



2019 REGIONAL LEATHERBACK BY-
CATCH PRIORITIZATION WORKSHOP
PARAMARIBO, 17 – 18TH OF MARCH 2019

COUNTRY PRESENTATION:
Trinidad and Tobago

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Funding and Technical Support

- National Fish and Wildlife Foundation
- Disney Wildlife Conservation Fund
- CGMK Foundation
- WWF
- U.S. NOAA Fisheries
- WIDECAS

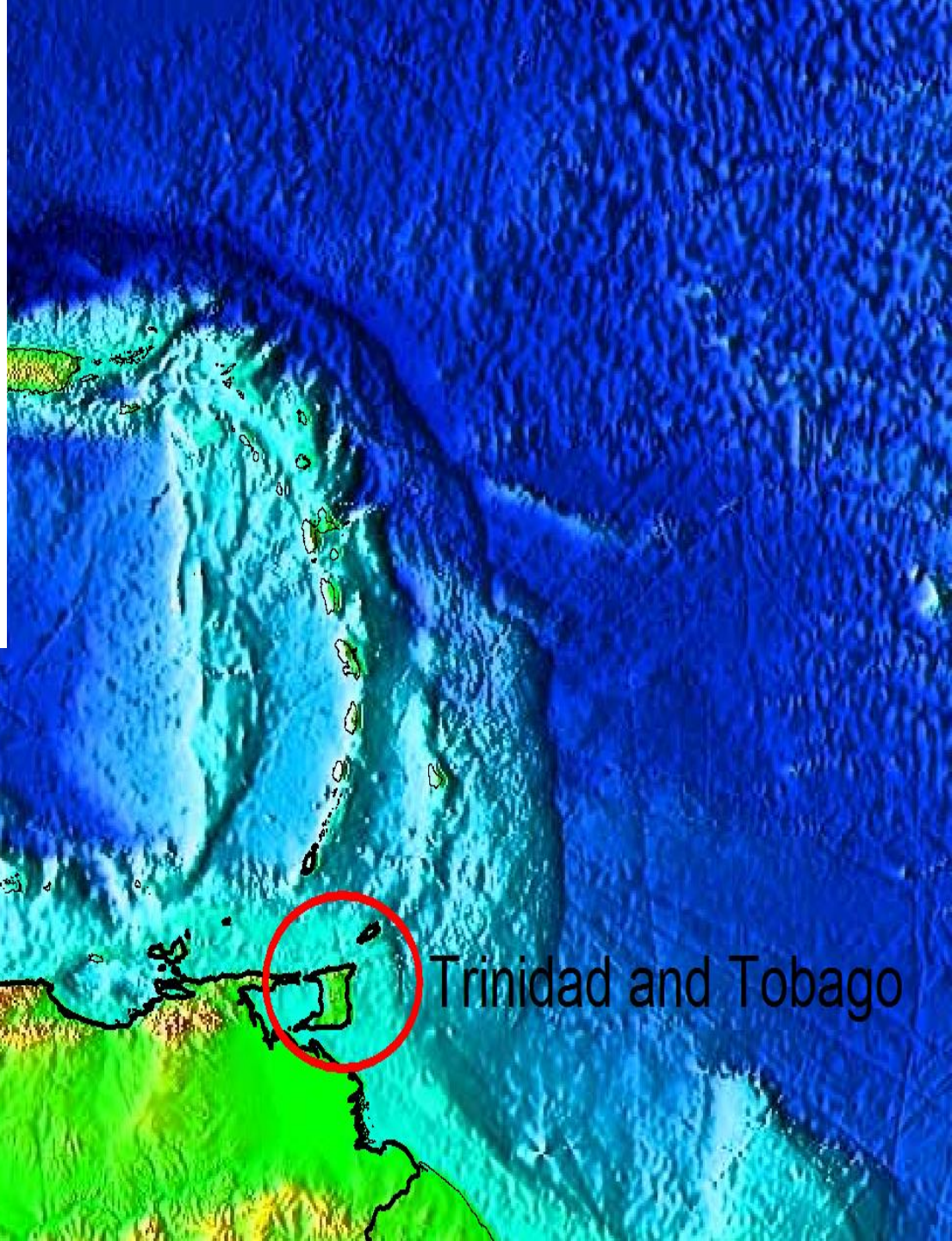




“Today, small-scale fisheries employ 50 of the 51 million fishers, practically all of whom are from developing countries. And together, they produce more than half of the world’s annual marine fish catch of 98 million tonnes, supplying most of the fish consumed in the developing world.”*

Berkes, F., R. Mahon, P. McConney, R. Pollnac, R. Pomeroy. 2001. Managing small-scale fisheries. IDRC. 309 pp.

