were exploiting natural resources "to their maximum capacity," and concluded the short-term consequences of human settlement were numerous extinction events and probable depletions in "even the most abundant resources." Further research on islands such as Niuatoputapu (Polynesian outlier, Kirch 1988), Tikopia (Santa Cruz Islands, Kirch and Yen 1982), Tongatapu (Tonga, Spennemann 1987), and Tahuata (Marquesas, Rolett 1998), among others, demonstrate through faunal analysis that sea turtle populations were extremely vulnerable and were easily depleted by initial colonizers; never recovering to pre-contact states (Woodrom Luna 2003). Jackson (2001) explained the lack of recovery as due to several factors: low fecundity, late maturation, and long generation times; greatly reducing the speed of recovery after harvesting. Archaeologists such as Spennemann, Kirch, Yen and Rolett, have used the decreased numbers of easily exploitable species like land nesting seabirds and reef and lagoon species like sea turtles to determine initial colonization sites.

Robert Johannes (2002), marine biologist, argued that the end of these drastic impacts was due to the introduction of tapus, such as those discussed above relating to sea turtle consumption. His argument suggested initial human contact resulted in the devastation of human prey populations across the Pacific, and shortly thereafter, cultural practices were put into place to protect prey from the activities that led to that devastation. He argued taboos were imposed to avoid overexploitation of marine resources, and species conservation developed in traditional societies as a reaction to the initial devastation discussed above and continued as a means of human survival (Colding and Folk 1997).

Marvin Harris (1974) followed a similar principle of ecological analysis; that communities adapt not to average but to extreme conditions. He used the example of the sacred Zebu cow and the recurrent failure of monsoon rains in India. He argued that Zebu with their small bodies, energy-storing humps, and great powers of recuperation are capable of surviving long periods of drought and are resistant to tropical disease;

therefore, they are adapted to the specific conditions of Indian agriculture. Harris concluded 'cow love' is an active element in a complex, finely articulated material and cultural order. 'Cow love' mobilizes the latent capacity of human beings to persevere in a low-energy ecosystem in which there is little room for waste. He moved on to describe taboos as adaptive responses: "cultures tend to impose supernatural sanctions on the consumption of animal flesh when the ratio of communal benefits to costs associated with the use of a particular species deteriorates" (Franke ud).

In comparison, as shown in the Results section above, some Pacific islands could be said to provide a low-energy ecosystem for human inhabitants leaving little room for waste of resources. By virtue of their physiology, sea turtles are indeed similar to the Zebu, capable of surviving long periods without food or water and have great powers of recuperation. Sea turtles have the ability to quickly clot their blood in even the extreme circumstances of low oxygen, high blood acidosis levels, and high atmospheric pressure (Soslau et al. 2004). This trait allows them to survive severe injuries such as loss of limb and puncturing of their body cavity that would kill humans with the same injuries. Turtles evolved before the age of the dinosaurs and have persisted relatively unchanged from their original form, suggesting they are naturally adaptive to changing environmental conditions like disease. However, unlike the Zebu -- which though taboo for consumption provide dairy products, fertilizer and farm labor -- sea turtles provide no further nutritive or functional benefit. Additionally, the Results section of this document shows that some Pacific Islands contain energy-rich ecosystems with abundant resources, yet those societies still highly regard the sea turtle and display the same cultural ideologies toward them as societies on islands with low energy ecosystems.

Johannes (2003) theorized that not all Pacific Island cultures evolved identical 'primary beliefs' and preferences such as taboo systems. He argued that some cultures never developed such measures because they lived under circumstances "where marine resources greatly exceeded their needs; they literally could not deplete them and thus were unaware that natural limits on the yield of their marine resources even existed" (Johannes 2003:115). He proposed that a review of the literature would show societies that developed conscious conservation practices such as taboos, which restricted resource use, were usually small and relied on natural resources that were circumscribed by

geography and thus easily depleted (Johannes 2002). Following Johannes, whom I greatly respect, my own early work supported this argument (Woodrom Luna 2003; Luna 2003), though this dissertation contradicts that early work.

Similarly, the archaeologist Marshall Weisler (2001) previously suggested small societies (with low human populations) had little noticeable impact on the marine ecosystem. Conducting his work on Utrōk atoll, in the Northern Marshall Islands, Weisler wrote turtle was consumed for over a thousand year period without reducing the stocks – "that is, there is not a declining frequency of turtle bones from throughout the cultural layers" (Weisler 2001:130). According to Raymond DeBrum of Likiep Atoll and Jamo Island (Jemo), this may have more to do with turtle tapus than with small societies. Chief Debrum told anthropologist Jack Tobin in 1958 the following regarding how restricted sea turtle consumption was to non-elites in the Marshall Islands and Utrōk atoll in particular – only the eggs inside the female (if any) and the 'bottom' was available for commoner consumption -- all the rest went to the elites.

> *There was a special way of distributing the turtle flesh according to our custom. The turtles would come ashore on a land parcel (wāto) on the island. The lineage head (alap) would take the turtle and cook it in the earth oven (um). He would take the shell, the four flippers, and some of the intestines (mōjnal) that had been previously cleaned and washed. All of the rest of the meat was put in a basket and taken to the chief (irooj). The most important part of the turtle was the frontal portion (aerā). If that was not brought to the chief as well as the rest of the parts reserved for him, he might become angry and throw the people off the land… The eggs inside the turtle (Kooj lep niddik) and the bottom (lokwan) … go to the commoners (kajoor). If a person saw a turtle come ashore, he had to report it to the alap. (It is true today also). After the turtle is cooked, the hip (mur) is given to the person who reported the landing of the turtle as a reward. This is the custom, no matter what the age, rank, or sex of the person reporting the landing. People have been thrown off their land for not obeying the custom of giving to the chief. When the turtle was brought to the chief, he called all his alap(s) and selected one of them to be his Distributor of Food [steward] (ri-kōmōnā). This was done in turn. Each alap got his share of the turtle – no matter how small the pieces had to be divided into. The meat is highly prized because of the strong smell. The saying is 'Wōn ajjuwōnwōn' (strong smell of the turtle). And this makes even a small portion sufficient. These customs are [still] followed on some atolls, for instance, on Aelok, Utrōk, and a few other places.*
>
> *--- DeBrum 1956 pers. com. in Tobin 2002:161-163.*

As we know from the Results section above, Tokelau is the only Polynesian country that did not restrict consumption of turtles to the elite. Table 3 is used to compare geographic and environmental indicators to determine if they correlate with consumption restricted to elites.

Table 3: Geographic and environmental indicators for each Polynesian country.

| Country | Cook Islands | French Polynesia | Hawaii | Niue | Pitcairn Islands | Rapa Nui | Samoa (American and Western) | Tokelau | Tonga | Tuvalu | Wallis & Futuna |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **land area (sq km)** | 252 | 3932 | 16688 | 264 | 43 | 173 | 3142 | **10** | 715 | 26 | 177 |
| **Sea Area (sq km)** | 1830000 | 5030000 | 1629545 | 390000 | 800000 | 2930000 | 510000 | **290000** | 700000 | 1300000 | 300000 |
| **Max. Height (m)** | 652 | 2241 | 4169 | 73 | 347 | 511 | 1857 | **3** | 1046 | 4 | 765 |
| **Lowlands** | 7% | 5% | unknown | 7% | 7% | unknown | 7% | **7%** | 7% | 7% | 7% |
| **Isolation index** | 104 | 108 | unknown | 97 | 116 | 149 | 91 | **92** | 77 | 82 | 87 |
| **Total Vulnerability** | 26 | 35 | unknown | 22 | 31 | unknown | 31 | **17** | 36 | 40 | 20 |
| **Threat Indicator** | 2 | 5 | 5 | 3 | 2 | unknown | 3 | **1** | 4 | 2 | 1 |
| **Terrestrial ecosystems** | 12 | 17 | 26 | 10 | 4 | 3 | 25 | **4** | 12 | 4 | 13 |
| **Marine Ecosystems** | 9 | 7 | unknown | 3 | 3 | 3 | 9 | **3** | 7 | 7 | 5 |
| **Biodiversity Score** | 5.21 | 4.75 | unknown | 4.33 | 5 | unknown | 4.87 | **4.83** | 5.21 | 4.81 | 4.42 |
| **Described terrestrial species** | 16 | 2084 | 1291 | 830 | 3 | unknown | 4698 | **3** | 2997 | 200 | 6 |
| **Described marine species** | 566 | 2876 | 7005 | 392 | 268 | unknown | 2705 | **191** | 1881 | 61 | 90 |
| **Estimated number of described species** | 1621 | 2085 | 8296 | 1222 | 466 | unknown | 7403 | **486** | 4878 | 261 | 595 |
| **Land Area Indicator** | 6 | 4 | unknown | 6 | 7 | unknown | 5.5 | **7** | 5 | 7 | 6 |

*Lowlands* is the percent of land area less than or equal to ten meters above sea level (EVI 2010). *Isolation Index* is the sum of the square roots of the distances to: the nearest equivalent or larger island, group or archipelago, and continent (UNEP 1998-2006). *Total Vulnerability* is environmental vulnerability due to natural disasters including impact on habitats, ecosystems, and species (higher numbers equal greater vulnerability) (EVI 2010). *Threat Indicator* is the number of different types of catastrophic events reported in the region (UNEP 1998-2006). *Terrestrial Ecosystems* is a count of the number of described terrestrial ecosystem or biome types. *Marine Ecosystems* is a count of the number of described marine ecosystem or biome types. *Biodiversity Score* is a measure of total biodiversity in an area (EVI 2010). *Described terrestrial species* is the total number of different terrestrial species reported in the region *Described* Marine *Species* is total number of different marine species reported in the region. *Estimated Number of Described Species* is the sum of terrestrial and marine species, though in some references was given as an independent number and in those cases is not the sum of the two previous columns (UNEP 1998-2006; SPREP 2010). *Land Area Indicator* captures the richness of habitat types and diversity, availability of refuges if damage is sustained or for protection, and species and habitat redundancy (EVI 2010).

While Tokelau is the smallest country in maximum height, land and sea area, its isolation index is in the medium range; therefore its voyaging sphere would have allowed regular trade with its neighbors in the region. Additionally, there is some evidence that resource imbalances were absorbed in maritime societies by shifting settlement patterns to make more intensive use of marginal zones, which would also have provided a buffer against resources scarcity (Yesner 1980). In addition, Tokelau has the lowest total vulnerability score, which measures environmental vulnerability due to natural disasters, including impact on habitats, ecosystems, and species (higher numbers equal greater vulnerability). Tokelau's land richness indicator, which captures the richness of habitat types and diversity, availability of refuges if damage is sustained or for protection, and species and habitat redundancy, is extremely high. Additionally, its biodiversity score, which is a measure of total biodiversity in an area, is as high as or equal to the other countries. Taken together, I believe these facts demonstrate Tokelau does not fit Johannes's model.

In addition to reliance on an easily-depleted natural resource base, other theorists have discussed sea turtle tapu development as dependent upon life on "large" islands with more turtle predators; islands with limited shallow marine areas (which would in fact be irrelevant to pelagic sea turtle species); or life on "high" islands with stratified societies. For example, archaeologist Melinda Allen (2007), considered geography as a key component in the development of turtle tapus, theorizing tapus were more common on islands that are large, have limited shallow marine areas, or both – islands she categorizes as "high." Agreeing with Marshal Sahlins (1958), she suggested that turtle tapus would be rare on atolls. I believe the problem with this argument lies in the dataset used to develop this theory and the lack of reference to any of the earliest ethnographic reports. The sources duplicate, with a few additions, those found in two of my earlier works, one of which contained an incorrect conclusion, which was also based on a limited data set (Woodrom Luna 2003; Luna 2003). Allen presented a table, which she discussed as showing the dichotomy between high islands and atolls with regard to turtle consumption (Table 4).

