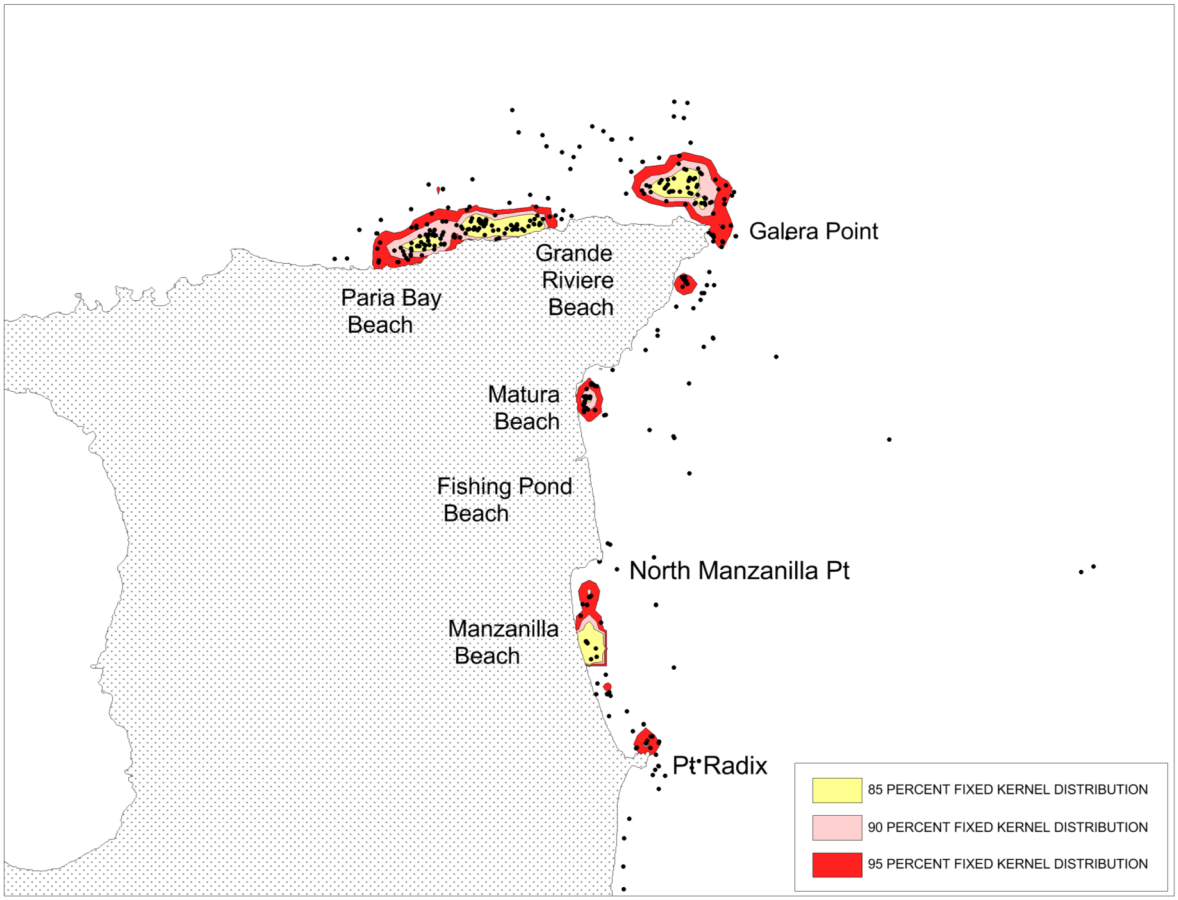
Preventing Leatherback Sea Turtle Gillnet Entanglement Through the Establishment of a Leatherback Conservation Area Off the Coast of Trinidad.



Scott A. Eckert

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WIDECAST
Wider Caribbean Sea Turtle Conservation Network

WIDECAST Information Document
No. 2013-02

Introduction

There is growing recognition that the accidental morality of non-target species by artisanal fishing fleets is a significant conservation problem (Gilman et al. 2010). While much effort and funding have been expended to mitigate and reduce the damage caused to marine resources by high levels of non-target catch (=bycatch) in large industrial fisheries, less effort has been invested in evaluating or mitigating bycatch by artisanal fleets. Some of this lack of effort is due to a poor understanding of the size of the artisanal fishery bycatch problem, and some due to the difficulty in interacting with artisanal fishers. Artisanal fishers tend to be dispersed along coastline areas and are often independent operators or only loosely organized into fishing cooperatives. Direct contact with such fishers for training and data collection is hampered because of this dispersed nature. Furthermore, artisanal fishers tend to be independent operators that work irregular hours, and often vary fishing methods and fishing effort in irregular patterns. Gathering data that can both characterize these fisheries and measure bycatch rates can be expensive and time consuming. However, the need to determine bycatch impact by artisanal fishers is very high. There are approximately 50 million artisanal fishers out of a global total of 51 million fishers (Berkes et al. 2001) fishing in coastal areas where marine biodiversity is highest.

Sea turtles are often subject to accidental capture and death in coastal fishing operations (Eckert & Eckert 2005; Eckert et al. 2008; Lee Lum 2006; NRC 1990). This is particularly a problem for coastal sea turtle species (NRC 1990) but all sea turtles reside in coastal waters for at least part of their lives including the oceanic leatherback sea turtle (*Dermochelys coriacea*) (Eckert et al. 2006; James & Herman 2001; James et al. 2005b). Since it is often large juvenile and adult turtles and particularly adult reproductive turtles that are incidentally killed by coastal fisheries, these fishery impacts to turtle populations can be highly significant (Crouse et al. 1987; Frazer 1986). In fact, the largest and fastest destruction of any sea turtle population came from the use of gillnets targeting swordfish off the coasts of Peru and Chile in the mid 1980's and early 1990's (Eckert & Sarti 1997).

One of the world's largest subpopulations of the leatherback sea turtle breed on the north and east coasts of Trinidad. Between 4,500 and 11,000 of these oceanic turtles nest at Matura/Fishing Pond and Grande Riviere beaches (S. Eckert unpub. data) each year. However, leatherbacks residing in Trinidad's water between January and September each year are subject to very high mortality in coastal gillnet fisheries. It has been calculated that 3,000 leatherbacks become entangled in gillnets each year off the Trinidad coast, with a mortality rate of 30% (Eckert et al. 2008; Lee Lum 2006).

To address the bycatch of leatherback sea turtles in the waters of Trinidad, WIDECAST and the Trinidad Dept. of Fisheries co-sponsored a national consultation with all stakeholders involved in turtle conservation or gillnet fisheries from Trinidad and Tobago in 2005 (Eckert and Eckert, 2005). The result of this 3 day consultation was the development of a plan to reduce leatherback bycatch, while simultaneously improve fishing though a series of gear enhancement experiments (Eckert & Eckert 2005; Eckert et al. 2008). Between 2006 and 2010 fishers worked with fisheries experts and sea turtle biologists to develop and test turtle safe fishing methods. These efforts led to the development of turtle safe net

fishing and hook and line methods that significantly reduced catch rates of turtles without reducing fisher incomes (Eckert & Gearhart 2008; Eckert et al. 2008; Gearhart & Eckert 2007; Gilman et al. 2010). However, despite the close involvement of fishers in the development of this new highly efficient fishing technology, only a few fishers have voluntarily adopted turtle safe fishing methods. While fishers indicate great support for the concept of changing gear types to reduce turtle entanglement (and the net damage caused by turtles) (Eckert & Gearhart 2008), fishers have been generally reluctant to try these new methods. And so while the means to reduce leatherback bycatch is available, it has not been adopted within the fishing communities.

Because the presence of leatherbacks in the coastal waters of Trinidad is seasonal (Eckert 2006; James et al. 2005a), we propose a mitigation strategy to reduce killing of leatherbacks is to institute time-area closures during the time when leatherbacks are in coastal waters. Time-area closures enable resource managers to close certain areas, or to limit the use of certain fishing gear in specific areas to enhance management efforts. However, the use of time-area closures must be based on rigorous data if they are to be efficient and effective. In particular it is important to understand the presence and distribution of the species of interest and the distribution of fishing effort when setting closure boundaries (Murray et al. 2000). A lack of data on turtle and fisher distribution around Trinidad precludes the use of time area closures. This project seeks to evaluate where gillnet fishing vessels operate around NE Trinidad and correlate those locations with areas of turtle capture, and to propose time-area closure regulations to reduce leatherback mortality.