Trinidad & Tobago



Trinidad and Tobago

Trinidad's Artisanal Fisheries

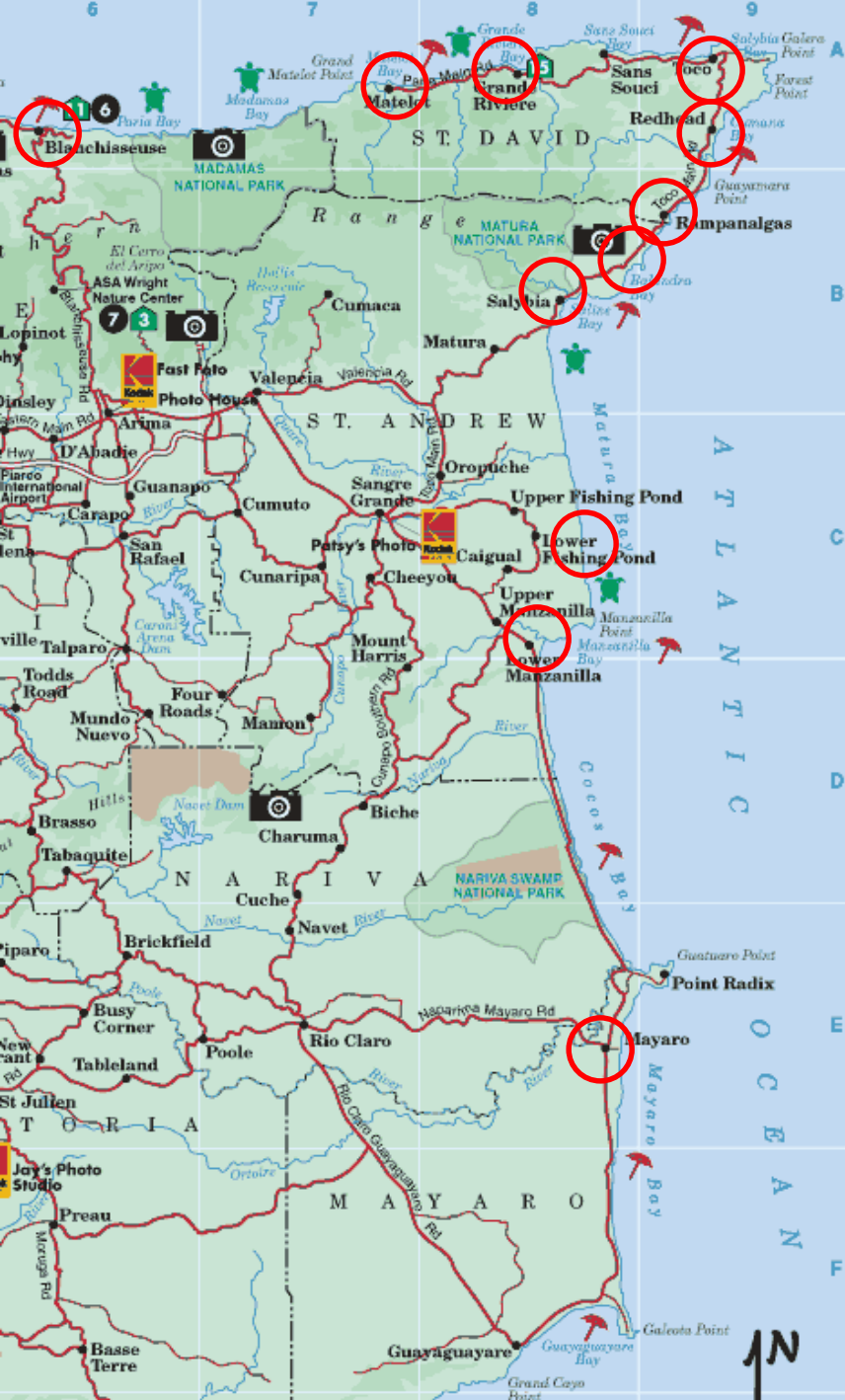
- Small pirogues with outboard engines
- Fishing methods include gill nets, trolling, handlines



Coast	# Landing Sites	Boats	Fishers
West/South	35	965	1930
North East	5	92	184
East	9	289	578
North West/North	16	294	588
Total	65	1640	3280

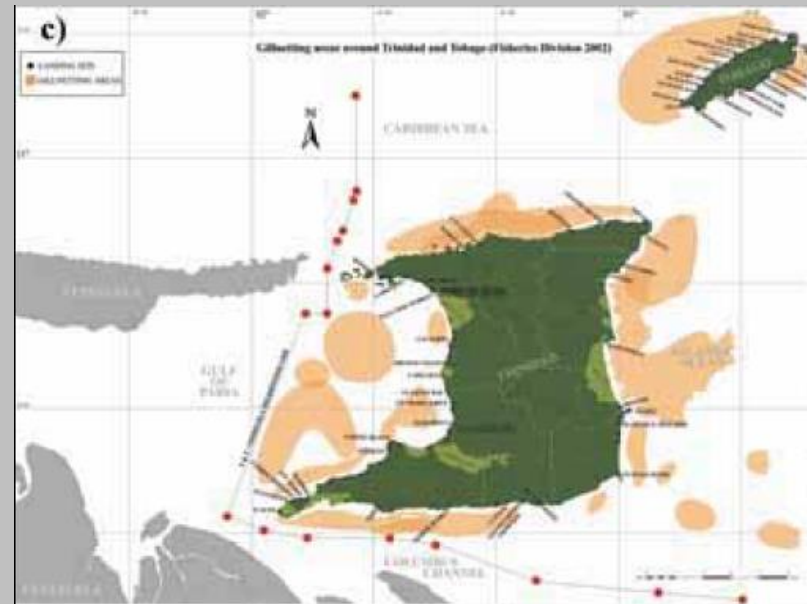
Table 1: Summary statistics for landing sites from the Fisheries Division from their vessel census 2015

source: Fisheries Division, Trinidad. 16 pp.