Table 4: Traditional restrictions on turtle consumption by Allen (2007) versus those from this dissertation.

| Location | From Allen | From Allen | From Allen | Island Type | Max. Height (m) | land area (sq km) | Turtle Consumption |
|---|---|---|---|---|---|---|---|
| **Tikopia, Reef Is., Solomon Is.** | High | Everyone but only eaten by some clans | Firth (1967) | Single-cone volcano (Steadman et al. 1990) | 360 | 4.6 | No one (Rivers 1914), then much later few but not many people |
| **Pukapuka, Cook Is.** | Atoll | Men | Beaglehole and Beaglehole (1938) | Atoll w/3 islets | 4 | 7 | Elites, then much later later Ritual consumption by all |
| **Tokelau Is.** | Atoll | Everyone | MacGregor (1937) | 3 Atolls | 3 | 10 | Ritual consumption by all |
| **Mangareva, Gambier Is.** | High | Chiefs, priests | Buck (1938) | Mix of low volcanic, high volcanic and 1 atoll | 441 | 13 | Elites |
| **Futuna, Wallis & Futuna Is.** | High | Chiefs, priests | Burrows (1936); Goldman (1970) | Volcanic | 765 | 62 | Elites |
| **Uvea, Wallis & Futuna Is.** | High | Chiefs, priests | Burrows (1937) | Relatively flat w/18 low croal or small volcanic islets | 145 | 82 | Elites |
| **Rapa Nui** | High | Not known | Metraux (1957) | Volcanic | 511 | 173 | Elites |
| **Southern Cook Is.** | Mixed | Chiefs | Buck (1927) | Mix of 1 near atoll, 4 raised coral, 1 low coral, 2 atolls, 1 high volcanic (UNEP 1998-2006; WWF 2009; White 2011) | 653 | 218 | Elites |
| **Tonga Is.** | Raised coral | Chiefs | Williamson (1924) | Mix of low coral, raised coral and volcanic islands (UNEP 1998-2006; Lovell and Palaki 2002) | 1033 | 699 | Elites |
| **Tuamotu Is.** | Atolls | Men | Emory (1975) | Low atolls except for Makatea which is raised | 113 | 885 | Elites, and when turtle was **"abundant** . . . boys as young as nine or ten years . . . were **sometimes** allowed . . . to share in the **scraps"** |
| **Marquesas Is.** | High | Chiefs, priests | Handy (1923, 1927) | Mix of low volcanic and high volcanic | 1231 | 1243 | Elites |
| **Societies Is.** | High | Chiefs | Handy (1923; Ferdon (1981) | Mix of low volcanic, high volcanic and 5 atolls | 2241 | 1491 | Elites |
| **Samoa Is.** | High | Chiefs | Buck (1930) | Mostly high volcanic w/2 atolls | 1858 | 3100 | Elites |
| **Hawaiian Is.** | High | Chiefs, priests | Kalakaua (1888) | Mix of 8 high volcanic, 124 tiny islets of rock, coral, and sand (TGOH 2009) | 4169 | 16642 | Elites |
| **Fiji Is.** | High | Chiefs | Dean (1921); Tippett (1968) | Mix of mostly high volcanic, w/low volcanic and raised coral, 3 atolls, 1 continental | 1324 | 18272 | Elites |

Note the additional columns of data from this dissertation, which show the error of the original data. Island Type, Maximum Height (m), and land area (sq km) figures are from (UNEP 1998-2006) unless otherwise noted.

Three of the four locations she discussed as allowing consumption by islanders with less than elite status, Pukapuka Atoll in the Cook Islands, Tikopia Island in the Reef Islands Group of the Solomon Islands, and the Tuamotu Island Group in French Polynesia, actually restricted consumption to the elites (Table 4). For all three locations, Allen used references with dates a hundred years later than the earliest reports found by this author. For Pukapuka, Williams in 1838 reported, "… to this day no ordinary native dares eat turtle. To be an eater of turtle is to be a big chief" (Williams 1838:196). For Tikopia, Rivers (1914) gave the account of John Maresere relating Tikopian customs for his 20-year stay on the island during the 1800s. Maresere reported, "The turtle…was eaten by none of the people…" (Rivers 1914:304). Rivers also discussed why during later years some of the common people began to eat turtle saying: "It seemed that this departure from the old custom may have been due to the influence of John who had eaten turtle himself without harm and had thereby induced the ordinary people to follow his example" (304). For the Tuamotus, Audran (1918) relayed information collected by the Reverend Père Hervé during his residence in the islands in the 1800s about traditions from 20 generations before that time. Hervé stated, "All the world knows that the turtle is royal food in Polynesia" (Audran 1918:27). Taken together, I believe this demonstrates the erroneousness of Allen's model (Table 4).

***Previous Theory 2: Tapus developed due to liminality***

In addition to geographic or environmental explanations for sea turtle tapus, the most prevalent theories deal with the concept of liminality -- occupying a position at, or on both sides of, a boundary or threshold. These theories hold that sea turtles are different, dangerous, misunderstood (these words seem to be interchangeable) because they straddle the line between the land and the sea or deep ocean or the line between air breathers and water breathers.

The anthropologist, Mary Douglas (1966), in the most famous book on the subject of liminality, suggested societies are likely to see things as taboo when they deviate from the norm, or from what people expect, or are strange or difficult to classify. She argued things that exist on the boundaries between categories are perceived as possessing both power and danger – the result is a rule against contact with the marginal thing

(Welkerling 2007). This idea implies that sea turtle taboos are related to characteristics inherent in the sea turtles themselves, characteristics that Douglas (1966) stated deviate from the norm and are strange and difficult to classify. She argued tapus may be rooted in a belief that such things are too 'good' for humans to have contact with or that they are 'dirty' or 'polluting.' Douglas repeats a quotation from Lord Chesterfield: "Dirt is matter out of place" (Douglas 2007: unpaginated). She interpreted this statement to mean things are not considered dirty in and of themselves, but because of where they stand in a system of categories – 'pollutions' are not members of any clear category (Anonymous 2012).

*At the Boundary between Worlds: Sea Turtles as Liminal Creatures*

Sea turtles undoubtedly qualify as strange and confusing -- living as long as humans, living as they do both in the water and on land, having the appearance of human emotion in the form of the salty secretions their salt glands release from behind their eyes -- all of these traits could be considered strange for a fish (Wyneken 2001). Air breathing like us, but able to hold their breath up to 10 hours (Broderick et al. 2007), and able to migrate unerringly thousands of miles back and forth between the exact same foraging ground and nesting beach (Bowen and Avise 1994); all with no parental care, no transfer of knowledge from the older generation to the younger. Most notably, sea turtles have the ability to continue to make lifelike movements for a long period after death, even after postmortem dismemberment and evisceration (personal observations during sea turtle necropcies 2000-2008).

Undeniably, there are also aspects of the sea turtle's physiology that could be classified as polluting in the literal sense. As long-lived animals, sea turtles bioaccumulate environmental contaminants. A review by Alonso Aguirre et al. (2006) presented the myriad of health hazards associated with the consumption of sea turtles such as: the presence of bacteria, parasites, bio-toxins, and environmental contaminants. They report health effects of consuming sea turtles infected with zoonotic pathogens to include diarrhea, vomiting, extreme dehydration, and death. They found that levels of heavy metals and organochlorine compounds in sea turtle tissues commonly exceeded international food safety standards and resulted in toxic effects including neurotoxicity,

kidney disease, liver cancer, and developmental effects in fetuses and children. Based on past mortality statistics from turtle poisonings, they demonstrate women and children are particularly susceptible (Aguirre et al. 2006).

There is also support for Douglas' argument in the ethnographic literature. The range of island groups with stringent taboos regarding women and children 'could be' the result of the determination of their greater susceptibility to health effects. Additionally, 'perhaps' the highly developed, elaborate, and stylized rituals associated with their capture and consumption acted as Douglas described to 'purify' the animal or its human consumers. The restriction of consumption to male royalty 'may have' further developed as a status symbol to designate those who were immune to such 'pollutants.' Though I do not believe we can know 'could be,' 'perhaps,' or 'may have,' for certain, what is important is that Douglas was arguing that the classification of the animal came first and then the taboo prohibitions followed.

Douglas shows a very useful way of looking at animal symbols systematically and as part of a particular society and culture (Howe 2004). She also brings us back to this key concept of liminality. A liminal animal is something anomalous or on the margins, occupying a position at or on both sides of a boundary or threshold. It combines attributes otherwise kept separate, or at edges where one thing shades into another. Marginal beings are likely to be associated with supernatural forces, whether benevolent or malevolent -- the inverse of normality. Victor Turner (1969) suggested that humans possess an inherent need and capacity for various forms of liminal experience. The term liminality, derived from the Latin '*limen'*, or threshold, was used by Arnold Van Gennep (1986) as a metaphor for the social borders crossed through rites of passage. Important symbols in ritual, taboo, the supernatural, and so forth, draw upon the human capacity for liminality, and encompass social, emotional, environmental, and cognitive elements.

Kenneth Emory (1947) connected the idea of liminality with sea turtle reverence, suggesting certain chants performed during sea turtle rituals contrasted above and below, inland and seaward. Barry Rolett (1986) also discussed chants that contrasted 'above and below' and 'inland and seaward', but suggested sea turtle 'transcendence of boundaries between worlds' -- specifically transcending land and deep sea -- led islanders to believe

turtles could guide the dead to transcend between life and death (Rolett 1986:97). Patrick Kirch (1994) made an important point about Rolett's theory, writing, "Rolett's argument hinges on the hypothesis that Polynesian peoples saw an analogic relation between the air-breathing but marine-dwelling turtle, and the transcendence of boundaries between the material and spirit worlds" (Kirch 1994: note 40). Can we know what analogies a people spread over such a diverse and wide-ranging area of our planet made? No, I do not believe we can. However, the connection of sea turtles with the deep sea is not a new one. Edward Tregear (1890) writing on what he considered 'Curious Polynesian Words,' made note of the similarity of terms for the deep sea and the sea turtle (Table 5).

Table 5: Tregear's list of Polynesian words for sea turtle and deep sea.

| **Polynesian Words for Sea Turtle** | **Polynesian Words for Deep Sea** |
|---|---|
| * *honu* (turtle, Hawai`i, Tahiti, Mangareva)<br>* *fonu* (turtle, Tongan)<br>* *honuofai* (land tortoise, Tahiti)<br>* *hono* (turtle, Marquesas) | * *fonu* (full, fullness, Tonga; full, Vanuatu)<br>* *huhuhohonu* (high tide, Mangareva)<br>* *vahihohonu* (deep place in sea, Mangareva)<br>* *hohonu* (deep, profound, the depths, Tahiti & Marquesas; to be deep, Hawai`i; the deep sea, the high seas, Mangareva) |

Tregear argued, "It seems irresistible to connect the deep sea having given a name to the sea-turtle, or else that the turtle has given a form of its name to the deep sea, the words are regular and persistent, with little or no variation" (Tregear 1890:1).

Valerio Valeri (1985) also discussed sea turtles as liminal creatures, arguing they are liminal because they live in the sea and can swim -- like fish; but breathe air on the sea surface and are born on and walk on land -- unlike fish; and therefore, are "at the intersection of two domains, ocean and shore … The turtle can thereby function as a metaphor for the relation between the dead and the living – a relation that makes it an appropriate manifestation of the 'aumakua" (Valeri 1985:21, 23). Valeri, like Douglas, talked about sea turtles as confusing, "turtles confuse a class opposed to man [sea animal] and one to which man belongs [breathing animal] [and], thus can represent a relating of the human and the divine… that is due to and controlled by divine initiative, since turtles are [not] controlled by man. Thus, like everything that is uncontrollable, they have a negative connotation" (Valeri 1985:119). Stasack and Lee (1994) stressed the confusing

aspect of sea turtles leading to their use as ‘aumakua, terming them ‘transformation creatures’ that have a “magical ability” to cross between earth and water (Stasack and Lee 1994:9). Patrick Ching (2001) too supported the idea of liminality, reporting the turtle was a powerful animal to the people of Hawai`i “because it linked the ocean and land together. This was important to the people because many of the other animals they knew of did not have the ability to do this” (Ching 2001:4-5).