Materials and Methods

To determine fisher operational areas around NE Trinidad, we recruited fishers who were willing to carry small GPS data loggers on their vessels. Each fisher was given a small stipend (initially $3.00 USD per day, later increased to $6.00 per day). While Vessel Monitoring Systems are commonly used in international fisheries they cost many thousands of dollars and are unrealistic for use on artisanal vessels. Instead we placed small data loggers (WINTEC G-Ray 2+, model WBT-202) in waterproof housings (Otterbox 1000) that were attached to each vessel. Total cost of each unit was about $150 (Figure 1).

Figure 1—Wintec[tm] G-Rays 2+ Global Positioning System receiver in waterproof housing

Each fisher was given 2 housings, one for the vessel and one to transport the GPS when not on the vessel. Since these dataloggers are quite small, and leaving then on the vessel might subject them to theft, we asked fishers to remove them after each day of fishing, place them in the second case and store them in their gear locker or at them. Each datalogger has a motion sensor that will suspend data collection if the unit is not moving to conserve battery life. Since battery capacity is sufficient for 28 hours of continuous operation, we exchanged the units every 5 days to download data and recharge them.

To determine turtle capture locations we used data from 2 sources. One source was from the fishers carrying the VMS units. Each GPS datalogger is capable of recording "waypoints" by pressing a "waypoint" button on the top of the unit. Fisher's agreed to press the "waypoint" button for each turtle captured which logged that location for later extraction. In our analysis, we also used turtle capture locations from previous projects in which we had onboard observers monitoring turtle catch (Eckert & Gearhart 2009; Eckert & Gearhart 2008; Eckert et al. 2008; Gearhart & Eckert 2007).

Each GPS datalogger provided downloadable GPS locations as tracklines, or data recorded at regular intervals (in our case we set those locations at 2 minute intervals). Two programs that are provided with the GPS units were used to extract and process this data to a form that could be imported to GIS software (see appendix 1). Because the dataloggers record locations every 2 minutes whether a boat was fishing or in-transit, we used boat travel speed to separate fishing locations from transit locations. By assessing all boat speed data, we found a distinct break in the amount of data below 5 km per hour and above 10 km per hour. Since fishers in this fishery keep one end of their net moored to the boat, and will drift for up to 6 hours while fishing, we considered all location data recorded during travel of less than 5 km per hour to be fishing and all locations recorded while the boat was travelling in excess of 5 km per hour to be in transit.

Location data for both turtle captures and fishing sets were mapped using MapInfo™ GIS software. To determine if there were areas of clustering in turtle captures we used Biotas™ (http://www.ecostats.com/software/biotas/) and its kernel home range analysis module. Parameters for the kernel analysis set the fixed kernel at 95%, 90%, 85% utilization distributions. Resulting shape files were plotted and used to develop proposed fisheries exclusion zones.

Results

Twenty-seven fishers participated in the vessel-monitoring program. A total of 1,357,922 fishing set locations were logged (Figure 2) and 482 turtle capture locations recorded (Figure 3). The distribution of fishing effort per month was calculated based on the total duration of gillnet soak time (Figure 4) and while fishing occurred in all months of the year, it was highly reduced from December - February. Turtle catch per month was also determined using only the data from vessels equipped with VMS (482 turtles, Figure 5). Turtle catch levels rose from March to July and declined through November, with a second peak in October. A catch-per-unit analysis confirmed that turtle capture probabilities increase from March to July with a secondary peak in October.

Fishing sets were mapped by month and in composite (Figure 5 & 6). As already noted, fishing occured year-around, though was highly reduced from December – February in this study. The location of fishing effort varied by month for some areas. For example from December – April, little fishing occurs in the nearshore waters off Manzanilla Beach. Starting in May, fishers increase their use of the waters directly offshore of Manzanilla to peak in September, and then gradually declined through December. Fishing effort off Galera point

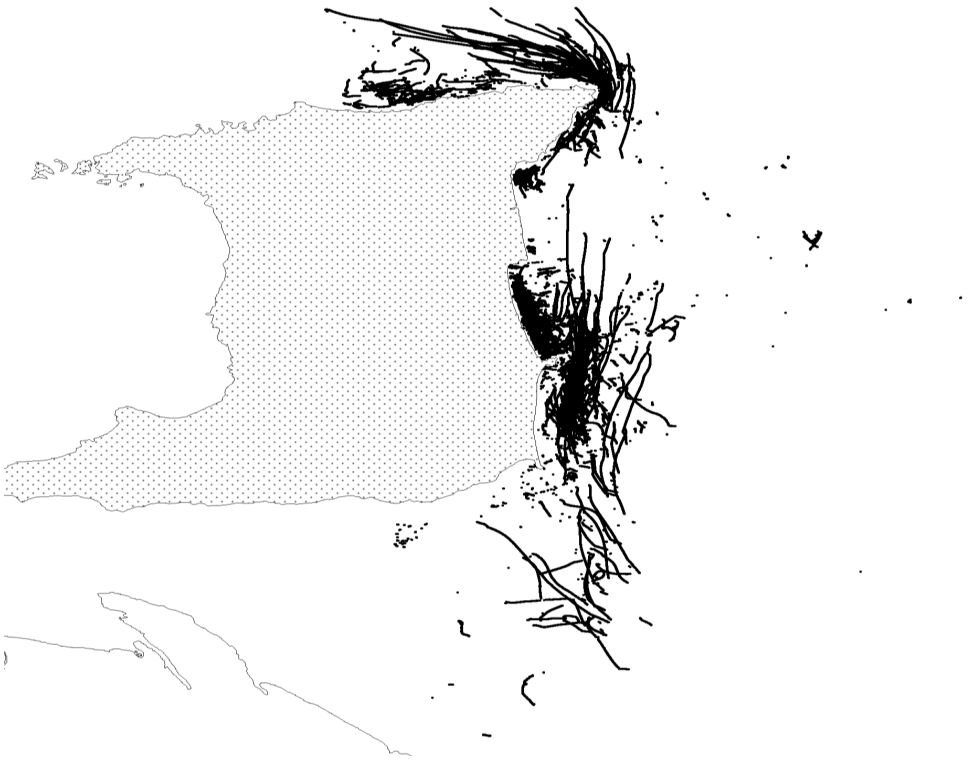

Figure 2—Fishing set locations for 27 fishers over approximately 12 months along the north and east coasts of Trinidad. Note that locations were recorded every 2 minutes and that each fishing set may soak for more than 6 hours and drift as much as 10 km.