Location of artisanal fishing depots along the north and east coasts of Trinidad.

Gillnet Fishing Areas in Trinidad



Mohammed et al. (2011)

Gill Net Fisheries

- **Bottom Set** - targeting demersal species, fished diurnally, use monofilament and nylon netting.
- **Surface Drift** – targeting pelagic species, fished nocturnally using nylon netting



Surface driftnets target two species of mackerel

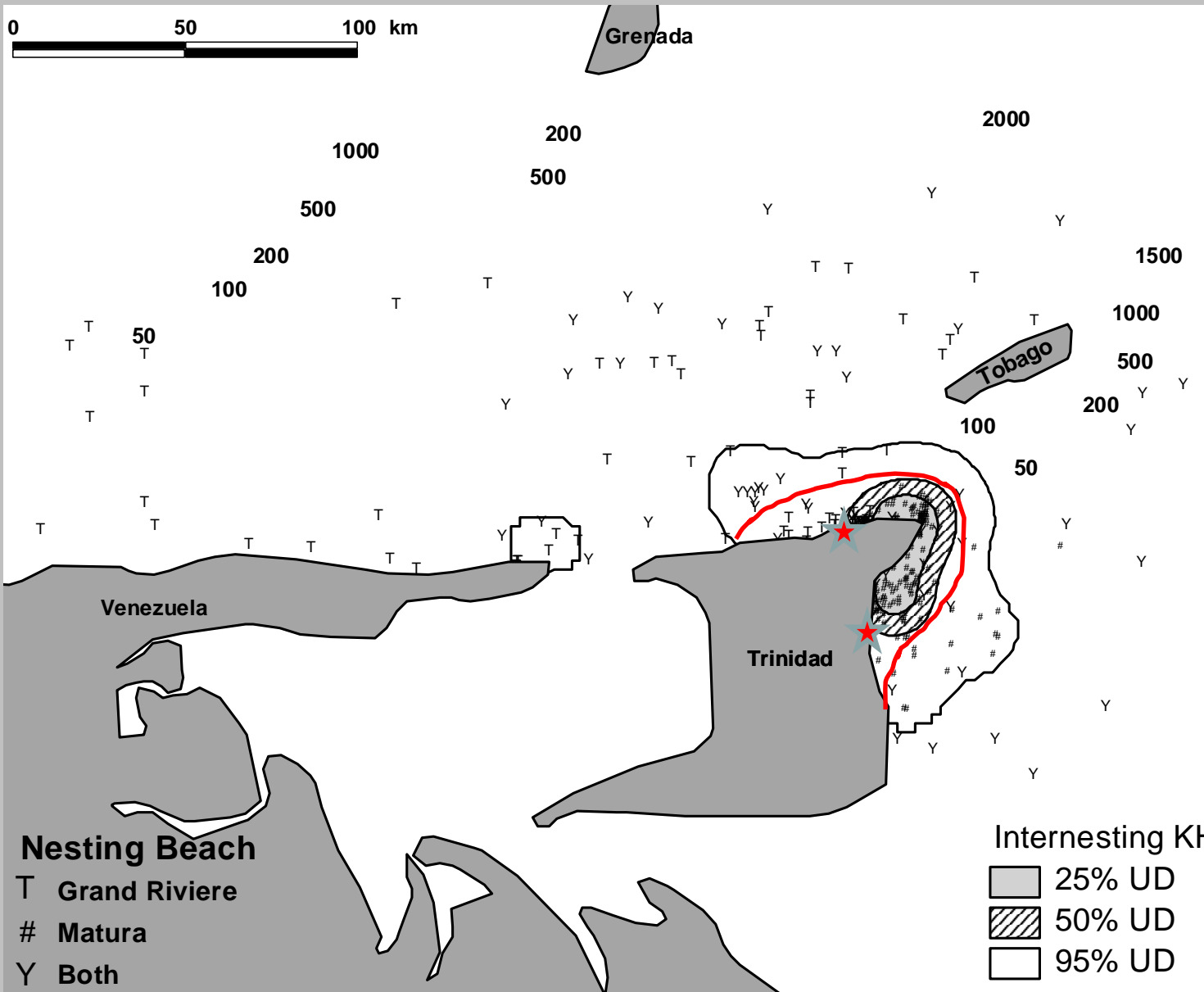
Serra Spanish
(*Scomberomorus brasiliensis*)