> *Turtle is seen as a benevolent character who inhabits the spiritual world and the physical world at the same time. It is the link between the two. Turtle is the foundation.*
>
> --- Sam Ka`ai in Davidson 2001:3

As I mentioned in the Preface, I do not reject the idea of liminal creatures. However, when we consider the facts from sea turtle physiology, the ideas that the sea turtle’s ability to live on land and in the sea, or to breathe air while being an ocean creature are the reasons for their liminal status, needs further justification. Contrarily, what stands out to anyone who has ever seen a sea turtle killed is their ability to continue to make life-like movements long after they are dead. Even after severing the spinal column, removing the brain and all internal organs; leaving nothing but the shell with flippers and tail attached and a bit of fluids, that sea turtle is still ‘swimming’ over an hour later, when you pick up the carcass to properly dispose of it (personal observations sea turtle necropsies 2000-2008). Such a physiological trait is undeniably worthy of the designation of ‘liminal.’ Once an islander sees what turtles can do after they are dead, turtles crossing boundaries between land and sea would not seem the least out of the ordinary.

Additionally, it is important to note that some of the various authors discussed above mention sea turtles as mediators or guides between heaven and earth, this world and the next, the ability to live while being dead supports these ideas (Valeri 1985; Rolett 1986; Davidson 2001). There is evidence in the ethnographic record that shows islanders knew sea turtles had this ability and thought it remarkable. Paul Hambruch (1936) when describing the Pohnpean city of Nan Madol (Nan Matol, Nanmatal) reported it was a religious center for the worship of the turtle god, *Nanusunsap*. Nan Madol literally means ‘in the space between things’ and it was constructed on an area called ‘the reef of heaven’

(Castle 1996). William Ballinger (1978) reported the sea turtle was considered worthy of worship at Nan Madol because the sea turtle's body still moved and seemed 'alive' after it was killed; a symbol of life after death.

F.J.H. Grattan (1948:79) wrote that in Samoa, the turtle's heart was known to continue to beat for "some hours after it is taken from the body, even against the pressure of a closed fist." On Kadavu Fiji Islands, the sea turtle was called, '*Ika mbula'*, 'living fish', a name reported by Reverend Wallace Deane (1921:175-176) to perhaps have its origin in the "well-known tenacity with which the creature holds to life."

For Hawaii, Patrick Ching (2001:4-5) wrote the honu [green sea turtle] was also considered to be a very powerful life force because of its ability to continue to 'live' even after being killed. Hawaiians believed because the "honu's body still moved and seemed 'alive' after it was killed, it had a great life force," and for this reason the head of the turtle was served with the meat to the chiefs – because the head continued to 'live' after being cut off (Ching 2001:4).

> *To an ali'i (chief), the meat of the honu was presented along with its head, which continued to "live" even after being detached from its body. This phenomenon was attributed to the honu's powerful life force. Hawaiians believed that by eating the honu, its life force would be passed on.*
>
> *The honu was also considered to be a very powerful life force because of its ability to continue to 'live' even after being killed.*
>
> *--- Ching 2001:5*

In Fiji too, it is reported consumption of the head was reserved for the chief of the highest rank, "because it was felt to contain the mana" (Thompson L. 1940:154). Mana is another word like tapu that has been translated with many meanings. Often it refers to power, luck, brightness, shininess, and efficacy; and it is linked to gods and chiefs (Gibbs 1994). Douglas Oliver (2002) provided a thorough explanation of the various definitions of mana:

> Some scholars have translated that word as having referred, throughout Polynesia, to a psychic force that flowed, like electricity, into objects, including humans, thereby making them fecund or powerful or effective. Others have translated it, also Polynesia-wide, as an adjective, one for characterizing the state of persons, places and objects made fecund or powerful by gods. And, at least one translation (this one by an on-the spot missionary lexicographer) defines the Tahitian version of the word as "power, might, influence; powerful, mighty, affluent; to be in power, possess influence" (Oliver 2002:51).

The offering of the head to the ranking elite is also reported in American Samoa, Banaba Kiribati, Chuuk State FSM, CNMI, Fakaofu Atoll Tokelau, Kambara Fiji, the Lau Islands Fiji, the Marshall Islands, Palau, Pukapuka Cook Islands, Samoa, Tokelau, Tonga, the Tuamotus French Polynesia, Tuvalu, and Ulithi Atoll Yap FSM (Montiton 1874 cited in Emory 1947, 1971; Krämer 1903; Macgregor 1937; Beaglehole and Beaglehole 1938; Thompson L. 1938, 1940a,1940b; Grattan 1948; Tobin 1957; Lessa 1962; Emory 1975; Balazs 1983; Lessa 1984; Johannes 1986; Kaay and Semese 1993;; McCoy 1997; Guilbeaux 2001; Tobin 2002; Resture 2003c, 2004b).

In the Mortlocks, the head of a green turtle was preserved and wrapped in numerous rags to protect it from dampness. The islanders were firmly convinced the island would perish through storm and waves if the head became wet (Krämer 1932). Richardson (1993) reported two Palauan legends featuring the talking decapitated head of a sea turtle.

*'0 te puoe te muhumuhu no te ta'ata ana'e iho 'o tei 'ite i te fa'aro'o*
*The sea-shell sings for him alone who knows how to listen*
*—From the Tahitian sayings (Stimson 1957:v)*

In his report of the Nan Madol complex, Arthur Saxe (1980) wrote, "Ponapeans, unlike North Americans, don't tell you all they know about things. A belief exists that if they do, they will die. Therefore, knowledge is shared piecemeal, a portion at a time. People will graciously answer your question and then stop. If you want to know more, you have to know enough to ask a more profound question" (Saxe 1980:17). Perhaps, had the liminal theorists discussed above known enough about sea turtle biology to ask the right questions (aka Saxe), all of these instances of the head going to the elite would be

found related to the sea turtles lifelike movements long after death; the boundary that sea turtles transcend as the boundary between life and death.

Yet, however plausible this may seem, a fascination with an animal -- regardless of the reason or existence of its liminal status -- "does not inherently lead one to conclude that the object is dangerous and must be avoided, or that it is sacred and must not be eaten…it does not explain why these ideas should take the form of taboos" (Fessler and Navarrete 2003:12).

***Previous Theory 3: Tapus began to enhance social solidarity***

The idea of liminality brings us back to the sea turtle rituals described in the Results section above. Douglas (1966) argued that a designation of liminal actually causes ritual -- rites enable people to avoid potential confusions -- rituals 'purify' and correct confusion. Emile Durkheim (1915) discussed community ceremonies centered on the totem animals that involved relaxing the normal taboo on eating the sacred animal in a communal meal during which people achieve a state of heightened emotion, or 'effervescence.' The heightened emotion leads to positive feelings toward the social group, which serves to enhance social solidarity -- linking together and reinforcing the social, natural, and supernatural worlds into a common system.

Roy Rappaport (1968) believed in the idea that cultural traditions, like taboos and rituals, are mechanisms that regulate human relationships with the environment. He argued some animals have more cultural value for ritual than for consumption, emphasizing the role of ritual in maintaining equilibrium between culture and environment. Arnold Van Gennep (1986) in his seminal piece, *Les Rites de Passage,* suggested that ritual can be compared to the windows and doors of a house; allowing things to pass into the house and between rooms, without having to destroy the integrity of the structure. Rituals provide openings, but also ensure that only the proper things pass through, at proper times, and in the proper manner.

Alfred R. Radcliffe-Brown (1958) argued that ritual and the ritual value assigned to certain objects reflects their importance in society. Under this definition, ritual values are social values, because they are a part of the fabric of society itself. He suggested these common interests and values are the foundations of social relations, and provide the basis

for individual and group associations (cultural value) with objects (like sea turtles) and occasions of importance (ritual value) (Radcliff-Brown 1952a, 1952b). The study of religion and ritual in particular is a means to holistically understand the 'emic' (local) perspectives of social individuals and the dynamics of social organization (Turner 1969). "Certain social activities are fully intelligible only in the light of values embodied and expressed at ritual performances" (Turner 1969:8).

*A System of Rites, Rituals Involved in Sea Turtle Capture and Consumption*

In their recent test of Johannes theory described above, Foale et al. (2011) demonstrated that in Melanesia, fishing taboos are primarily designed to manage relationships between social groups. Rebecca Bliege-Bird and others (Smith and Bliege Bird 2000; Bliege Bird et al. 2001; Bliege Bird and Smith 2005), argued the rituals and taboos associated with sea turtle capture and consumption raise the status of individuals as a signal of underlying strength, risk taking, skill, and leadership. Furthermore, the rituals are an effective means to broadcast these signals since the collective good (a feast) attracts a large audience. Similarly, Andrea Bender (undated) suggested sea turtle hunting is an arena for status rivalry and taboos related to it are instruments for monitoring and control of the compliance of cultural norms.

Donald Marshall (1957) also talked about the importance of sea turtle rituals, stating: "The turtle was an important ceremonial symbol, possibly because of the connotation of its unusual sexual member" (Marshall 1957:32). Marshall is referring to the male penis, which is disproportionately large for the turtle's size. The penis of today's average mature (80-100 cm shell length) green turtle is typically over one foot in total length (Hamann et al. 2003). The penis of today's average mature leatherback turtle (144 cm shell length), the largest of the sea turtle species (Figure 12), has been measured at 49.3 cm or 1.62 feet long (Eckert et al. 2012). *Scientific American* recently published an article entitled, "Terrifying Sex Organs of Male Turtles" (Naish 2012), which states: "observational data suggests that male turtles *might* employ their organs in display or aggression … (James 2004)" (Naish 2012:7).

Figure 12: A Leatherback turtle's penis is extracted from its cloaca during dissection on *Inside Nature's Giants*. Image (c) Windfall Films. Source: Naish 2012.

Throughout the world, a high cultural value is placed on the sea turtle penis. In the Caribbean, sea turtle penis steeped in rum is used as an aphrodisiac by older generations in the British Virgin Islands. In Santo Domingo Dominican Republic, many shops sell a rum drink containing pieces of fish, leaves, bark, and other ingredients to which dried sea turtle penis can be added as an aphrodisiac (the drink is called damajuana or mamajuana). Sea turtle penis is also considered an aphrodisiac in Haiti; it is added to a sugar cane-based drink (clairin). In Jamaica, sea turtle penis is sold by the inch and mixed with rum, wine, roots, oysters, conch, and other ingredients. Turtle penis was sold for up to USD1.75 per inch (2.5 cm) in 1992 (CITES undated and references therein).

Regardless of the reason, all across the Pacific sea turtles were, and often still are, highly regarded as important and necessary ritual food as well as venerated objects of rituals. Highly developed, elaborate, and stylized rituals -- enclosed in a multitude of rites and taboos, and lasting as long as a year -- were involved in everything from the production of turtle hunting gear to preparation for the hunt, the hunt itself, return of the

hunters, putting away of the gear, and for the offering, distribution, cooking, and consumption of sea turtles and their eggs.

> *A part of every one caught was offered to the gods, and the rest cooked with sacred fire*
>
> *--- Prout 1843:429*

> *The libation of coconut water having been poured, the hakari ... takes the "sacred stone" and places it on the stomach of the turtle, while the tuturi chants the following prayer offering up the turtle.*
>
> *--- Emory 1947:84*

> *Near to each royal residence is a place set apart especially for the killing of them, and it is an occasion of great ceremony when one is dispatched*
>
> *--- Anonymous 1892:41*

Harriet Ritvo (1987) argued to understand animal symbolism and ritual, one has to know about the humans with whom it is associated; both sides connected with and some times equated with each other. One also has to know the habits of animals, how were they used, how was that use controlled, or not. According to Ritvo, the supernatural events associated with breaking sea turtle taboos were not that common; very few people, if any, had any direct experience with their occurrence. She argued that they nevertheless inspired compliance; often such an event was more threatening as a metaphorical act than as an actual one. Conversely, Handy (1927) stated, "It is beyond question that in consequence of breaking tapu death actually occurred and still does occur in Polynesia" (Handy 1927:50). Breaking taboo was a kind of contamination, connected with the moral state of the perpetrator. "The native who disregarded tapu, whether of sacredness or unsacredness, was breaking psychic law, and the resultant physical effects were sickness, accident, and death" (Handy 1927:50).

So what made turtles immoral, dangerous? (Howe 2004). Howe argued animals are strongly associated with humans. "We ingest them, take them inside ourselves, our physiology depends on the transfer of qualities of the natural world into our bodies through food" (Howe 2004). Early Polynesians believed food to be a transmitter (Handy 1927). For sea turtles, considered gods, sacred, supernatural, this idea would heighten to include the taking in of that sacredness or even of the deity itself.