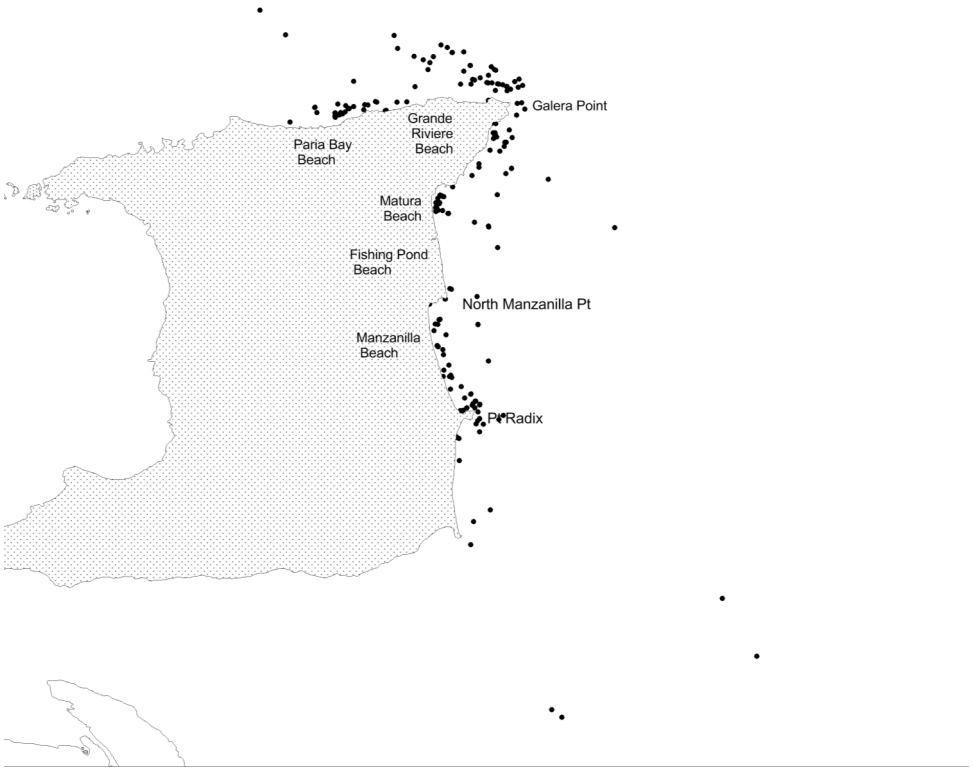

Figure 3—Leatherback sea turtle capture locations (·) during 12 months off the north and east coasts of Trinidad.

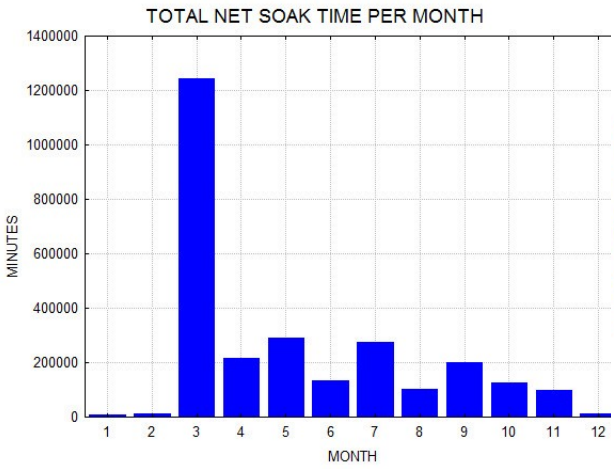

Figure 4—Fishing effort based on total soak time of gillnets off the north and east coats of Trinidad divided by month. Twenty-seven fishers participated for up to 12 months on this project.

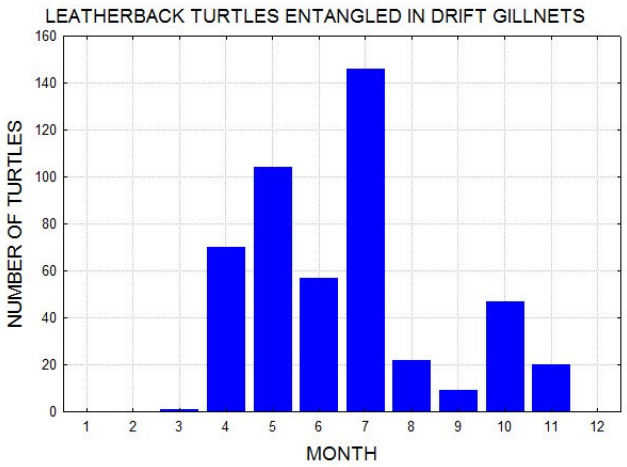

Figure 5—Catch-per-unit effort (CPUE) of leatherback sea turtles off the north and east coasts of Trinidad divided by month.

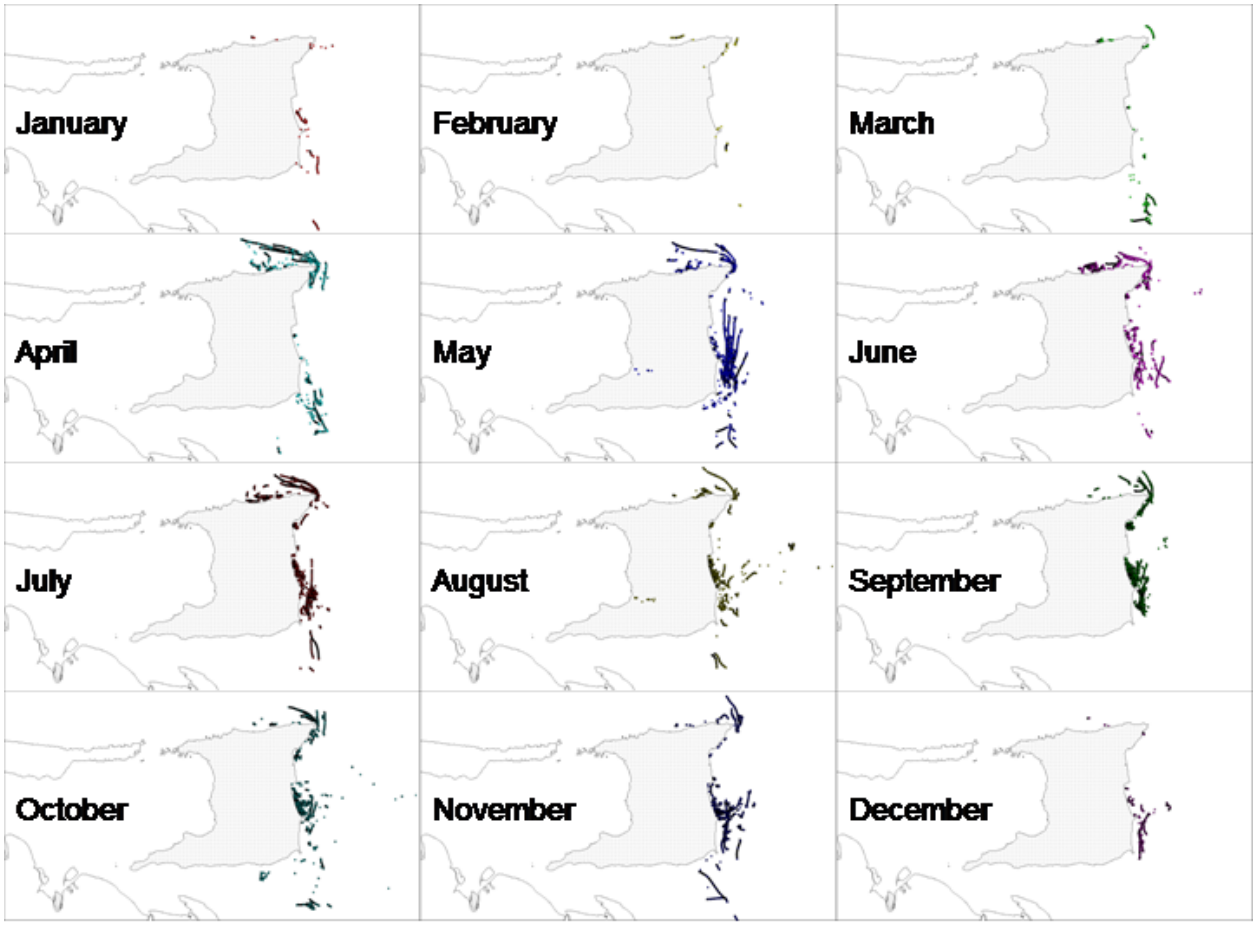

Figure 6—Distribution of fishing effort by month for gillnet fishers off the north an east coasts of Trinidad.