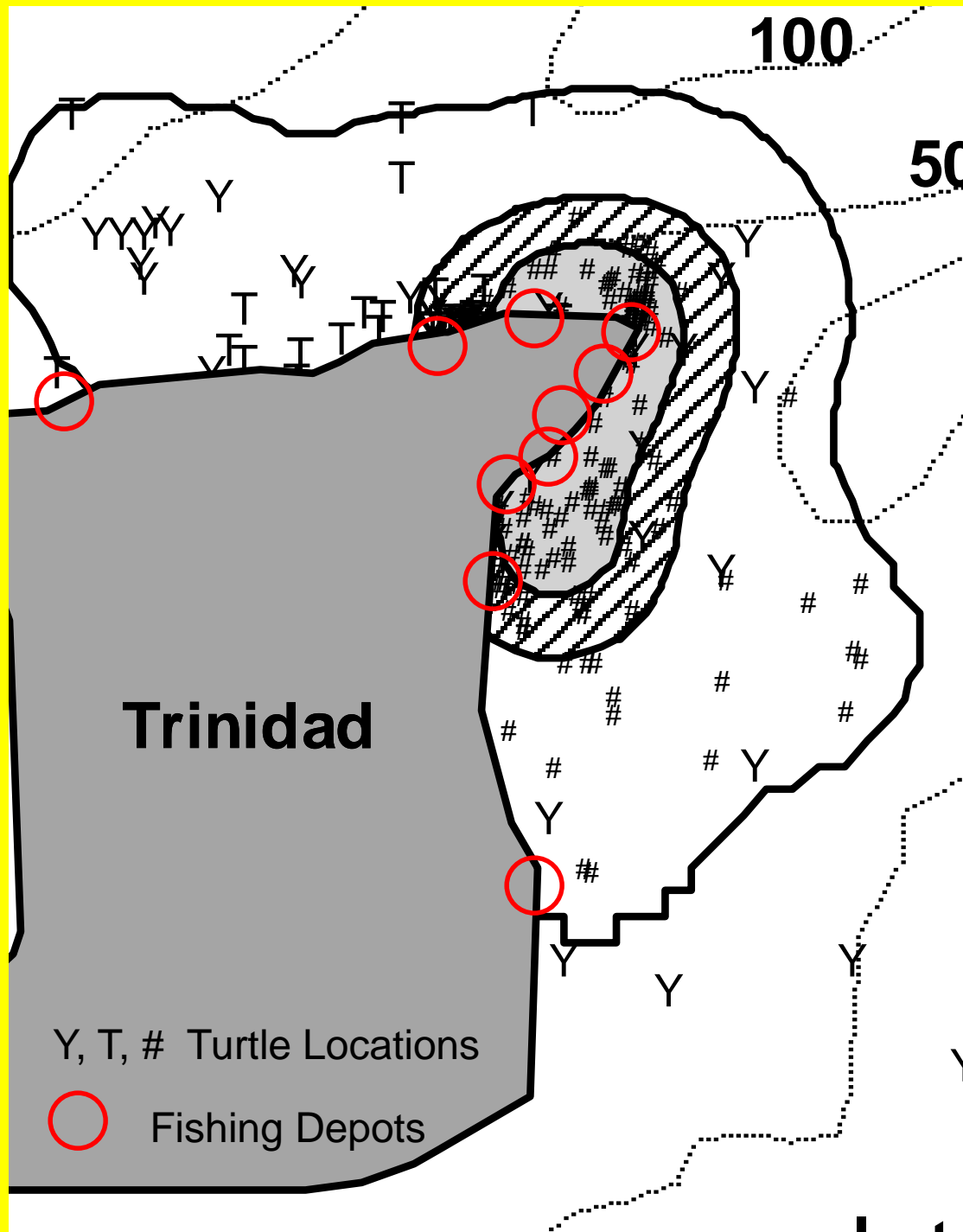
King
(*Scomberomorus cavalla*).