Daniel Fessler and Carlos Navarrete (2003) in their study, *Meat is Good to Taboo*, described several 'likely avenues' that led to the creation of taboos based on disgust (immoral, dangerous food). They argued first there was observance by a large audience of the effects of eating a toxic food (e.g., vomiting or death from eating turtle such as described in Aguirre et al. 2006), which led to social transmission of avoidance of that food. Second, this shared avoidance contributes to the formation of taboos, as observers seek to prohibit others from doing things that cause the observers pain. Third, avoidance leads to patterned behavior across members of a group (e.g., forbidden turtle) and punishment of violations of the pattern (e.g., death to the violator of the turtle taboo), "justifying their perspective through the creation of cosmological or other explanatory schemas" (e.g., turtles as gods, sacred, etc.). Fourth, observers acquire the responses of those who are nauseated at the *prospect* of violating the taboo or eating something that 'is not food' (e.g., the Fangarere who state if they eat turtle they will vomit (Firth 1930, 1967)). Finally, self-serving behavior on the part of the arbiters of culture can further reinforce the taboo since, being a highly valued food, the arbiters of culture are more likely to erect taboos that allow them to monopolize meat than they are to do the same with regard to other foodstuffs (Fessler and Navarrette 2003:23). In his study of indigenous resource taboos, Clark Monson (2004) suggested just such a scenario for Guam's taboo on flying foxes and the high incidence of neurological disorders among those who eat them. Monson argued predators high on the trophic scale, like sea turtles, bioaccumulate and biomagnify environmental toxins, something already proven by Aguirre et al. (2006) and discussed above.

***Previous Theory 4: Tapus came about due to indigenous stories and legends, stories and legends that originated in Southeast Asia***

> *It must be borne in mind that food shared and consumed with another constituted for the Polynesian a concrete bond or medium of rapport, perhaps the most intimate of all mediums, by reason of the fact that it was taken into the body.*
>
> *--- Handy 1927:195*

The idea of taking in the sacredness or even the deity itself when eating a sacred animal is fundamental to the fourth theory. A diffusionist approach that suggests that rather than developing after settlement through indigenous invention -- the independent

invention of cultural forms -- this reverence and the ideologies associated with it were transported into the Pacific from another place at some point in the distant past. Specifically, that they arrived with the initial human settlers. The tapus developed due to god-stories and early legends featuring sea turtles; stories and legends that originated the same place the settlers did -- Southeast Asia.

Van Wyck Brooks writing in the introduction to John Stimson's *Songs and Tales of the Sea Kings*, stated:

> He [Stimson] had cleared up obscurities and conflicting statements for the whole Pacific about the gods, who appeared now in a consistent light, and he had recovered the lost meanings of esoteric words by showing that the words survived on other islands. For the rest, the magnificent chants and prayers seemed to prove that the Polynesians had not come "up" from savagery but were descended from some great civilization in the Asiatic past (Brooks 1957:xxxix).

Pacific Island cultures are filled with traditional oral tales, the cultural importance of which has been widely acknowledged as having considerable value in the reconstruction of human history (Nunn 2004). Charles Redman (1999) discussed nature and culture as interlocking components of a single system; stating people convert natural phenomena into cultural objects and reinterpret them with cultural ideas or elements. Stories and legends are cultural elements Pacific cultures classify as belonging to a realm unto themselves – belonging neither to the cosmos nor to society – but combining attributes of both (Gell 1995). Folklore often consists of spiritualized explanations of cultural phenomena (Harris 1974), and cultures are "wrapped in stories and legends that draw attention to supernatural conditions" (Parikh 2004). Stories present people's account of themselves, a narrative record from the inside of their outlook on life (Gifford 1924).

William Robinson-Smith (1889) in his controversial book, *Lectures on the Religion of the Semites*, gave priority to the concept of holiness as the nature of what is uniquely 'divine' and as the most important concept of the sacred. He reported that in ancient religion, gods, like men, had a physical environment in which they acted and manifested themselves – gods were connected with certain places or areas -- the natural habitat of the god that must not be violated or infringed upon. Holiness during this time,

he argued, had nothing to do with morality or purity of life, but the basic underlying concept was restriction or prohibition. A holy place is prohibited to common use. There are holy waters, sacred trees, sacred animals, sacred caves and pits, sacred stones or altars, and shrines and sanctuaries were often erected at these sites. The solidarity of the tribe and the holiness of certain restricted places are the basis of the major theme of his work – sacrifice. Sacrifice, in the form of a sacramental meal, is the oldest and most essential of all "primitive" religious rites – it binds the god and his worshippers in a "mystic sacramental communion," uniting them in a life-bond for all social relationships. The development of the offering of atonement resulted from a period of loss of the sense of friendly rapport with the deity and a growing sense of malaise and need to regain favor. Robinson-Smith contended that what is essential is the proper observance of rites and customs, of rituals and cultic activities, and of food prohibitions (taboos) that are *believed to secure favor with the gods*. Andrea Bender (undated) agreed, suggesting taboo means not only forbidden but also indicates deep spiritual power, even dread, thereby implying there is *some sacred or supernatural sanction* associated with the prohibition.

*Sea Turtles and Supernatural Events*

Supernatural events are often attributed to sea turtles. Most relate to catastrophic events that occur when specific taboos, rituals and ceremonies regarding sea turtles are not observed, and some relate to attributes of the sea turtles themselves such as wisdom, miraculous cunning, purifying, savior or rescuer, and the ability to speak after death.

> *Tortoise shell was a prominent magical charm, and in fact, the neck plate of the upper shell had greater magical power than the tail plate.*
>
> *--- Erdland 1914*

> *The god was supposed to avenge the insult by taking up his abode in that person's body, and causing to generate there the very thing [a sacred turtle], which he had eaten, until it produced death.*
>
> *--- Turner 1861:239*

> *In the Northern Province, the people believe that if a pregnant woman eats turtle meat she will give birth to a child with flippers instead of arms and legs.*
>
> *--- Spring 1980*

*Sea Turtles as Humans*

Indigenous stories that present turtles as supernatural entities that move with ease between animal and human form are also prevalent. Edward Durkheim (1915:141) was one of the first to write on the cosmological systems of ancestral totemism -- the system where a natural object or animal is believed by a particular society to have spiritual significance and is adopted by it as a human ancestor or emblem. He saw totemism as a religion, suggesting religion always involves a distinction between things that are sacred and things that are profane. Totemic animals are sacred, and the classifications that situate them in relation to the other things of the universe at the same time assign them a place within the religious system as a whole. There is a connection between religion, classification, and the totem. Durkheim stated, "The relevance of these "primitive" classifications to the origin of religious thought is no less direct. They in fact imply that all the things thereby classified in the same clan or the same phratry [a descent group or kinship group] are closely akin to one another and to that which serves as the totem of the clan or of the phratry" (Durkheim 1915:149).

Totemistic beliefs are now more closely aligned with ancestor worship, where the totem is often regarded as human, as a relative, often with supernatural powers and as such is respected and venerated. Ancestor worship involves reverence granted to deceased relatives who are believed to have become powerful spiritual beings or, less frequently, to have attained the status of gods (Saliba 2007). One of the most widely reported sea turtle stories concerns the ability to assume human form at will. The sea turtle's actions in the stories often reveal a cosmological dimension that presents tales of the turtle as protector of the waters. Many stories refer to sea turtles as beings that used to be human, usually royalty, as human ancestors and relatives (totems), or as beings that can turn into a human and back again at will, usually as a protector, provider or rescuer of humans.

> *... The two women lying in the water in the hold of the canoe had suddenly changed into turtles.*
>
> *--- Guinea 1992b*

*The eila of Sor (with the three branches Sorelap, Soregis, Naureg) descended from the turtle …*

*--- Krämer 1932:88-89*

*The green turtle was a human being.*

*--- Kuschel 1975*

*Sea Turtles and the gods*

The Hawaiian historian, David Malo (1951), comprehended sea turtles' sacred nature, as suggested by Robinson-Smith and Bender, as the reason they were reserved for the chiefs and priest -- because the chiefs and priests were "the children and servants of the gods" (Malo 1951:47). Malo stated, "The genuine tapu of sacredness was always connected directly or indirectly with the *higher gods* who embodied the positive mana in the universe and protected all that was in intimate rapport with them" (Malo 1951:47, emphasis added).

In many Pacific locations, stories portray sea turtles as sacrificial foods, as gods, as sacred, as spirits, as supernatural and or belonging to, relatives of, protected by, or made by a god or gods.

*The turtle belongs to you [Karika, the ancestor god]…*

*--- Williams 1837:194-195*

*A turtle shell also was the god they worshiped till the "lotu" of the white men spread over all these lands.*

*--- Taliaitupou 1904:19-26*

*Certain articles of food, too, were considered permanently appropriated to the use of gods… turtle…*

*--- Hutton 1874:177*

*Sea Turtles in Creation Myths*

In line with their status as gods, sea turtles feature as key players in the creation stories of many cultures, and in some are the actual island itself.

*… The creation-tale… also tells how the god Auriaria overturned Banaba and buried Tabakea [the turtle] beneath it, so that he lies there to this day supporting the island on his back.*

*--- Grimble 1972:46*

*A very long time ago, the great sea was not so deep, and the land was mostly on two very big islands, two giant turtles floating in the water…*

*--- Mailly 1998*

*And in time, the island that the great sea turtle had made became known as Papua New Guinea*

*--- Stokes et al. 1978*

*The Tangaloa Cult*

*Certain foods appear to have been very generally restricted throughout Polynesia to the gods and their representatives, the priests and chiefs: such were…the turtle...*

*--- Handy 1927:46*

Handy suggested the turtle tapus exist because sea turtles were sacred for religious reasons – the sacredness came first, which necessitated reservation of turtles for the chiefs and priests as "the children and servants of the gods" (Handy 1927:46). Arguing that turtle tapus were *not* in place to restrict the best foods for the elite, Handy stated, "The genuine tapu of sacredness was always connected directly or indirectly with the higher gods who embodied the positive mana in the universe and protected all that was in intimate rapport with them." Handy further argued, "As a matter of fact, both the tapu and the theocratic systems were founded upon the fundamental principles of a religious philosophy undoubtedly more ancient than any of the culture traits peculiar to Polynesia" (Handy 1927:44-45). For Handy, the idea of turtles as tapu sacred embodiments of gods came from Southeast Asia and arrived in Polynesia by way of the first ancient settlers.

Handy contended that there are elements of Polynesian religion that belong to two "ancient foundational systems" (Handy 1927:312). The rituals involved in sea turtle capture and consumption, concepts of mana, sacred places like marae, offerings to the gods, ancestor worship, and the tapu system all coming from the eldest of these systems. A system brought in by ancient settlers from Southeast Asia related to the ancient Vedic religions of India (Hinduism and Buddhism), which he termed 'Indo-Polynesian' "because comparative study has led me to conclude that their sources are to be found in the regions long dominated by Indic religious influence" (312).

William Ballinger (1978) discussed the sea turtle's religious significance in Southeast Asia (the Far East), stating the carapace (top shell) represented heaven and the plastron (bottom shell) represented the earth:

> In India, the Satapathe Brahmana, as early as 6000 B.C., uses the turtle as an important emblem of creative power. Kurma is the foundation, at the bottom of the Sea of Milk, on which the creative pillar is reared in the age of reality. Vishnu, the creator, sits on the top of Mandara, the shaft of the world, which rests on the back of Kurma, "the turtle-shaped one, the maker" (Ballinger 1978:64). In the Indu religion, Kurma is also called Kachcha-pa. As Kachcha-pa, the turtle is considered the first of the nine treasures of Kuvera, the god of wealth. In other tales, Vishnu, the creator, appears as a tortoise to stir up the Sea of Milk from which the world of animated beings was to be created and the turtle is called Kacyopas, the lord, the guardian of the shores, he who occupies the shores (Ballinger 1978:64-65).