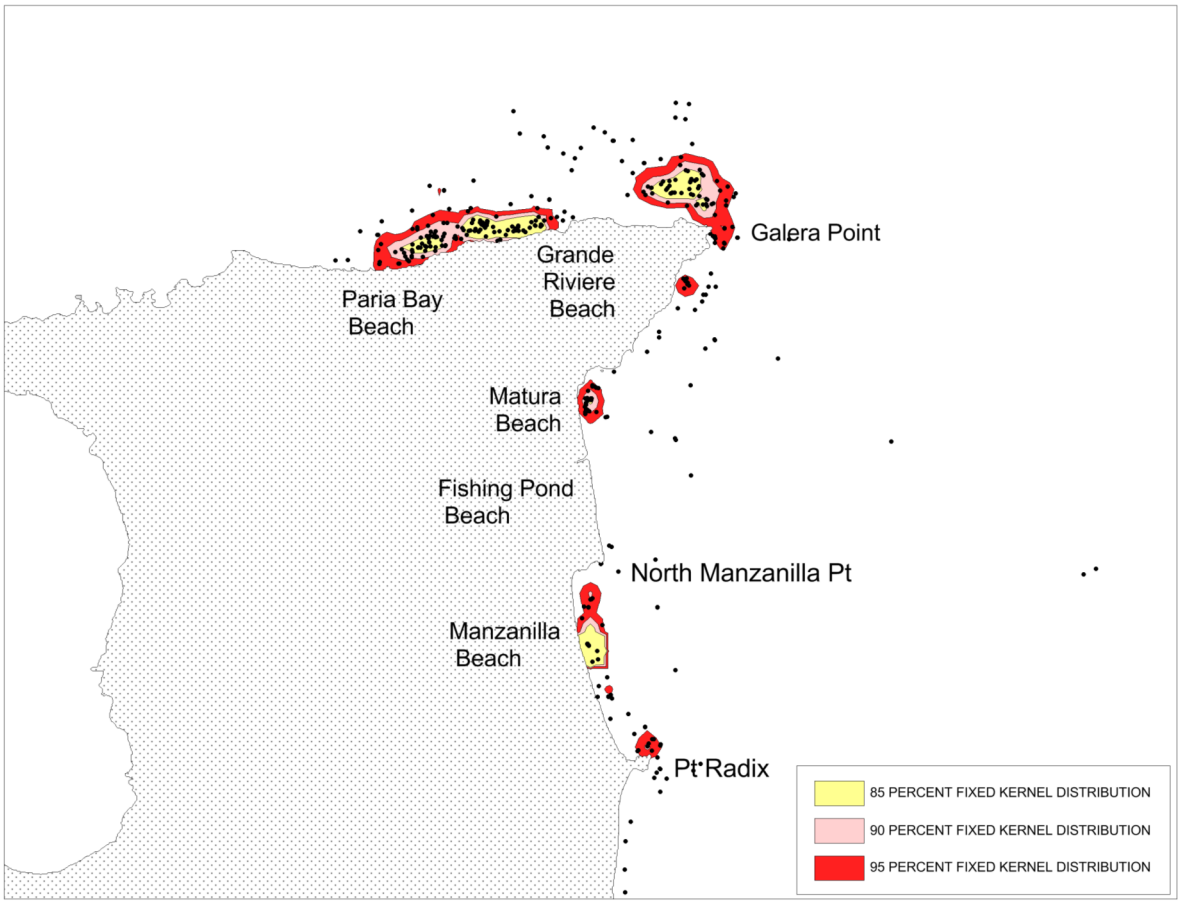

Figure 7—Kernel distribution analysis of leatherback sea turtle gillnet capture "hotspots" of the north and east coasts of Trinidad. Turtle capture locations are denoted as black "dots" (·)

and the central north coast (i.e. from Grande Riviere – Paria Beach) follow a pattern similar to that for the entire fleet, increasing from the first of the year to peak in July.

Turtle captures from the vessels equipped with VMS were combined with 368 turtle captures from previously monitored fishing efforts for a total of 851 turtle capture locations. The results of a kernel home range assessment provided an assessment of turtle capture "hotspots" (Figure 7). These hotspot areas are most prevalent off Manzanilla and Matura beaches on Trinidad's East Coast; off NE Trinidad around Galera Point and along the north coast of Trinidad from Grande Riviere to Paria beach. Significantly, the distance from shore for the hotspots off the east coast extend to 2.5 km; around Galera out to 8 km; and along the north coast out to 4 km.

Discussion

We found that turtle captures by gill-driftnet fisheries occur from March – October and peak both in terms of total number of turtles captured and catch-per-effort in July. Distribution of turtle-catch clusters into geographically distinct areas "hotspots" associated with

nesting beaches and within the important interesting habitat off Galera Pt. identified by Eckert (2006). Turtle catch and fishing efforts were lowest from December – February which is likely due to a combination of lower fishing effort during the Christmas holidays and difficult wintertime fishing conditions (Figure 6). Fishing effort peaked in March (Figure 4), due likely to the high demand for fish in Trinidad during the Easter Holidays, but this increase did not warrant a similar increase in turtle catch (Figure 5). From other studies, we know that at least male leatherbacks arrive early in the year (e.g. February) (James et al. 2005a) and may remain resident until the end of May. Female leatherbacks probably begin to arrive shortly after the males. While information on female leatherback arrival is circumstantial it has been proposed that mating may occur 30 days prior to first egg production (Eckert & Eckert 1988) and that because most nesting generally begins after March 1 and grows steadily until late May it can be assumed that they too arrive in February. What probably explains best the lack of increased turtle captures in March in our study is that most fishing activities during March were from vessels operating out of the Mayaro fishing depot and well to the southeast of Trinidad, which is an area with low turtle presence. We did not have many fishers operating from north or northeast coast fishing depots at this time so our data may be biased away from areas of high turtle catch probability for February and March.

One of the primary goals of this study was to evaluate whether turtle captures cluster in a manner that would enable the establishment of time-area closures to net fishing. Based on our data, turtle captures cluster off nesting beaches within 2.5 km of the shore on the east coast and 4.0 km of the north coast and around Galera Point (Figure 7). Use of kernel home range analysis enabled us to delineate statistical boundaries around the hotspot areas at various levels of protection. For example a 100% utilization distribution would encompass all locations of turtle captures including random or geographically isolated points. Such an assessment is generally considered too heavily influenced by outliers or rare events to be practical. A more logical and yet highly conserved approach is to evaluate the kernel to include 95% of the data (called the 95% utilization distribution). In practice this means that 95% of the capture locations are encompassed within this area, and by extension that excluding net fishing in these areas should protect turtle 95% of the time. We can also evaluate lower levels of protection based on management goals, and in our case we've chosen to model the 85%, 90% and 95% utilization distributions (Figure 7).

With a primary goal to protect leatherbacks during 95% of their time in the waters of Trinidad as well as to create boundaries that can easily be followed by fishers, we propose a Leatherback Conservation Area that extends north from Point Radix, to North Manzanilla point; from North Manzanilla point to the rocky headland that bounds the north end of Balandra Bay and extending east 2.5 km to a point 2.5 km east of Galera Point. From this point the region extends 8 km north and southeast to a point 4 km north of the west end of Paria Bay (Figure 8).

This area encompasses 48% of all fishing areas described by our study (Figure 2). So management actions to reduce leatherback entanglement will have a significant impact to traditional fishing operations. However, because we have abundant and very high quality data