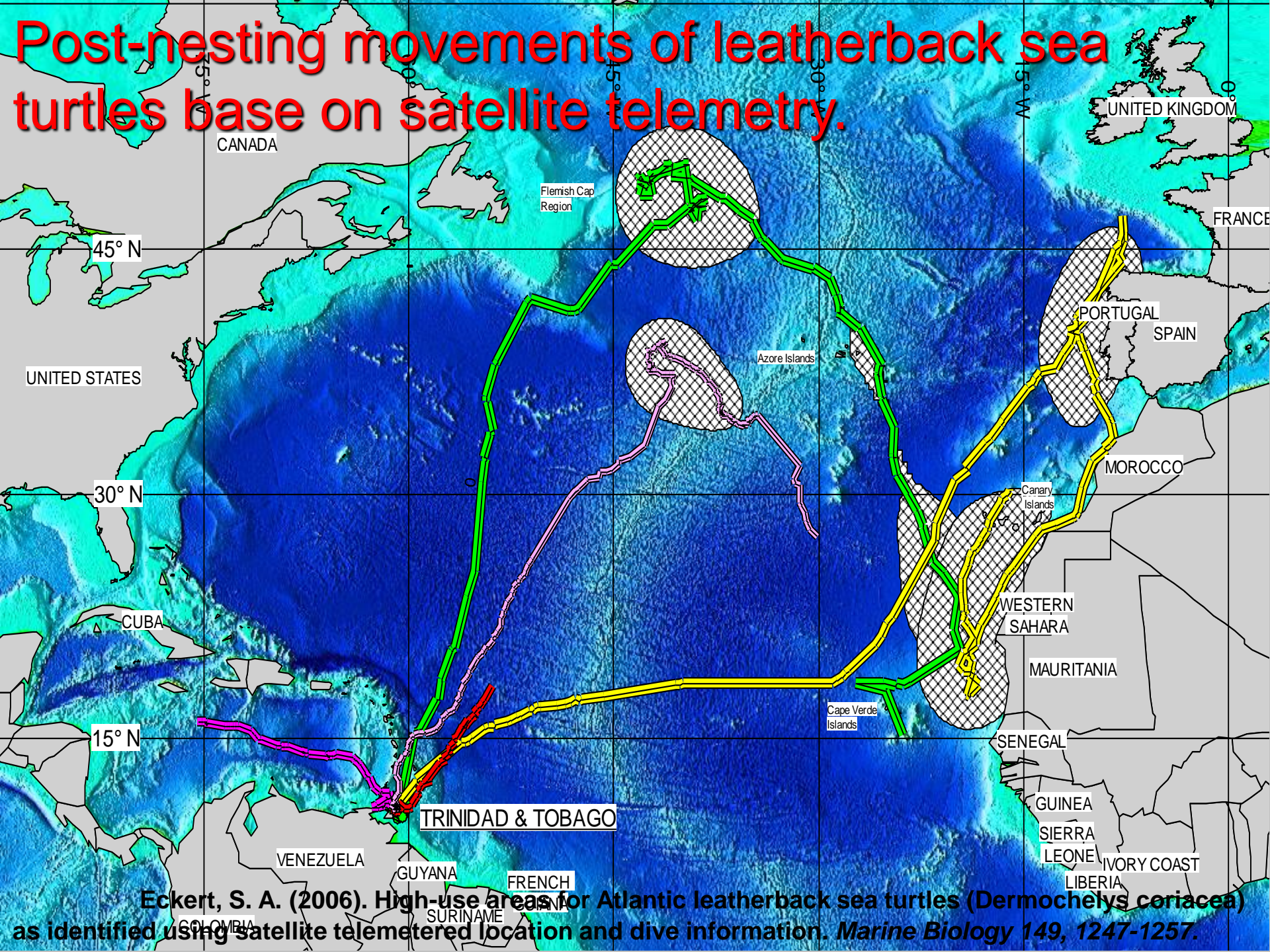
More than 10,000 leatherbacks nest annually and will produce up to 75,000 nests.

Each turtle will reside in Trinidad's coastal waters from February – August.





Post-nesting movements of leatherback sea turtles base on satellite telemetry.



Eckert, S. A. (2006). High-use areas for Atlantic leatherback sea turtles (*Dermochelys coriacea*) as identified using satellite telemetered location and dive information. *Marine Biology* 149, 1247-1257.

Gill Net entanglement: Largest threat to Trinidad's leatherbacks

- 3,000 entanglements per year *
- Mortality 33% *

* Eckert, S. A. and J. Lien. 1999. Recommendations for eliminating incidental capture and mortality of leatherback turtles, *Dermochelys coriacea*, by commercial fisheries in Trinidad and Tobago, WIDECAST Information Document 1999 – 001. WIDECAST, Beaufort, North Carolina.

Lee Lum, L. M. 2003. An assessment of incidental turtle catch in the gillnet fishery in Trinidad and Tobago. Research Report: Institute of Marine Affairs, Trinidad and Tobago. 38pp.

Lee Lum, L. 2006. Assessment of incidental sea turtle catch in the artisanal gillnet fishery in Trinidad and Tobago, West Indies. Appl. Herpetol. 3: 357-368.



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Wider Caribbean Sea Turtle Conservation Network

Seasonality

February – May

Males and Females



Four of nine leatherbacks which stranded while entangled in a single gillnet at Matura Beach, Trinidad
PHOTO COURTESY NATURE SEEKERS