Several authors discussed the religious significance of the sea turtle in India. In the Hindu mythology of India the world is held up by four elephants standing on a turtle, the god Akupara (the World-Turtle) features in a creation myth as the turtle that holds up the earth and the sea, and the second reincarnation of Vishnu was a turtle called Kurma (Mustika et al. 2003; Lindemans 2004; Nier and Giovannini 2008). In Indonesia, turtles are the "Sustainers of life on Earth" and statues of Kurma form the base of the main temple shrines in the "Island of Gods" (Mustika et al. 2003: unpaginated). Green turtle meat is used in Hindu rituals in Bali, and on the Island of Java the most important Buddhist temple is decorated with panels that tell the story of the god Bodhisattva's past incarnation as a turtle and rescuer of humans (Troeng and Drews 2004; Nier and Giovannini 2008).

Handy termed the second ancient foundational system, brought into the region by later settlers mostly from southern China and Melanesia, 'Tangaloa-Polynesians.' He argued, by taking for themselves the name "ariki," which the Indo-Polynesians already used for chief, the 'Tangaloa-Polynesians' established themselves as chiefs over the earlier 'Indo-Polynesian' population. They introduced ideas of local, family, and personal gods; orators as the mouthpiece of the gods; god houses; and the idea of animals as embodying gods and ancestors. Handy wrote:

> It was probably the Tangaloa worshippers who introduced the habit of regarding certain animal species in particular – … turtles – as forms embodying or representing in some way particular classes of psychic [or otherworldly] beings. Their [the Polynesians] terms aitu and tupua were employed to designate respectively free and locally embodied psychic creatures (Handy 1927:321-322).

Turtles were indeed treated with reverence in ancient China. Temples often housed turtles, the shells of which were a means of telling the future. A turtle features in the creation story of China where the goddess Nu Gua used its legs to prop up the sky, and the god San-xing is represented as a turtle. A turtle is one of the four Chinese magical beings, holds the entire universe on its back, and is the source of the original magic square; turtle motifs were used in burials and stone turtles to support memorial tablets of the elite (Allan 1991; Claessen and Oosten 1996; Frazier et al. 1988; Eckert 1993; Lindemans 1997a, 1997b, 2004a, 2004b, 2004c, 2004d; Ruben 2001; Davidson 2001; Zi 2006; Nier and Giovanni 2008). Shun-Sheng Ling (1972) in his paper, *Turtle Sacrifice in China and Oceania*, provides photographs detailing turtles in China used as sacrificial offerings, in sacrificial rites, ceremonies, and fortune telling, associated with the deity of Kai Chang [Kaizhang, i.e., manifestation of the Duke Kai], and as stone and golden images in the Bilong [Pilung] and Donghsan Temples [official residences or palaces of the gods]. George Balazs (2000) also provides details of turtle worship in China, in his presentation, *Turtle Sacrifice to the temple gods in the Penghu Islands of Taiwan*. Balazs described offerings of sacrificial images of sea turtles to temple deities, especially the goddess Ma-tsu guardian of fishermen, at the Ocean Spirit, Tien Hou Ma-tsu, Golden Turtle, Fishing Boat, and Gold temples as part of the Lantern Festival of the Chinese New Year.

> Rice cakes made into all shapes and sizes of sea turtles are the most common items placed in the temples as sacrifice. Other offerings include turtle images fashioned from gold and coins. The PengHu people believe that the sea turtle is an auspicious creature, blessed with good luck and long life. Ling (1972), writing in Chinese, has drawn comparisons between the PengHu ceremonies and the ancient Polynesian practice of sacrificing and feasting upon sea turtles at stone altars in the remote Tuamotu Islands (Emory 1947) … Real turtles are not sacrificed during the PengHu ceremonies, although Ling (1972) speculates that they probably were used for this purpose in the distant past (Balazs 2000:1).

Is Handy correct? Did these ideologies arrive in the Pacific with ancient peoples from first India, then Indonesia, and then China? Can we really know? Perhaps more information is needed, such as that provided by the next theory, one that is directly related to Handy's work regarding import from Southeast Asia.

***Previous Theory 5: The tapus themselves came into the region with the initial settlers, settlers that originated in Southeast Asia***

Supporting Handy's (1927) early work on *Polynesian Religion* discussed above, the idea of sea turtle tapus having traveled into the region from Southeast Asia is one that is receiving new attention. Another diffusionist approach that suggests rather than developing after settlement through indigenous invention, the reverence and ideologies associated with sea turtles were transported into the Pacific from another place at some point in the distant past. Specifically, it is hypothesized that they arrived with the initial human settlers that traveled from Southeast Asia, who stopped for thousands of years in Papua New Guinea, before proceeding into Polynesia.

One of the lines of evidence used to determine settlement patterns in the Pacific is the presence of Lapita pottery. It is considered a horizon marker for Pacific colonization -- an artifact that diffused widely and rapidly -- one of the stylistic characteristics of which is often called the Lapita face. Recently, two Pacific archaeologists suggest the faces, previously considered human, are actually sea turtles (Terrell and Schechter 2007, 2009):

> We have put forward evidence for saying that 'faces' on Lapita vessels from thousands of years ago and certain designs on historic and modern carved wooden bowls and platters from the Sepik coast of Papua New Guinea are two ways of representing the same thing: sea turtles and certain traditional ideas such creatures evidently have evoked (Terrell and Schechter 2007:79).

They cite ethnographic evidence using a Papua New Guinea creation myth, *The Turtle and the Island*, likening it to the story of Adam and Eve - where a primordial creator turtle contributes to the rise of humankind - as well as archaeological evidence using Lapita pottery (Figure 12).

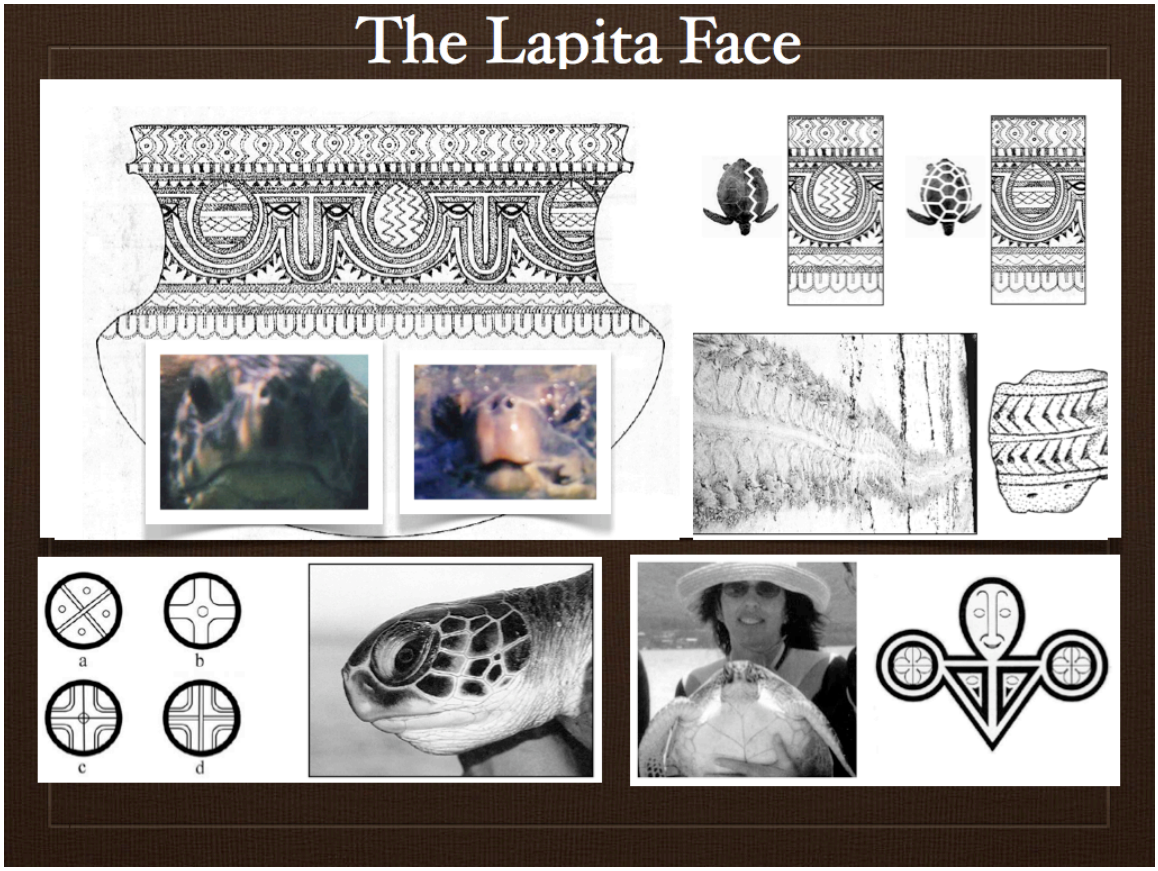

Figure 13: Stylistic characteristics of Lapita pottery and the "Lapita Face" that Terrell and Schechter (2007) suggested may in fact be sea turtle images.

Terrell and Schechter (2007, 2009) argued that sea turtle legends, tapus, and rituals all began in Papua New Guinea with one renowned sea turtle in particular. From the Vanimo creation story, *The Turtle and the Island*, a primordial creator turtle responsible for the rise of humankind. They also support Rolett's idea of turtles as liminal creatures because they transcend 'above and below' as discussed and refuted above.

> Given what we have suggested here, we are prepared to argue that Spriggs's double-faced design type symbolically alludes to a fabled culture hero, say, riding on the back of a legendary sea turtle, such as in the tale from Vanimo. On a more speculative note, we wonder whether the complementarity we find in Lapita iconography may reflect the 'above and below' theme noted by Rolett (Terrell and Schechter 2007:79).

Yvonne Marshall who discussed Terrell and Schechter's interpretation argued:

> I am suggesting that inscribed Lapita was invented to display and thereby materially lay claim to the lived valuables, including foods, through which power and status were negotiated. Inscribed vessels carrying explicit amplified messages held and displayed valuables, possibly including turtle meat, during socially constitutive events. The choice of pottery serving vessels with stands placed the Lapita message at the centre of rituals of encounter in which the presentation and sharing of selected valued items was a critical component. Inscribed Lapita vessels ensured valued items would be seen and acknowledged by all in these ritually powerful settings (Marshall 2008:71).

Echoing Marshall, Adrienne Kaeppler (2007) wrote on "special wrappings and containers for divinity, how these added sacredness to the objects they contained, and how divinity became embedded into objects, their wrappings and their containers" (Kaeppler 2007:97). She described a god house given to Cook in Hawai'i with a turtle shell door containing a cord (Kaeppler 1978, 1985) and suggested it was the turtle shell door frame that showed it was a receptacle into which a god could be called by prayers or offerings. The cord she referred to is fabricated of coconut husk fibers, human hair, and animal intestine objectifying life-giving qualities:

> Apparently, an `aha cord that was made during the chanting of a prayer entangled or captured that prayer and objectified it. The `aha cord, or objectified prayer, could then be placed in the hale waiea, house for the preservation of life, the doorway of which might be outlined with turtle shell, an objectification of lifegiving qualities (Kaeppler 1985:122).

This cord, as described, is much like the ones Polynesian kings used to tap the turtle pieces to break the tapu as described in the Results section above. Additionally, Kaeppler described Emory's translation of Rev. Père Hervé Audran's report on the Tuamotus writing: "in his account of the sacrifice of a turtle on the marae, Montiton (35, p 379) described, the libation of coconut water having been poured, 'a sacred stone of oval form which bore the effigy of a divinity,' which the hakari kept in the god house and placed on the stomach of the turtle as it was consecrated while the tuturi chants a prayer offering up the turtle" (Emory 1947:34). Again quoting Emory, she wrote:

> In a Vahitahi version of the prayer delivered when the turtle is offered at the marae, occurs 'he tiki makoha' (a makoha image). At Hao, makoha means braided or put together, or is applied to a bunch of coconut fibers prepared for cordage. Hence, tiki makoha may be an image of braided sennit" (Emory 1947:30 in Kaeppler 2007:117). At Fagaau, the "sacred breast plate of the turtle, was offered up before one and then another of the upright slabs called Tauruhua, Kainuku, and Puniava, and standing to the side of the platform at Ramopohia marae (Emory 1947:84).