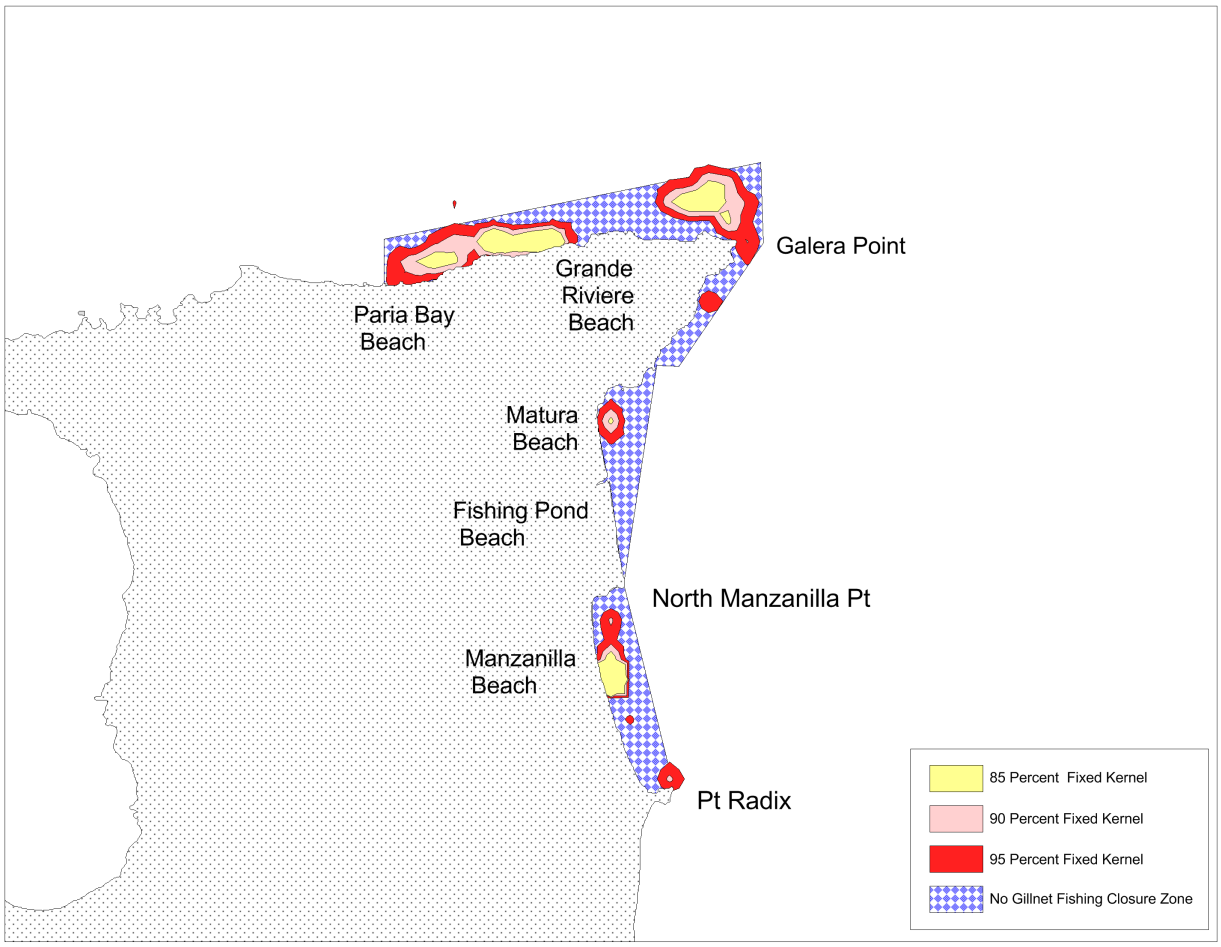

Figure 8 - Time-area closure polygon that encompasses 95% of all turtle captures as identified in this study. We propose this area be designated as the Leatherback Conservation Area

on both fishing effort and turtle captures we can refine our analysis significantly to reduce impact to fishing operations.

Turtle bycatch is highly influenced by gear type. Gillnets typically used by fishers along the coast of Trinidad include braided nylon "greenweb" surface drift gillnets with a 10.8 cm mesh size that are from 100 – 150 meshes deep (i.e. 10 – 15m). Each net can range in length from 500 m – 2 km. Such nets are fished at night at the surface and target primarily kingfish and other mackerel species. Our research has demonstrated that reducing net depth to 50 meshes, and dividing the net into separate panels reduces turtle entanglement rates by 45% (Eckert & Gearhart 2009) and can reduce mortality by as much as 95%. Instead of banning surface drift gillnets entirely, allowing the use of narrow "turtle safe" nets in some regions of lower turtle capture probability could be an effective alternative to a complete closure of all net fishing. We therefore modeled a graded time area closure that accommodates different styles of fishing within the Leatherback Conservation Area based on probability of capturing leatherbacks. This management action prohibits all net fishing in areas of high turtle capture probability, but allows turtle safe nets in areas of lower turtle

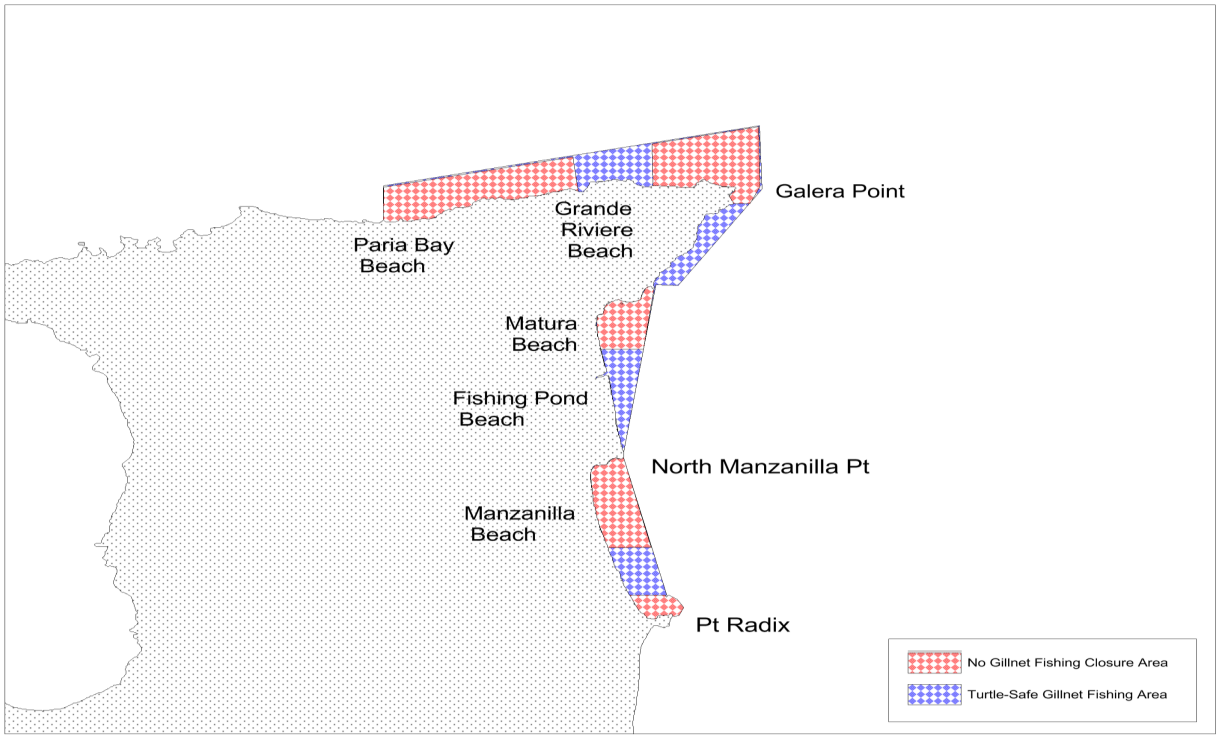

Figure 9: Graded time area closure polygon that include 95% of all turtle captures as identified in this study. It is proposed that red areas delineate areas completely closed to gillnet fishing from 1 February – 31 October, while blue areas are open only to turtle-safe gillnets during this same time period.

capture probability (Figure 9). Complete closure areas include those regions directly off-shore all major nesting beaches, out to 2.5 km on the east coast and 4 km on the north coast as well as the waters surrounding Galera Point out to 8 km. Timing of the closure would extend from February 1 – October 31 each year. This scenario would mean that instead of closing 48% of the area to fishing, only 19.7% of the area would be impacted to net fishing. Within the remaining 28.3% of the fishing area, only turtle-safe net fishing would be allowed. Turtle safe nets are defined as those that are constructed of panels that are each of no more than 20m in length and no more than 50 meshes deep, though the panels can be connected together in length to create nets of 2 km long or longer (Eckert & Gearhart 2009). Hook-and-line fishing (e.g. trolling, banking, switchering) would be allowed in all areas at all times.

It should be noted that these potential regulations apply only to surface drift gillnets. Other net gear used by fishers include bottom set monofilament gillnets that target primarily sharks and demersal species. No research has been undertaken on bycatch rates with such gear, but from fisher interviews it is clear that they sustain lower bycatch rates, but far higher mortality for turtles. Because these nets are anchored to the bottom, turtles are unable to surface when they become entangled and they drown. Multiple species of marine turtle are incidentally killed by bottom set nets (S. Eckert, pers. obs.) including leatherbacks, hawksbills, green turtles, olive ridley and loggerheads. Given that this gear is highly destructive and that there is no mitigation methods yet available, all bottom set gillnets should be banned until methods are developed to reduce this type of gear's impact on sea

turtles and other non-target species. Similarly, "pot" style fishing should also be restricted to areas outside the leatherback conservation area, as the vertical lines on these pots are known to entangle leatherback sea turtles.