**An Assessment of Leatherback Sea Turtle
Population Trends at Matura Beach,
Trinidad (2006 - 2017)**



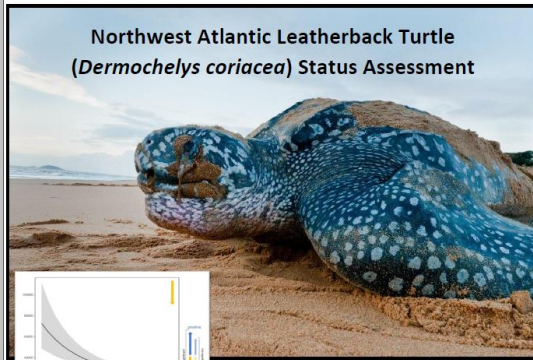
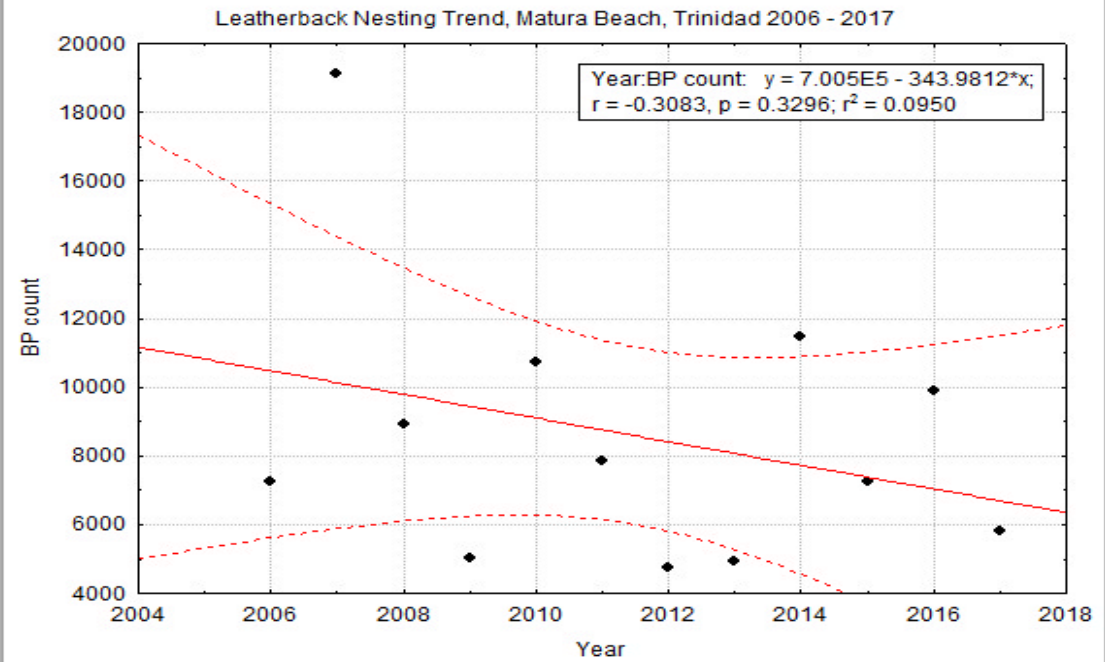
Photo: Scott Eckert

**Scott Eckert, WIDECAST
Kyle Mitchell, Nature Seekers**

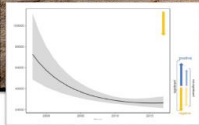
2018



WIDECAST Information
Document No. 2018-01



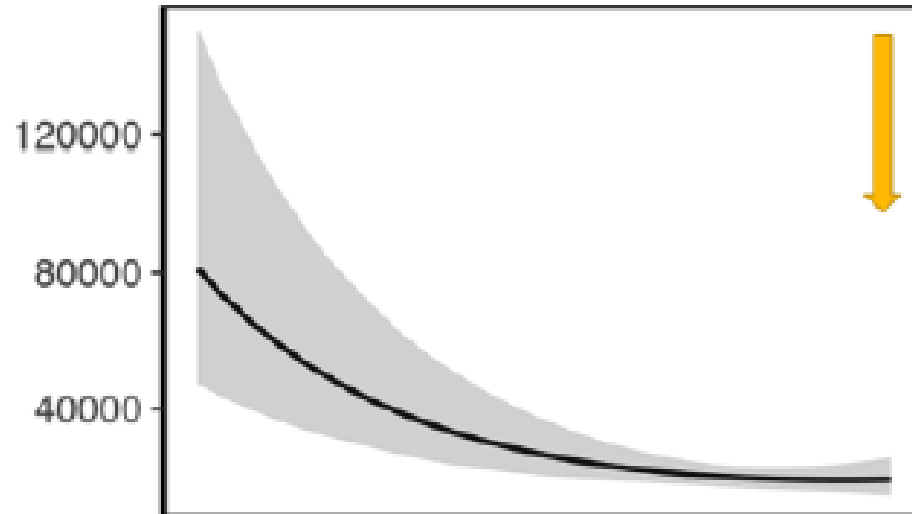
**Northwest Atlantic Leatherback Turtle
(*Dermochelys coriacea*) Status Assessment**



Prepared by the Northwest Atlantic
Leatherback Working Group
WIDECAST Technical Report No. 17

2018

Guianas/ Trinidad



Turtle Legislation

Fisheries Act of 1916, amendments 1975
(Conservation of Marine Turtles) Regulations and the
Protection of Turtles and Turtle Eggs Regulations

Conservation of Wildlife Act of Trinidad and Tobago, 1958,
Amended 1963

Turtle Legislation

In 2011, the Fisheries Division through its parent ministry, the Ministry of Agriculture, Land, and Marine Affairs (currently Ministry of Agriculture, Land, and Fisheries), amended the PROTECTION OF TURTLE AND TURTLE EGGS REGULATION

“No person shall, at anytime, kill, harpoon, catch, or otherwise take possession of any turtle, or purchase, sell, offer or expose for sale or cause to be sold or offered or exposed for sale any turtle, turtle meat or any other part of the turtle.”