On Tench Island in Papua New Guinea, the Hamburg Expedition obtained a 47 cm long by 18 cm wide wooden figure of a turtle. "The limbs are laid on the shell; the head outstretched and brought to life by several limed grooves. Chiseled lines rubbed with lime also outline the plates of the carapace. Even with all the simplicity of presentation, it is quite obvious that *Chelonia mydas* is being represented" (Nevermann 1933:202).

> Finally, we have offered a plausible reason for why this symbolism has endured for so long. Sea turtles are reported to figure prominently in the lore and cosmology of Pacific Islanders (Terrell and Schechter 2007:80).

Papua New Guinea is, as Terrell and Schechter suggested, rich with sea turtle lore. A sea turtle features in the creation story of Papua New Guinea as the progenitor of all sea turtles, the creator of the dry land that became Papua New Guinea, and matchmaker to the first man and woman; tasks that took place "when turtles had teeth" (Stokes et al. 1978:). In Papuan folklore, turtles received their shells after escaping from a god's children (Dixon 1916; Daly 1993).

Silvia Spring (1980, 1981a) presented the traditional laws followed in procuring turtles for the elites (often simply called elders). Turtles were feast foods with up to 60 turtles required when the chief organizes a turtle hunt using specially trained and recognized turtle hunters. The magic man cuts a special vine containing turtle magic and calls the turtles out of the water, but only for these special feasts. The hunters must organize their personal affects and dress neatly; they cannot gossip, have bad thoughts, spy on others, or sleep with their wives the night before a hunt. A man with a pregnant wife cannot go on the hunt; and no wife can sweep, work, or walk about, and their children cannot play or make noise until the hunt is over. The leader of a sacred turtle net (a magic man himself) cannot sleep with, speak with or eat with his wife for one year before the hunt, and must bath in the sea to call the turtles before the hunt. His wife too

had to bathe in the sea, and then tie on a special grass skirt that she must wear until the net came back to the village again. The leader of the net set a date to cast the net, and ten canoes were used. During the hunt, no one may speak except the leader. As a turtle is caught, a cry is yelled, and a trumpet shell is blown. Women and children are forbidden from touching the turtles. The turtles had to be caught without harming the turtle:

> In the old days, the village elders believed that drinking turtle blood would increase their diving and swimming powers and so turtles had to be caught without a drop of blood being spilled (Spring 1980:16).

On Tabat, Lihir, and the main island of New Ireland Province, turtle was reserved for the chiefs (Paringson et al. 1999). In the Manus Province, rather than eaten, turtles were used in rituals, to exchange for war prisoners then consumed ceremonially, and were protected totems for those who would never kill or eat them. In Tutu Village, two clans have the leatherback as totem and if this ownership is not recognized, the leatherback will stop nesting (Seligman 1910; Murray 1912; Nevermann 1933; Fortune 1935; Schwartz 1963; Spring 1980; Quinn and Kojis 1985). Turtles were also protected ancestral totems on Murua (Woodlark) Island, East Sepik, Cape Nelson in the Northern (Oro) Province, and the Trobriand Islands (Murray 1912; Schwartz 1963; Spring 1980, 1981a).

On M'buke Island, pieces of turtle meat were used as invitations to ritual performances and important exchanges, carved figures of turtles decorated the stands that held the painted skulls of the male head of the family (transformed by death into a powerful spirit), and turtle skulls were hung in the men's house (Mead 1933; Nevermann 1934; Gustafsson 1992). On Taku Atoll (Takuu), turtles were sacred, were ritually killed and cut up with certain parts reserved for the Ariki, were the proper offering to the island spirit who healed a fatal injury, and "spirits sent turtles to their mortal wards, or guide the feet of their wards to the turtles" [a ward is an adult male with an individual spirit that is his and that has him] (Fortune 1935; Mead 1932:181; Moyle 2007).

> *Sir Ghosts ... his ward will say, "Is there a turtle to the east of me now?" Then if the only turtle near is to the west Sir Ghost can make the itch in his helpless votaries' back answer, "yes" to that false mortal suspicion.*
>
> *--- Fortune 1935:59*

Turtle had an important place in presentation and feasting on Ponam Island in early Manus (Carrier 1989, 1991). In Manus, turtles were caught by special nets made and used through special and magical rituals, were not eaten by magic men with power over turtles in fear they lose their magic, were not eaten in the Trobriand islands lest it ruin the magic of the yam garden, and turtle shell ornaments hung from the beams of sorcerers' homes.

In Turubu Village, East Sepik Region, violation of these tapus meant the eruption of sores on the man's body while his arms and legs would swell (Spring 1980, 1981a; Parkinson 1986). Gravestones are often decorated with turtle designs, sometimes highlighted with red enamel paint, and when the mourning period was over a "turtle dance" took place to "shake the dust out of the house of mourning" (Mead 1956:126; Parkinson 1986).

In Northern (Oro) Province, a pregnant mother never ate turtle for fear her child would be born with flippers. In the Arawe Islands of West New Britain Province, a pregnant mother never ate a hawksbill for fear she could no longer bear children. In Kui Village of the Morobe Province, no one ate leatherback lest they become weak (Spring 1980; 1981a).

On Daru Island Western Province, in preparation for a turtle hunt, "a wooden figure of a man is set up by night, and a charm something in the nature of a small bull-roarer is swung," special charms are put on the prow of the canoe, and once caught the turtle may only be cut up by one particular man (Beaver 1920:57). Wooden images of turtles and other animals, painted red, were hung along funeral screens at gravesites (Gill no date given cited in Beaver 1920). At Matura, also in the Western Province, turtle is an important food and the cause of much ceremony. Pregnant women were not allowed to eat turtle and a man with a pregnant wife could not go on a turtle hunt or spear turtle (Beaver 1920).

In the Fly River area, there are special sorcerers, "a charmer of turtle," that provide charms for turtle hunting. On the Northeast coast, killing a turtle is an occasion for a clan mark – a raised scar that is a sign of having killed a turtle -- though on Kiwai Island, it is the sister of a brother who has killed his first turtle that receives scarification.

In fact, turtle spearing is one of the great ceremonies of Kiwai where ancestor graves are tended carefully lest no turtle be caught (Beaver 1920):

> On one occasion the grave of one man only, named Bidja, was neglected. When afterwards the villagers went out to the reefs in their canoes, everybody speared many turtle except Bidja's people. In the night his spirit appeared and spoke to them, and they heard a voice without knowing whether it came from the canoe or from under the water, it said, "Oh, my friend, no fault belong me; you no been make my burial ground good, you fellow no can find him turtle, you fellow nothing go back. Next time you fellow look out my burial ground good, next time you see." The people returned to the village and did as they had been told. When they went out again they speared a great number of turtle, and afterwards were careful not to neglect the graves of their dead parents (Beaver 1920:305).

So, does the prevalence of sea turtle lore in Papua New Guinea substantiate not only Terrell and Schechter's but also Handy's theory that sea turtle reverence entered the Pacific with the original settlers from Southeast Asia? Kirch argued that it did:

> When the ancestors of the Polynesians first colonised the islands of Remote Oceania — which, before the arrival of humans, had no large vertebrate predators — the populations of annually nesting sea turtles may have appeared to be a vast, incredible food resource. Although prolonged predation by Polynesians certainly led to reduced numbers of these sea turtles (attested by significant declines in the quantities of turtle bones in later archaeological assemblages), the symbolic and ritual associations developed in Ancestral Polynesian society were retained, albeit in modified form, in many Polynesian culture (Kirch 1994:285).

Traditional rules regarding sea turtle consumption in the different island groups that make up Polynesia contain remarkable similarities. Those similarities combined with the relatively short settlement time frame presented by Wilmshurst et al. (2011) above, do suggest an origin for sea turtle tapus in ancestral Polynesian society (Kirch and Green 2001), possibly before migration took place into this region of the Pacific (Handy 1927; Terrell and Schechter 2007, 2009).

## Chapter 5: Conclusion

For years, conservationists have called for better information on sea turtle and human interrelationships (Balazs et al. 2000, Frazier 2006). This circumstance, as well as the implications for conservation of both sea turtles and the human-turtle relationship of the peoples that interact with them, were the subjects of this dissertation. I addressed the question: What are the cross-cultural, ethnographic and historical understandings of sea turtles and how do they compare to various theories regarding the creation of sea-turtle consumption tapus in the Pacific? My aim has been two-fold:

1) to empower the people of the Pacific in the management of their sea turtle resources through the reintroduction and revitalization of traditional management measures; and

2) to educate those Pacific populations, who are requesting exemptions to existing sea turtle conservation laws to allow for a traditional and cultural harvest, about the specifics of what such a harvest would involve when following traditional laws regarding who, what, when, where and how turtles could be captured, killed, prepared, cooked, distributed, and consumed.

The various theories regarding the cultures that created sea turtle consumption taboos (versus those that did not) have suggested reliance on an easily depleted natural resource base, life on 'large' islands with more turtle predators, islands with limited shallow marine areas, and/or life on 'high' islands with stratified societies led to purely chiefly consumption (Johannes 2002; Allen 2007). In my opinion, the only thing we know for sure is that these widespread, similar practices took place across many environmental types of islands. Such widespread and similar practices would therefore logically lead to the conclusion that the development of sea turtle taboos had nothing to do with the environment, island geography, or resource base the society was living on.

The association of turtles with gods, as human, as capable of supernatural feats, as ritualistic sacred items, as special and restricted foods, and so forth, is not limited to any one geographic area; nor do they individually, or as a group, exclude any geographic area. Instead, these associations stretch from the Northern Marianas to the Torres Strait to

Rapa Nui and Hawai`i -- an area covering not only Polynesia but also Melanesia and Micronesia, with the exception of the Line and Phoenix Groups that have no indigenous population and for which no information could be found (Woodrom Rudrud in preparation). Arguably, these cultural traits show a pan-Pacific distribution, and this large area encompasses a wealth of linguistic groups and every conceivable type of social structure suggesting that none of these influence sea turtle reverence or significance.

The only consistency between all these diverse cultures is the sea turtle itself. An amazing food *could have* easily become a marker for social boundaries, differences, and group identities. A part of the delineation of social classes – different food, different preparation methods, different rules of eating – which *can* also become a marker of who is willing to eat with whom. At some point in time, *perhaps* sea turtles became marked as a boundary between peoples and over time these boundaries became increasingly prominent, as the need to differentiate islanders from foreigners and enemies continued. Once not eating turtle marked the boundaries between groups, *perhaps* then the practice became permanent.

Heather Young Leslie (2007) suggested cross-culturally, many peoples include non-human beings as 'persons' with whom they interrelate in emotive, cooperative and/or competitive, and productive ways. She presented the example of Tonga, where ocean beings such as fish, sharks, and turtles "are understood as partners rather than prey," and she discussed foraging and hunting peoples who often describe certain animals "as sentient beings who give themselves as food to humans, often out of love." A further example from Fiji relates the belief that by coming onto land, sea turtles "sacrifice themselves for traditional purposes" (MacCay et al. 2008:8).

The many similarities between sea turtles and Pacific islanders -- long-lived, great survivors, great navigators, competitors for limu, fish, shellfish and crustaceans, possessors of mana -- *could have* acted to create for them a symbolic view of sea turtles as 'persons' as Young Leslie described – relatives of gods and men.

However, notice all of the "could have" and "perhaps" in the last two paragraphs. Such thinking simply puts us right back into the trap set for the previous theorists: the argument makes sense – but we simply cannot know for certain. The trap I refer to is the

distinction between presentism and historicism raised in the work of George W. Stocking and other historians of anthropology. Presentism refers to judging the past based on the present and can be very distorting and misleading (Sponsel 2009). Historicism refers to trying to objectively document and interpret the past in its historical context. It is easy to judge in hindsight, but it can also misrepresent the historical context and create more problems than it resolves (Sponsel 2009).

What is certain is that all across Polynesia, traditional cultures held the sea turtle in high regard and, with only one exception (Tokelau), restricted their consumption to the elite. Sea turtle taboos have important ramifications for the protection of endangered species like sea turtles (Colding and Folke 1997). Indigenous peoples inhabit nearly one-fifth of the Earth's surface (Martin 1993). Active involvement of these groups in the protection and conservation of species and biodiversity is extremely important, especially for protected species, where problems have arisen when local groups have been denied access to a traditional resource (Colding and Folke 1997). A study by J. Colding and C. Folke (1997) demonstrated that some taboos totally protect threatened and ecologically important species, thus serving not only conservation ends, but also preserving the culture of the communities involved.