Regulatory Considerations

With time-area-closures, it is important to consider enforcement and regulatory feasibility. At the request of WIDECAST, an assessment of Trinidad regulatory structure was undertaken (Plater 2010) to create model regulations for a time area closure around the north and east coasts of Trinidad (see appendix 2). While this report provides only a rough delineation of closure boundaries it does describe in detail model regulations that can be instituted by the Governement of Trinidad and Tobago to establish a Leatherback Conservation Zone and limit the use of gillnets within this zone. It also notes that the "Minister has authority under Section 4 of the Fisheries Act to implement and modify regulations prohibiting the killing of "fish," including sea turtles." and that "existing regulatory authority permits the Minister to create Prohibited Areas. This authority has been used extensively to close areas to fishing completely, or tailor more specific prohibitions as deemed necessary." Thus, the establishment of a Leatherback Conservation Area and regulations on fishing methods only requires administrative action by the Ministry and does not does not require parliamentary action.

Conclusions

Based on our extensive assessment of gillnet fishing off north and eastern Trinidad, and an analysis of where such fishing accidentally captures leatherback sea turtles we propose a time area closure zone within a Leatherback Conservation Zone from February 1 – October 31 each year. This closure includes all demersal nets. For drift-gillnets the closure is graded with all drift-gillnets banned from areas of high leatherback catch probability and long deep nets (>50 mesh) banned from areas of lower turtle catch probability. Overall anticipate that this closure scheme will reduce leatherback mortality in excess of 90%.

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Appendix 1 – Instructions to extract location information from Wintec 202 GPS units.

PROCESSING DATA FROM WINTEC 202 GPS DEVICES

Each WINTEC 202 GPS unit logs data to a *datenamed*.tes file. You will use 2 programs to extract that data as trackline information and as waypoint information. The two programs are provided with the instruments, "WBT Tool" is used for trackline extraction and to initially prepare the data, and "Timemachine X" is used to extract the waypoint data.

1) START THE PROGRAM WBT_TOOL FROM THE SCREEN ICON
2) INITIALLY THE PROGRAM WILL CONNECT YOU TO GOOGLE EARTH IN AN ATTEMPT TO MAP PLOT YOUR DATA, CANCEL THIS ATTEMPT WITH THE RED X (PROGRAM CLOSE) IN THE UPPER RIGHT CORNER OF THE SCREEN.
3) ON THE LOWER RIGHT CORNER , THE WBT TOOL ICON (A BLUE SHIELD WITH CURVED ARROWS) SHOULD BE VISABLE. IF NOT SELECT THE TRIANGULAR ARROW TO OPEN A POP-UP WINDOW WITH THE ICON. ACTIVATE THE ICON.
4) ON THE OPENING POP-UP SCREEN SELECT CLEAR ALL DATA
5) SELECT THE TAB "LOG DATA TRANSFER"
6) IF THERE ARE ANY FILES LISTED SELECT AND HIT THE DELETE BUTTON.
7) SELECT THE TAB "LOG DATA MANAGE"
8) SELECT THE TAB "COPY LOG DATA FROM PC"
9) SELECT THE FOLDER C:\VMS PROJECT\UNPROCESSED DATA\AND THE FOLDER WITH THE FISHERS NAME THAT YOU ARE WORKING ON.
10) SELECT THE *.TES FILE YOU PLAN TO PROCESS
11) SELECT THE TAB "LOG DATA TRANSFER"
12) UNDER THE TITLE "TRANSFER THE LOG DATA FORMAT IS A SELECTION BOX. CHOOSE "9.EXCEL(*.CSV)"
13) SELECT "TRANSFER"
14) HIGHLIGHT THE RESULTING FILE LIST AND **RIGHT** CLICK ON THE BLUE HIGHLIGHTED BOX.
15) SELECT "COPY ALL TO"
16) CREATE A FOLDER UNDER THE FISHERS NAME (WHOSE DATA YOU ARE WORKING ON.)
17) SELECT SAVE
18) STILL IN "LOG DATA TRANSFER", NOW USE THE "TRANSFER THE LOG DATA FORMAT" SELECTION BOX TO CHOOSE "4. TIMEMACHINEX(*tk2)
19) SELECT TRANSFER
20) START TIME MACHINE (ICON OF GREEN, RED, BLUE AND YELLOW BALLS)
21) THE OPENING POPUP SCREEN WILL SAY "COM PORT SETTINGS". IGNORE THIS BOX AND SELECT THE RED X.
22) A LARGER SCREEN WILL NOW POPUP
23) SELECT "TRACK CONVERT"
24) SELECT TAB TK2
25) THE tk2 FILE YOU JUST CREATED IN WBTOOLS SHOULD BE ON THE SCREEN
26) RIGHT CLICK ON THE FILENAME AND SCROLL DOWN TO "TO TK3"

27) LEFT CLICK
28) SELECT TAB TK3
29) RIGHT CLICK THE FILE AND SELECT “TO CSV”
30) ON THE RIGHT HAND SIDE OF THE SCREEN IS THE FILE
31) RIGHT CLICK ON THE CSV FILE
32) COPY THE FILE TO A FOLDER UNDER THE FISHER NAME THAT YOU CALL “TURTLES CAUGHT”
33) DELETE THE CSV FILE FROM TIME MACHINE
34) DELETE THE TK3 FILE
35) DELETE THE TK2 FILE
36) CLOSE TIME MACHINE
37) SELECT WBT_TOOL
38) UNDER LOG DATA TRANSFER, CLEAR THE FILE WITH THE DELETE BUTTON
39) UNDER THE LOG DATA MANAGER TAB SELECT “CLEAR AL LOG DATA”
40) REPEAT FROM STEP ONE FOR THE NEXT FILE.

Appendix 2: Plater, Brent. 2010. Draft Marine Turtle Regulations. Unpub Report. 8 p.

Government of the Republic of Trinidad and Tobago

DRAFT
MARINE TURTLE CONSERVATION REGULATIONS

JUNE 2010

TABLE OF CONTENTS

1.0 Introduction

Trinidad and Tobago has made great progress protecting marine sea turtles. Since the 1970's, poaching of marine turtles has been reduced, important nesting beaches have been protected, and a tourist program has been initiated that creates dozens of jobs and brings thousands of dollars of revenue into the local economy.

However, significant conservation challenges remain. Marine turtles continue to be taken, both legally and illegally, within Trinidad and Tobago's territorial waters; poaching remains a concern, particularly in Tobago; and perhaps most alarmingly, large numbers of adult leatherback sea turtles—the largest and most imperiled of the marine turtles—are being incidentally killed in artisanal nets at an unsustainable rate. If these killings are not reduced, it is possible that the leatherback sea turtle population in Trinidad and Tobago could be lost.

In this document, two regulatory changes are proposed to aid marine turtle conservation in Trinidad and Tobago. Both changes can be implemented using authority already granted to the Minister of Food Production, Land, and Marine Affairs: no further Act of Parliament is needed to implemented these proposals. The first proposal closes an inadvertent loophole in existing marine turtle protection regulations, a loophole that arguably permits individuals to kill marine turtles under certain circumstances without violating any conservation law. The second proposal creates a new fisheries regulation that will reduce bycatch of leatherback sea turtles while providing local fishers with new opportunities to increase daily revenues.

To understand the rationale and import of these proposed regulations, this document first describes the biology of the leatherback sea turtle, including its recent conservation status. The document then discusses existing hunting, fishing, and conservation laws and regulations that apply to marine turtles in Trinidad and Tobago. Next, the document discusses the gaps in protection that currently exist, and how those gaps are impacting sea turtle conservation in Trinidad. Finally, the document provides draft proposals to remedy these conservation challenges through regulations implemented by the Minister.