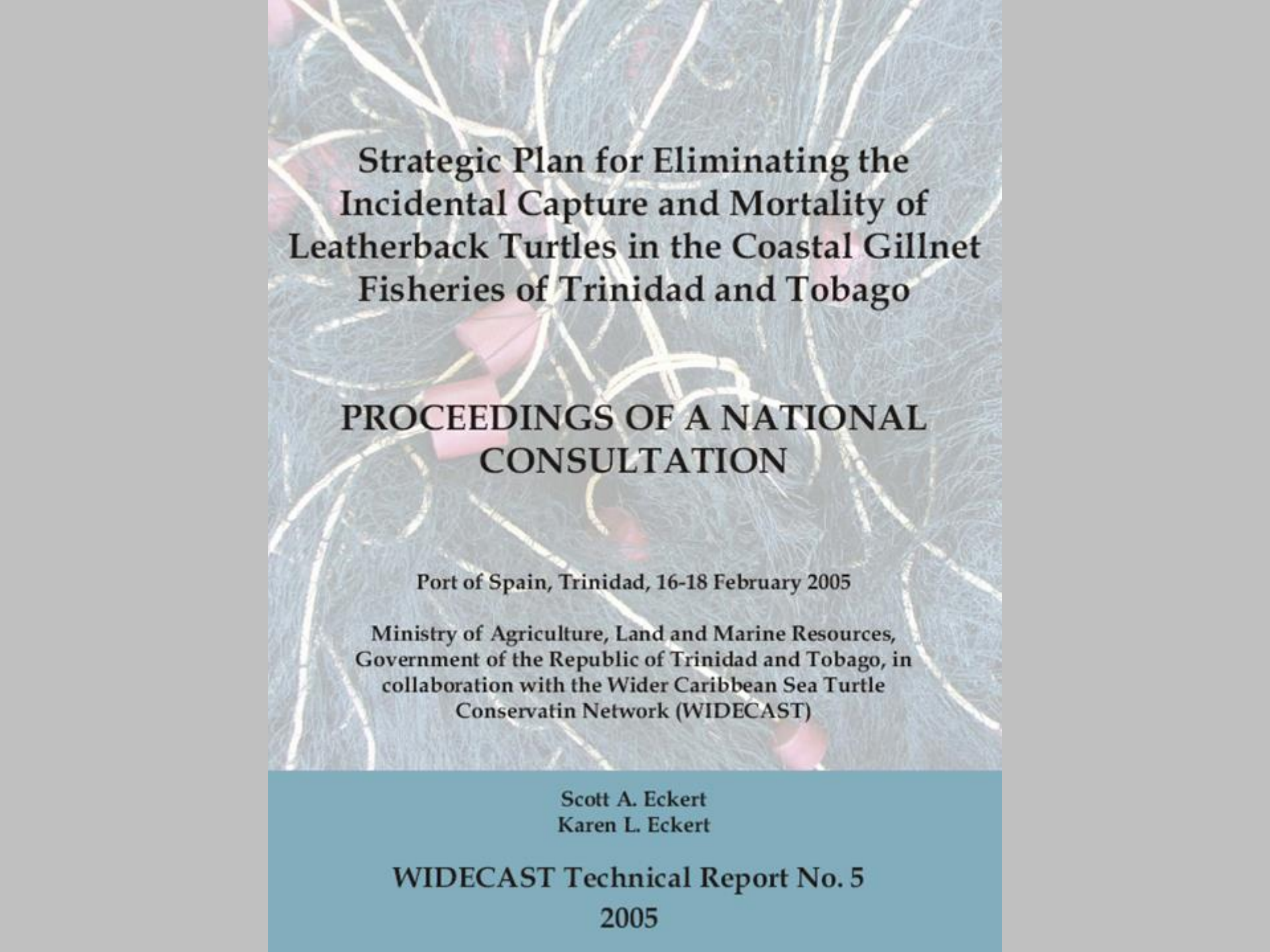
This closed the loophole where nesting turtles were protected under the Wildlife Conservation Act but were allowed to be targeted under the Fisheries Act.