***The Loss of Traditional Conservation Measures***

Michael Warren (1992) demonstrated that studies that depict local communities and their knowledge as "primitive," simple, and static are now countered by a rapidly expanding database generated by both biological and social scientists describing the complexity and sophistication of many indigenous natural resource management systems.

Charles Birkeland and Alan Friedlander (2001; Birkeland 2005), for example, point to traditional fishing gear, which they argued was time-consuming to make, designed to catch just the target species, and biodegradable -- the line was made from coconut fiber, hooks from stone and bone, and rocks and shells were used as weights. Therefore, species remained abundant, preventing the modern day issues of bycatch and ghostfishing (lost or abandoned gear that continues to 'fish'). So, why then did these very effective systems disappear?

Johannes (1998) argued traditional systems collapsed with colonialism because of outside interference and the forced institution of open-access conditions. He stated, "when such local customs and laws were precisely defined and fixed legally they tended to freeze tradition, leaving villagers less flexible in their responses to demographic changes, changes in technology, or other developments that require adjustments in local resource use patterns and controls." He also argued that colonial governments, ignorant of traditional management structures and institutions, introduced various types of ineffective centralized natural resource management policies, which persist today and often greatly weaken the power of local authority. Others suggested these systems have been lost as a result of acculturation, development, commercial fishing, and population growth (Calamia 1999).

In addition, Pacific Island economies and cultures have changed and are increasingly influenced by external forces. Furthermore, younger generations may not adhere to traditional roles and customs. Changes in political authority structures and social practices, loss of respect for ceremonial restrictions and turtles' spiritual significance, along with the introduction of mechanized gear, have had negative effects on sea turtle populations. Outboard motors and modernized attitudes mean easy and unrestricted access to all areas at virtually any time of the year. As Johannes pointed out, the introduction of commercial fishing, the rise of important exportable resources, and the introduction of new fishing gear and faster boats have all brought new management challenges with which traditional measures were not designed to cope.

Another factor, presented by Birkeland (2005), is that as the human population and economic demands increase, as technologies advance, and as governments and societies spread, people's conceptual frameworks change. In the past, islanders were very much aware of their limited resources and of the consequences of overharvesting. If islanders overharvested their resources, they did not have the option of going to the store or importing supplies from elsewhere. In such small, self-supporting societies, responsibility was imperative because people were dependent on local resources. In contrast, industrialized nations have a vast web of buffers that protect their citizens from the effects of local resource depletion; therefore, much of the public does not perceive an immediate dependence on responsible resource management (Birkeland 2005).

Without having to confront these serious consequences, human society has become detached from the results of its actions. As Birkeland stated, "it is possible for villages in American Samoa and Yap to manage coastal resources, but how can indigenous people manage coastal resources in Waikiki or Hong Kong?" He argued that the result of the global mixing of cultures on responsible management of resources by indigenous people is arguably as serious as climate change. Human populations are growing, and the resulting urbanization and immigration of people are changing Pacific cultures from subsistence to participants in the international cash economy. The byproduct of human population growth and technology is the global economic demand that overwhelms local control of marine resource harvest and leads to loss of responsibility. If a village community controls local harvests, the villagers are likely to protect resources in consideration of future local harvests. If they cannot control extraction by outsiders, then they are more likely to feel they may as well harvest them themselves (Birkeland 2008). While some may assume the greater threat to sea turtles comes from external forces like drift nets of foreign commercial fishing fleets, in reality, "the consumption of nesting turtles and their eggs appears to be the single-most important source of turtle mortality" in the Pacific (NMFS and USFWS 1998a, 1998b, 1998c).

### *Spiritual Ecology*

Few believe conservation was the aim of the traditional laws presented here; nevertheless, conservation of the sacred species was often the result (Zann 1985; Johannes 1978). Anthropologists have demonstrated that religious beliefs can influence the ways in which humans interact with the environment, and religious beliefs of ancient peoples often helped to protect the natural resources on which they relied (Sponsel 2001c). The taboo restrictions were not laws, as we know them today, but were more cultural, religious, and spiritual in their nature. The importance of observing and obeying them was a cultural construct. As such, the benefits gained by obeying them went further than simple avoidance of a legally imposed penalty. Religious and cultural values such as the spiritual and social aspects of conformity to a cultural ideal also came into play (see Zann 1985; Kirch and Yen 1982).

> Spirituality is part of being human, and religion is an inevitable component of culture and society . . . religion can serve to regulate human behavior in adaptive ways that help maintain the balance between natural resource consumption and the carrying capacity of their ecosystems as well as avoid irreversible resource depletion or environmental degradation (Sponsel 2001c:8).

Sponsel (2001a) examined the assumption that many, if not most, indigenous societies are guided in their ecological relationships by a profound spirituality in which the environment is respected and treated as sacred. The power exerted by such religious and cultural ideals in significantly influencing the actions of large groups of believers to behave in drastic ways has been demonstrated throughout history. Religious, as well as religion, as used in this context does not refer strictly to membership in a contemporary religious denomination but is defined broadly to include a pursuit or interest to which some one ascribes supreme importance, treated or regarded with a devotion and scrupulousness akin to worship. Of course, there are those who profess no religious belief, but the vast majority who do, and who would be influenced by a religious view of the environment, would far outweigh the acts of the few. Anthropologists have yet to discover a single culture without a religion (Sponsel 2001a). Sponsel (2002) pointed to the Spanish Inquisition, the Holy Crusades, the Heaven's Gate mass suicide and even the current terrorism crisis, and argued there can be no doubt of the power of cultural religious beliefs to significantly influence people's behavior.

In a 1998 interview on the Oprah Winfrey Show, Gary Zukoff, author of *Seat of the Soul* (1990), stated, "the opposite of good is not evil, it is indifference; the opposite of love is not hate, it is indifference, the opposite of right is not wrong, it is indifference." Indifference is a noun meaning apathy, a lack of interest, care, or concern; lack of importance or significance; ordinariness or lack of quality. The majority of modern peoples are indifferent to the right of nature to exist for its own sake. They neither care nor are concerned, unless they are shown how it benefits them. Religion is the key to changing that attitude, and spiritual ecology may be the key to integrating religion with ecology. Spiritual ecology refers to scholarly and scientific studies of the dynamic relationships among religions and spiritualties on the one hand, and environments, ecologies, and environmentalisms on the other (Sponsel 2001b; 2012).

One of the principals of spiritual ecology is community – the unity, inter-relatedness, and interdependence of all beings and things (Sponsel 2001b). Because of the interdependence of all things to one another, we do not destroy nature without destroying ourselves. As Sponsel (2001:195) so aptly put it, "Ecocide is assured suicide for *Homo sapiens*."

Religion has the ability to change lives. Within it lies the power of rebirth – to be born again. Perhaps, within it lies the power to change our modern attitudes toward nature – to allow nature to be born again into our worldview. "The ecocrisis is a moral crisis in which religion can act as the primary source for constructing an attitude of respect and reverence for life and diversity" (Sponsel 2001c:9).

***A New Way Forward***

The best way managers can effectively manage sea turtle resources is to increasingly take into account and incorporate traditional conservation measures, such as, but by no means restricted to, the *tapu* restrictions discussed above.

> Political philosophers – from Aristotle to Marx and Nietzsche – have long speculated that citizens are more likely to do what they are supposed to do if they believe the moral codes that regulate their lives are not arbitrary social constructions but rather are anchored in bedrock values that transcend the whims of mere mortals. 'Don't do x because I say so' has less impact than 'don't do x because God says so' (Tetlock 2003:320).

Tapping this influence is essential for expediting the success of modern marine resource management programs. The culture of the people who are a part of that ecosystem could thus be used to augment existing management regimes, thereby, enabling them to work more effectively and consistently. As Jack Frazier (2006) wrote, "Without understanding the human-turtle relationship, no turtle conservation can be effective – no matter how much 'good science' it relies on" (Frazier 2006:174). For years, sea turtle specialists have called for research on the global cultural heritage relating to sea turtles, which they describe as "diverse, deep, and significant" (Balazs et al. 2000). Frazier (2005a) went further arguing, effective conservation activities *depend* on an understanding of the cultural, social, and traditional role of the sea turtle, and strengthening arguments about the social and cultural value of these animals *requires* the

collection of "ethnographic information from all around the Pacific" regarding marine turtles employed in various cultural manifestations (emphasis added) (Frazier 2005a:6).

This dissertation research answers the conservationists' call, provides the first single-source pan-Pacific documentation for human-sea turtle relations cross-culturally, cross-ecosystems, and over time. I have argued that traditional, locally-motivated, tapu-style restrictions with the moral weight normally accorded to spiritual or religious factors are required if sea turtles are to remain a nutritional and cultural resource and on-going participants in the vast marine and terrestrial ecosystem in which they have been co-habiting for millennia. If we want sea turtle conservation to succeed, we must return to traditional values that revere them as sacrosanct.

## Appendix: In brief, Sea Turtle Life History

*Introduction*

Marine turtles are air breathing, saltwater reptiles with flipper-like limbs. Worldwide there are seven species of marine turtles. They are, in increasing order of size, olive ridley (*Lepidochelys olivacea)*, Kemp's ridley (*Lepidochelys kempii*), hawksbill (*Eretmochelys imbricata)*, flatback (*Natator depressa*), loggerhead (*Caretta caretta*), green (*Chelonia mydas)*, and leatherback *(Dermochelys coriacea)* (Figure 14).

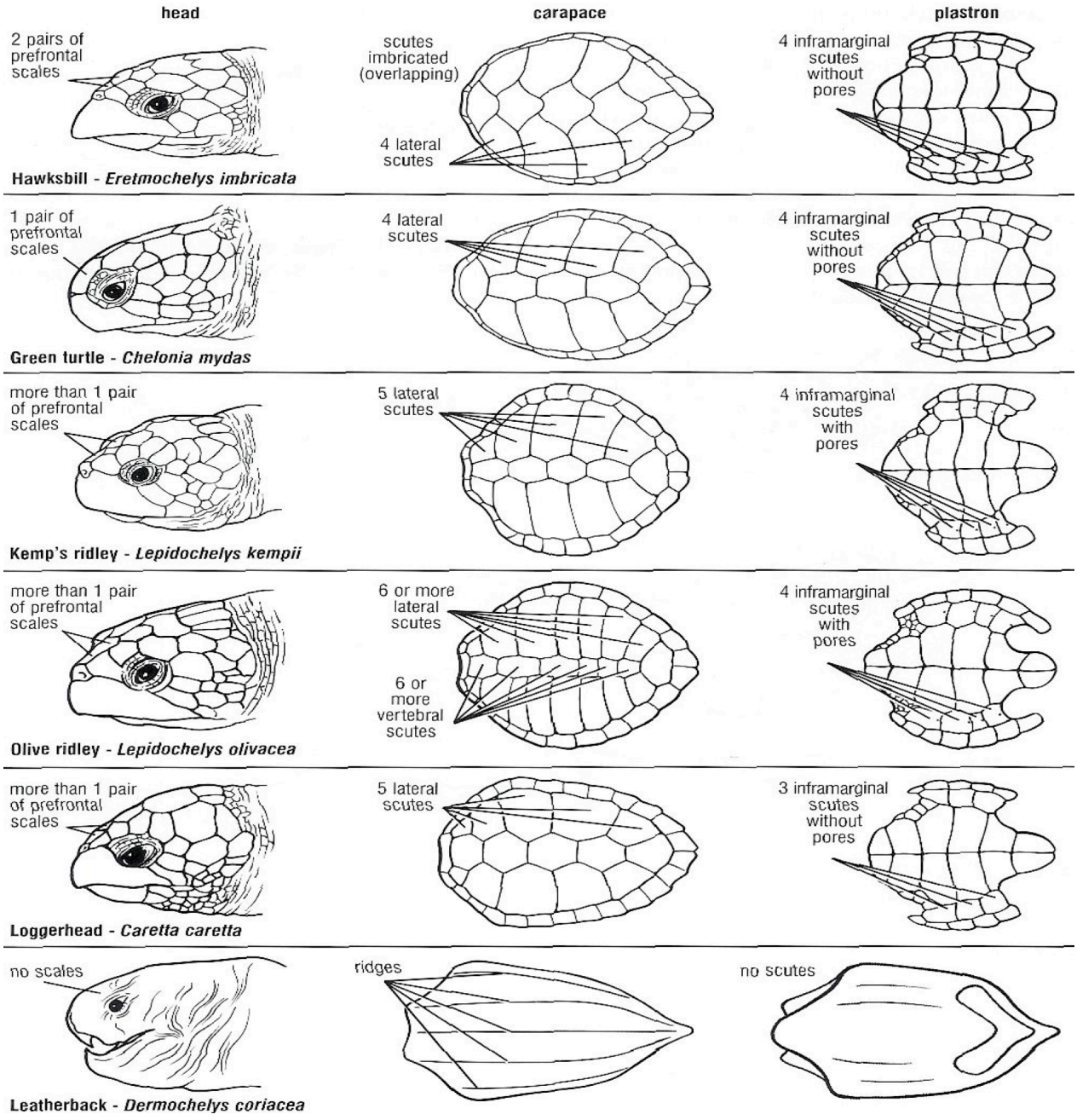

Figure 14: Marine Turtle Species identification. Source: Wyneken 2001:4.