2.0 Biology and Conservation Status of Leatherback Sea Turtles

2.1 The Leatherback Sea Turtle, *Dermochelys coriacea*

The leatherback sea turtle is a superlative species. It is the largest living reptile in the world: mature adults can be as long as six-and-a-half feet (2 m) in length and weigh almost 2,000 lbs. (900 kg). The leatherback sea turtle is also the oldest extant sea turtle species: the leatherback's ancestors have been observed in the fossil record as far back as 150 million years ago. It is also the most widely distributed sea turtle, nesting on beaches in the tropics and sub-tropics and foraging in higher-latitudinal sub-polar waters.

The leatherback sea turtle is also, unfortunately, the world's most imperiled sea turtle. The species declined by more than 90% in the 1990s, and today there are fewer than 30,000 individuals left on Earth. This was the fastest decline of any large vertebrate in history, and the species is now considered Critically Endangered by the IUCN.

Industrialized fishing fleets in the Pacific Ocean caused the leatherback sea turtle's population decline. Sea turtles drown when they are incidentally caught in nets or hooked on long-lines set by fishing vessels. During the Pacific Ocean population collapse, populations in the Atlantic and Caribbean appeared to be more stable. But recent data indicates that threats to Atlantic and Caribbean populations are reaching a point that the continued viability of some leatherback populations is questioned.

2.2 Trinidad and Tobago's Leatherback Sea Turtles

Trinidad and Tobago currently contain the second largest nesting population of leatherback sea turtles in the world, just behind French Guiana. More than 6,000 leatherbacks nest in Trinidad each year: in 2007, 10,500 leatherback turtles were recorded nesting in Trinidad.

The robust population in Trinidad is due to the Nation's comprehensive, long-term program of legislative protection for turtles and community engagement in conservation. During the early 1970s, high rates of slaughter of egg-bearing female turtles created national concern for the future of the species. In 1975, Trinidad implemented regulations under the Fisheries Act to limit the killing of sea turtles and the harvest of turtle eggs. In 1990, Trinidad also declared Matura Beach, one of the most important nesting areas for sea turtles in Trinidad, as a Prohibited Area under the Forest Act during the nesting season. These regulations were combined with community engagement in the Matura area, and soon a community-lead turtle patrol was implemented on the beach. Today the community-lead patrol, called Nature Seekers, is the largest employer in the Matura region and has brought poaching of leatherbacks close to zero.

2.3 Challenges to Leatherback Sea Turtles in Trinidad and Tobago

Although incredible conservation gains have been achieved in Trinidad and Tobago, several threats are still impacting sea turtles and jeopardizing the population as a whole.

For example, poaching, while extremely limited at Matura Beach, is known to occur on other nesting beaches in Trinidad and throughout Tobago. Efforts have been initiated to spread the community-led turtle patrols to other beaches, but these efforts are still in their infancy.

Perhaps more importantly to the survival of the species, approximately 3,000 leatherback sea turtles are entangled in gillnets each year in Trinidadian waters. As many as 1,000 of these turtles drown or are killed in an effort to salvage the net. The scale of the loss is unsustainable and is undermining the long-term

efforts of conservationists, NGOs and the Trinidad and Tobago government to prevent the population from going extinct.

3.0 Domestic Sea Turtle Protection Legislation in Trinidad & Tobago

Trinidad and Tobago currently has two major domestic laws that address sea turtle conservation. The first, the Fisheries Act, contains several provisions pertinent to sea turtle conservation. The second, the Conservation of Wildlife Act, provides protection for sea turtles implicitly. The key elements of each law are outlined below.

3.1 The Fisheries Act

The Fisheries Act of 1916, although a limited statute, does contain several provisions pertinent to sea turtle conservation. As a preliminary matter, the Fisheries Act contains two key definitions that bring sea turtles under the Fisheries Act's purview. First, the Fisheries Act defines the term "fish" broadly to include, among other things, "turtles" and "turtle eggs," thus bringing these marine reptiles under the jurisdiction of the Fisheries Act. Second, the Fisheries Act defines a "prohibited area" as "an area declared by the Regulations made under section 4 to be a prohibited area." Although this definition is somewhat circular, read in context with the implementing regulations described below, the definition gives the Minister the authority to promulgate a wide variety of gear, time, and area fisheries closures, and impose fines and penalties if the prohibitions are not obeyed.

Section 4 of the Fisheries Act provides the Minister with the authority to promulgate regulations. For example, the Minister is authorized to "prescribe the size of mesh, form, and dimensions of nets or appliances for fishing, and for the manner of using the same"; to make regulations "restricting the size of fish, crabs, shrimps, and turtles that may be taken"; regulations "declaring any area to be a prohibited area"; or regulations "prohibiting the killing, harpooning, taking, removing, catching or any other means of taking possession of fish or any variety thereof either absolutely or at such times and within such areas as may be prescribed."

Previous Ministers have used this authority to create several distinct types of regulations under the Fisheries Act. For example, there are over 13 separate restrictions on nets in Trinidad, which prescribe the size and form of nets and the manner in which each net can be used to harvest specific species. Furthermore, previous Ministers have also established several prohibited areas, restricting access to these areas.

Previous Ministers have also used the authority granted under Section 4 of the Fisheries Act to promulgate regulations specifically protecting sea turtles. For example, in 1975, the Minister promulgated the "Protection of Turtle and Turtle Eggs" regulations, which establish several prohibitions against taking sea turtles

and their eggs. There are three major elements of these regulations. First, the regulations prohibit the killing of female turtles between the land and any reef, or in areas where there are no reefs, within 1,000 yards of the high water mark. Second, the regulations prohibit taking turtle eggs once the eggs are laid and buried, and prohibit the sale, purchase, and possession of turtle eggs. Finally, the regulations prohibit the killing of any sea turtle, regardless of sex, between 1st March and 30th September.

Although relatively comprehensive, these regulations do allow for direct take of critically endangered sea turtles under certain circumstances. This alone is a conservation concern, but it becomes particularly troubling in light of the conflict the regulations create with the Conservation of Wildlife Act, described below.

3.2. The Conservation of Wildlife Act

Trinidad's Conservation of Wildlife Act was initially passed in 1958 and amended most recently in 1980. The Wildlife Act defines an "animal" to include "any mammal, bird, or reptile and includes the eggs, carcass, meat, nest or young thereof," ensuring that sea turtles and their eggs are also under the jurisdiction of the Wildlife Act. The statute further defines the term "protected animal" as "any animal not specified or mentioned in the Second or Third Schedule" of the Act. The Second and Third Schedules define game species and species declared as vermin, respectively. Therefore, any animal not expressly listed in the Second Schedule as a game species or in the Third Schedule as vermin is a protected animal under the Conservation of Wildlife Act. Direct take of protected animals is prohibited under the Act.

Sea Turtles are not listed in either the Second or Third Schedules, so therefore they are protected animals under the Conservation of Wildlife Act and may not be directly taken by any method. However, as explained below, this puts the Conservation of Wildlife Act in tension with the Turtle protection regulations implemented under the Fisheries Act.

3.3. Fines & Penalties

Both the Fisheries Act and the Conservation of Wildlife Act contain statutory provisions setting fees and penalties for violations of the respective acts. These fines are generally perceived to be too low to deter poaching or other illegal wildlife activities. However, these fines cannot be changed by regulation: an Act of Parliament is required to change the size of the fines and penalties.

4.0 Gaps in Protection for Sea Turtles in Trinidad and Tobago

Three gaps in sea turtle protection remain in Trinidad. Combined, these three threats leave the population vulnerable to extinction. Fortunately, two of these three threats could be addressed relatively quickly through regulations promulgated by the Minister; no further Acts of Parliament are required to fill these

two gaps. These gaps are described more fully below, and opportunities to fill the gaps are discussed.

4.1 Conflict Between Fisheries Act Regulations and the Conservation of Wildlife Act

As explained above, the leatherback sea turtle and all other sea turtles are considered protected animals under the Conservation of Wildlife Act, and therefore they may not be directly taken. However, this prohibition against direct take is, at least in theory, in conflict with the Turtle and Turtle Egg Protection Regulations implemented under the Fisheries Act. On their face, these Fisheries Act regulations permit the killing of male sea turtles from 1 October through 28 February; permit the killing of female sea turtles during the same period when the turtles are outside of a reef, or when no reef exists, more than 1,000 yards from shore; and may provide inconsistent protection of turtle eggs: eggs are protected only when laid and buried, and therefore it may be possible to take eggs after they are laid by a turtle but before they are buried without violating this law.