The life history of the marine turtle is generally divided into four stages: the nesting and embryo stage, the hatchling stage, the feeding and developing stage, and the sexually mature or reproductive stage.

*The Nesting and Embryo Stage*

All sea turtle species have in common a series of stereotypical nesting behaviors (Carr and Ogren 1959; Carr et al. 1966; Ehrenfeld 1979), although there are subtle differences between species, and some elements of this behavior may vary between individuals and between nesting attempts. In general, sea turtles deposit their eggs onshore, above the high-tide line. The female first digs a body pit with her front flippers. This behavior is believed to avoid predators by lowering her profile on the beach and to allow for a deeper nest by lowering her rear flippers. Then, using her rear flippers she digs a flask-shaped egg cavity, generally about two feet deep, though depth is related to rear flipper length. After depositing about 100-150 eggs, she covers the nest with sand, camouflaging the area to hide the nest, and returns to the sea. A single female will often nest several times in a single season, with an egg-laying cycle of approximately fifteen days; generally returning to the same stretch of beach for each laying (Broderick et al. 2003).

Except for the flatback (*Natator depresus*), Kemp's ridley (*Lepidochelys kempii*) (Pritchard and Marquez 1973), and some populations of hawksbills (*Eretmochelys imbricata)* (de L. Brooke and Garnett 1983), sea turtle nesting occurs almost exclusively at night. Sea turtle nesting is seasonal, for most populations begins in late spring, and concludes in late summer. Although more than one sea turtle species may nest on the same beach, their nesting seasons are often slightly offset. In Florida (USA), for example, leatherbacks begin nesting in mid-March and conclude in mid-July, loggerheads begin nesting in early May and conclude in late August, and green turtles begin nesting in early June and conclude by mid-September (Meylan et al. 1995).

Physical attributes of beach sand and biological characteristics of developing eggs in a clutch affect the nest environment within which sea turtle embryos develop. Sand grain size and type affect gas and water flux (Ackerman 1980), and along with sand thermal conductivity and temperature (Speakman et al. 1998), impact the reproductive

success of egg clutches (Mortimer 1990). Females have difficulty digging egg chambers in coarse, dry sand, leading to multiple aborted attempts; there is high mortality in drier conditions; and mortality increases the larger the diameter of the sand (Mortimer 1990).

The eggs exchange respiratory gases with the surrounding beach as their metabolic activity increases throughout the 45 - 60 day incubation (Ackerman 1980). Oxygen consumed in embryonic metabolism comes from the atmosphere, through the sand containing the nest (Prange and Ackerman 1974). Hatching success is correlated with sand grain size (coarser grains equal lower hatching success) (Mrosovsky 1983), number of grains per volume, moisture (the sand must be moist and fine enough to prevent collapse of the egg chamber during construction) (Mortimer 1982), and air content.

Low oxygen consumption due to lack of a suitable nest environment can produce a hypoxic (low oxygen) environment for developing sea turtle embryos (Ackerman 1977), and has been shown to increase incubation duration, and decrease hatching success and embryonic growth rate in green and loggerhead turtle clutches (Ackerman 1981a). Contaminants can change the incubation environment and can cause drastic changes to embryo development (Drews 2005; McCallum 2005; Vanda et al. 2006). Often such malformed hatchlings are clustered together and not evenly distributed between nests demonstrating something going on with those particular nest environments (Barr 2005; Emiolaro 2005).

All sea turtle embryos exhibit temperature-dependent sex determination during egg incubation (Koga and Balazs 1996). Nest temperature during the second trimester, the sex-determining period, determines the hatchling sex ratio and small temperature differences between regions of a nest act to ensure production of both sexes. In general, temperatures above 29ºC produce females and those below produce males.

*The Hatchling Stage*

The eggs incubate for about two months, though nest temperature influences the duration of incubation, with warmer nests hatching sooner (Kaska et al. 1998; Bilinski et al. 2001). Using their egg tooth, they break out of the shell. Once out, they stretch and

"pop" what remains of their yolk sack into their body cavity. Scraping sand from the top of the nest onto the nest floor, they step onto this raised floor and move toward the surface. Hatchlings have been shown to be physically incapable of coordinated movement when their temperature exceeds certain species-specific levels (35.7ºC olive ridley, 33.4ºC black, and 33.6ºC leatherback), and they even become physically incapable of nest escape and suffer death if body temperature reaches threshold levels (41.3ºC, 41.3ºC, and 40.2ºC respectively). In general, hatchlings must wait to emerge when surface sand temperatures fall below approximately 35ºC (Drake and Spotila 2002).

Once they emerge from the nest, they race to the ocean going toward the lowest brightest horizon, away from tall dark silhouettes, and down any slope in elevation. This is an extremely dangerous time and there are many predators during this life history stage. Once in the ocean, they use wave direction to orient out to sea and away from the beach, repeatedly reorienting their body until they are being flipped head over tail, indicating they are facing the waves. They then swim in a "frenzy" for the next day or two, using waves and currents as navigational markers to reach the open ocean. During this time, their only food source is what remains of their yolk sack. Once they reach hiding places under seaweed mats or other flotsam far from shore, they feed on invertebrates such as sea jellies.

Hatchlings determine wave direction by detecting the horizontal movement of water of the benthic environment in shallow coastal areas (Wang et al. 1998) and the orbital pattern of water movement that occurs as waves spread through deeper water (Lohmann et al. 1995). Laboratory experiments conducted on loggerhead hatchlings indicate that hatchlings can also detect the magnetic field of the earth and use it as a cue to orient themselves once in the open ocean (Lohmann 1991). Only a few hatchlings per nest survive. Some are eaten by predators or are disoriented by lights from coastal developments or, impeded by obstacles, die from the sun's heat and never reach the ocean. Once in the ocean, sharks and other predators eat an unknown number. Those that make it, stay in the pelagic environment for several years, with estimates of the length of this stage ranging from 5 to 15 years. It is estimated that only one in 1000 hatchlings will live long enough to reach reproductive age.

*The Feeding and Developing Stage*

Once they reach approximately dinner plate size (around 35cm depending on the individual, population, and species), the juveniles recruit at random to join older sexually mature turtles in coastal feeding and developing grounds. Though closed populations that recruit to foraging areas in relatively close proximity to natal areas occur, developing grounds may also be thousands of miles away from the beach of their birth (Bowen 1995; Bowen et al. 1995; Lahanas et al. 1998). Males appear to recruit to areas farther from their natal beaches while females recruit closer (Casale et al. 2002). Recent studies suggest that recruitment to feeding grounds may not be a hard shift with some juveniles going back out into the pelagic environment after recruitment (M. Snover, pers. com.).

Many turtles maintain home ranges during their feeding and developing stage where patch reef and shallow coral-covered areas are common (Frazier 1982; Pritchard and Trebbau 1984; Brill et al. 1995; Limpus and Reed 1985; Rakotonirina and Cooke 1995; Chaloupka and Limpus 2001). In addition, many turtles show site fidelity, returning repeatedly to the exact same foraging areas using similar routes (Godley et al. 2003; Broderick at al. 2007). Feeding and developing habitats also occur in the open ocean, where physical features such as zones of surface convergences (boundaries between different water masses) are as productive as the more familiar coastal habitats like alga, sea grass beds and reef environments (Polovina et al. 2000, 2001).

When active, sea turtles swim to the ocean surface to breathe every few minutes. When resting, while 30-45 minutes is the average, they can remain underwater for as long as ten hours between breaths (Broderick et al. 2007; MTRP undated). Resting depths have been shown to be constant on a given night, suggesting that turtles return to the same spot or one of a similar depth after surfacing. Site fidelity to certain resting crevices or ledges within the reef has also been suggested (Van Dam and Diez 1997).

Research on this feeding and developing stage in sea turtle life history is limited and estimates of the length of this stage range from 10 to 50 years, depending on the species and population.

*The Reproductive Stage*

Once they reach the reproductive stage, marine turtles make the trip to or near the beach of their birth to reproduce and start the process over again. Turtles have been shown to follow narrow migratory pathways in the open ocean between their nesting beach and their feeding and developing grounds (Hays et al. 2001) that sometimes span the territorial waters of three or more nations (Limpus and Parmenter 1986; Limpus 1988).

The picture of how sea turtles make these long migrations is becoming clearer. Turtles appear to be attracted to chemicals to which they were exposed as embryos (Grassman 1993), and it has been suggested that they are further able to imprint themselves with their natal location by using the earth's magnetic field in map-based navigation. Genetic studies have shown that gene pools from many turtle rookeries around the world are easily distinguishable, suggesting considerable geographic isolation of female lineages and supporting the common belief that turtles return to the beaches of their birth (Bowen and Avise 1994).

Bartol et al. (2003) used laboratory experiments on loggerheads to show that sea turtles also use visual cues to orient themselves to their nesting areas and navigate their aquatic environment. Another study suggested that rather than navigating directly between nesting grounds and coastal foraging grounds, turtles make ocean crossings in a fairly straight line and then follow the coastline home (Hays et al. 2002).

Not every adult female breeds in any one year (Limpus and Reed 1985). It is thought that females skip breeding seasons because of the minimum period needed to accumulate sufficient fat for vitellogenesis (egg production) and for reproductive migration (Chaloupka 2001). Before commencing egg production, the turtle must have recovered from any previous reproductive episode, and have accumulated enough energy reserves (fat) to support egg production.

Turtles are promiscuous breeders, mating several times and storing the sperm before nesting. Multiple paternity within nests and between nests of the same female has been noted. Studies suggest that this stage is most important for projected long-term survival of marine turtles and have shown that the demographic value of one mature

adult, irrespective of sex, is equivalent to approximately 126 immatures (Chaloupka 2002). Their life span is also unknown; estimates of 75 to 100 years have been suggested (MTRP undated).

*Ecology*

Sea turtles are thought to play important regulatory roles in their environment. Their large size and avid appetites make them important ecosystem components. Green turtles typically maintain sea grass beds, keeping them cropped down so that they have a continuous supply of young healthy shoots. Areas such as the Caribbean where turtle numbers have been decimated show significant expansion of sea grasses that overgrow the area with old, rotting tops (Jackson 1997). Green turtles also eat tremendous amounts of algae and are important in keeping algae to coral ratios in balance.

Sponges are known as extremely destructive bioeroders of coral reefs. With sponges as their main food, hawksbills may act to keep these bioeroders in check. Leatherbacks eat six-times their weight in sea jellies a day and are therefore an important component in controlling sea jelly populations, an extremely important function in today's oceans (Gulko and Eckert 2004). In the Gulf of Mexico for example, the Coast Guard has to specially train personnel to recognize sea jelly swarms, as they are so massive that they are mistaken for oil spills.

Sea turtles may also play a significant roll in the ecology of coastlines upon which they nest. Turtles introduce nutrients and energy from their distant foraging grounds through the eggs, hatchlings and hatchling remains ingested by nest predators, consumed by detritivores, decomposers and plants, as well as the introduction of nutrients and energy lost as metabolic heat or gases during embryo development and hatching (Bjorndal and Bouchard 2003).

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