Although forceful arguments exist indicating that the Conservation of Wildlife Act, as an Act of Parliament, should trump the regulations promulgated by the Ministry, there is a widespread belief in Trinidad that the Fisheries Regulations inhibit enforcement of the sea turtles' protected status. This is in part due to an unconfirmed report of a Magistrate judge ruling that found that the fisheries regulations, because they expressly reference sea turtles, trump the provisions of the Conservation of Wildlife Act.

Although formal documentation of the Magistrate's interpretation does not appear to be available, the belief that the sea turtles' protected status has been undermined by the turtle regulations is impacting law enforcement efforts, because poaching laws cannot be easily enforced during portions of the year that the Fisheries Regulations are operative. To restore anti-poaching efforts, it is imperative that the conflict between the Fisheries Regulations and the Conservation of Wildlife Act be remedied.

4.2 Closure Area Needed to Protect Sea Turtles from Entanglement

As explained above, leatherback sea turtles are being caught in gillnets from artisanal fishers in Trinidad waters at an alarming, unsustainable rate. Approximately 1,000 turtles are killed annually in this manner, threatening the entire population with extinction. Nearly all of these entanglements occur during the sea turtle breeding season and within fifteen kilometres of the Trinidad coast.

Presently, there are no suitable domestic laws or regulations for the government to address this problem. However, existing regulatory authority does provide the Minister with the ability to enact reasonable closure regulations without an additional Act of Parliament. In particular, a suitable time/gear/area closure or protected area could be implemented under existing regulatory authority to restrict sea turtle deaths.

5.0 Proposed Sea Turtle Protection Regulations

5.1. Proposed Amendments to the Turtle and Turtle Eggs Regulations

As explained above, the Minister has authority under Section 4 of the Fisheries Act to implement and modify regulations prohibiting the killing of "fish," including sea turtles. The Minister could exercise this authority by modifying the existing Turtle Protection regulations to eliminate any possible opportunity to directly take sea turtles legally under Trinidad law. To be effective, three key changes would need to made: the amendment must eliminate any legal killing of female sea turtles, regardless of where they are found; the amendment must clarify that turtle eggs can never be taken, not even after they are laid but before they are buried; and the killing of male sea turtles must be prohibited.

The following draft proposed regulation can accomplish these objectives:

Additions are underlined, subtractions are ~~striken.~~

Protection of Turtle and Turtle Eggs Regulations

made under Section 4

1. These Regulations may be cited as the Protection of Turtle and Turtle Eggs Regulations.
2. No person shall—
   (A) Kill, harpoon, catch, ~~otherwise~~ take possession, destroy, harm, harass, or pursue, or attempt to kill, harpoon, catch, take possession, destroy, harm, harass, or pursue ~~of~~ any ~~female~~ sea turtle which is in the sea within any reef or ~~within one thousand yards from the high water mark of the foreshore where there is no reef~~ on land or within the Exclusive Economic Zone of Trinidad and Tobago;
   (B) Take or remove or cause to be taken or removed any sea turtle eggs from any sea turtle or any sea turtle nesting area on land or within the Exclusive Economic Zone of Trinidad and Tobago; ~~after they have been laid and buried by a female turtle or after they have been buried by any person~~;
   (C) Purchase, sell, or offer ~~or expose~~ for sale or cause to be sold or offered ~~or exposed~~ for sale or be in possession of any sea turtle, sea turtle egg, or parts of or products made from any sea turtle.
3. ~~No person shall, between 1st March and 30th September, kill harpoon, catch or otherwise take possession of or purchase sell, offer or expose for sale or cause to be sold or offered or exposed for sale any turtle or turtle meat~~.

5.2 Proposed Time/Area/Gear Prohibited Area

Similarly, existing regulatory authority permits the Minister to create Prohibited Areas. This authority has been used extensively to close areas to fishing completely, or tailor more specific prohibitions as deemed necessary.

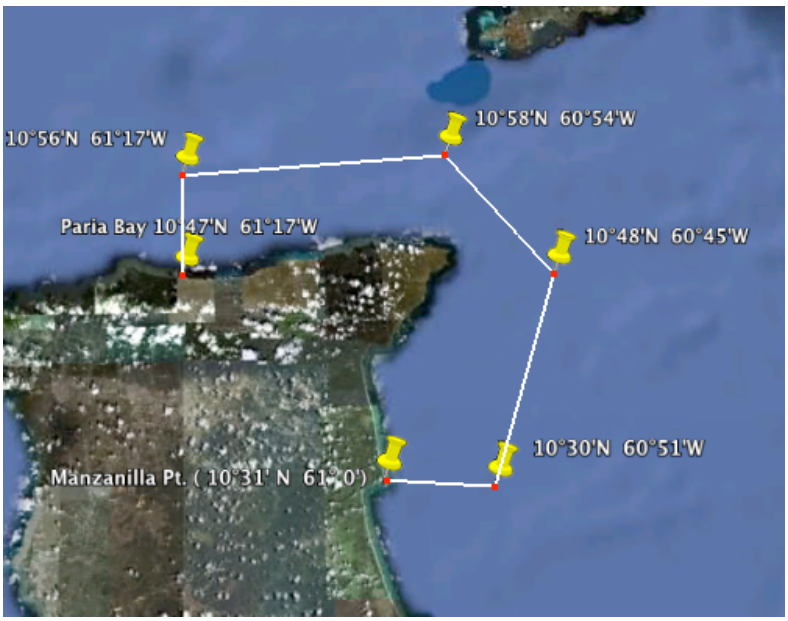
To eliminate leatherback sea turtle entanglements, a prohibited area that bans net fishing, but permits trolling can successfully reduce leatherback sea turtle entanglements around important nesting beaches during the nesting season. To include most of Trinidad fishable waters, the closure areas should extend 10 miles out to sea.

The following draft regulation would accomplish these objectives:

Leatherback Sea Turtle Conservation Area
Made under Section 4

1. These regulations may be cited as the Leatherback Sea Turtle Conservation Area Regulations.
2. *Prohibition*. No person may fish with, set, haul back, or be in possession of any fishing net, including any net specified in Section 2 of the Fisheries Regulations, between 15 February and 30 July, in the area bounded by the high water mark of coastal Trinidad and straight lines connecting the following coordinates in the order listed:
   Blanchisseuse/Paria Bay (10°47' N 61°17' W) to 10°56' N 61°17' W;
   10°56' N 61° 17' W to 10°58' N 60°54' W;
   10°58' N 60°54' W to 10°48' N 60°45' W;
   10°48' N 60°45' W to 10°30' N 60°51' W;
   10°31' N 60°51' W to Manzanilla Point (10°31' N 61°0' W).

A satellite image of this closure area is provided here:



Although this area only accounts for a fraction of the sea turtle's range in the Southern Caribbean, impacts on fishers should be addressed. Fortunately, studies conducted by WIDECAST indicate that fishers can earn the same and even more money by swapping out turtle-entangling nets for trolling gear. This saves the fishers money because they do not need to repair nets, and it also increases the value of the fish caught because trolling targets high-value species such as kingfish. Although the number of fish caught may drop, the overall economic gain will remain the same or be greater for the fisher because there will be less down-time caused by turtle entanglement. Proposals to fund capital costs to implement a gear swap to turtle-friendly fishing gear should be considered.

6.0 Conclusion

Trinidad and Tobago has made great progress protecting leatherback sea turtles, but great challenges still remain. While some challenges, such as the low fines and penalties for harming sea turtles, cannot be addressed without an Act of Parliament, other challenges can be addressed immediately through existing regulatory authority held by the Minister under Section 4 of the Fisheries Act.

Using this authority, the Minister can rapidly harmonize existing turtle protection regulations with the Conservation of Wildlife Act to ensure that sea turtles cannot be directly taken at any time. The Minister can implement a Sea Turtle Protection/Conservation area that would limit gillnet fishing within 10miles of critical leatherback sea turtle nesting beaches during the breeding and nesting season.