Turtle Legislation

To address take under the Fisheries Act, all species sea turtles were designated as Environmentally Sensitive Species (ESS) in 2014. ESS species are protected and prohibited from:

- a) the taking, removing, harming, injuring, hunting, selling or killing of the ESS and possession of, or trade in any specimen of the living animal and its parts, eggs and products;
- b) deliberate or reckless capture or endangerment of the ESS through the setting of nets and other fishing activities;
- c) deliberate or reckless capture of the ESS in commercial shrimp trawler nets;
- d) the use of any device or substance that may harm, stun or impact negatively on the ESS. The negative impacts would be, but not limited to, those that would impair the sight, hearing, ability to swim or move of the ESS or its ability to detect prey and predators or affect its habitat or nesting ground;
- e) the sale, consumption, possession, offering or storage of the ESS;

The ESS Legal Notice of 2014 identified the largest threat for leatherback turtles is the incidental capture in gill nets



**Strategic Plan for Eliminating the
Incidental Capture and Mortality of
Leatherback Turtles in the Coastal Gillnet
Fisheries of Trinidad and Tobago**

**PROCEEDINGS OF A NATIONAL
CONSULTATION**

Port of Spain, Trinidad, 16-18 February 2005

Ministry of Agriculture, Land and Marine Resources,
Government of the Republic of Trinidad and Tobago, in
collaboration with the Wider Caribbean Sea Turtle
Conservation Network (WIDECAST)

Scott A. Eckert
Karen L. Eckert

WIDECAST Technical Report No. 5
2005



Photo courtesy Carlos Drews



WIDECAST

Wider Caribbean Sea Turtle Conservation Network

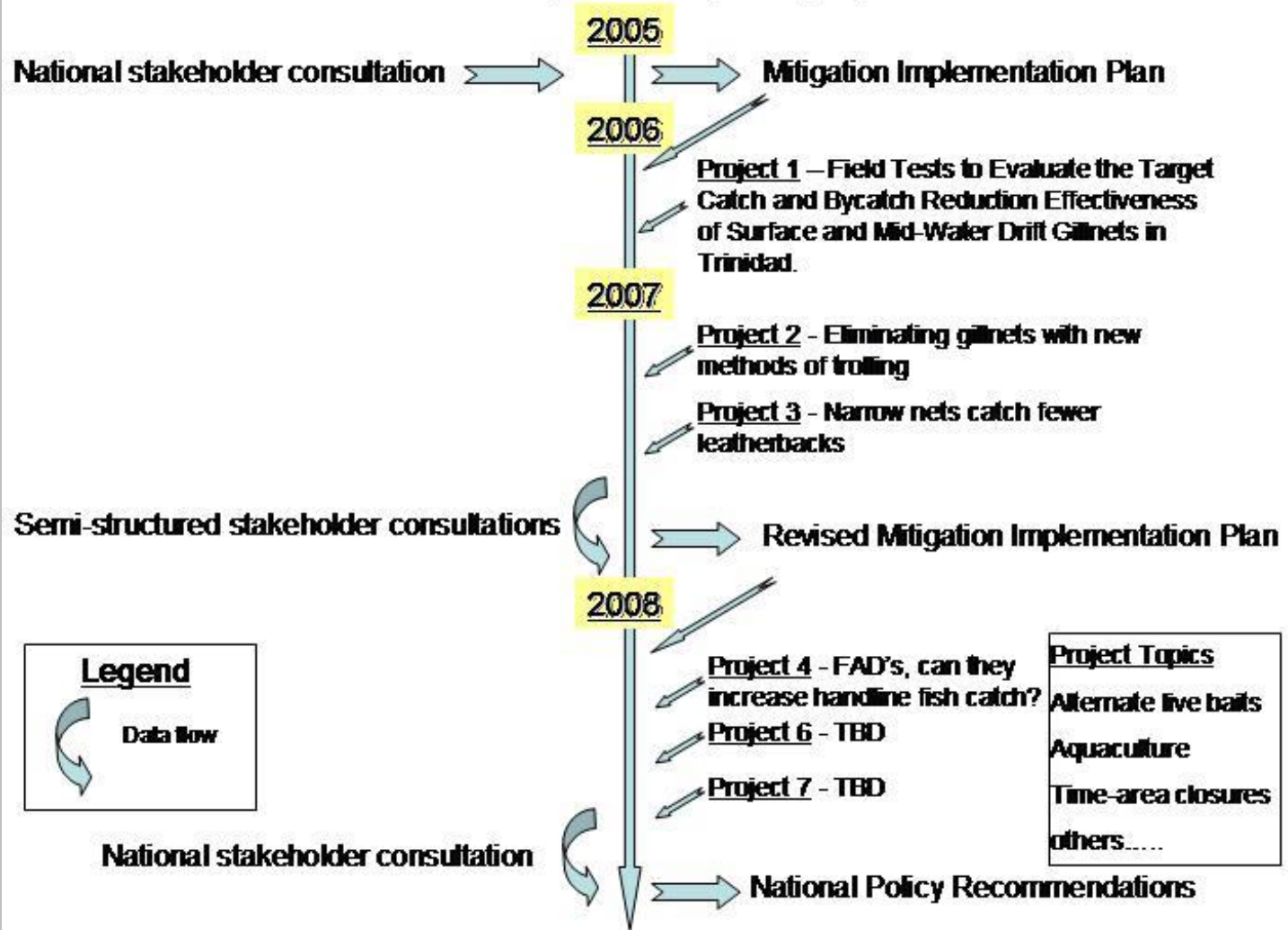
Consultation outcome

- **New Bait Types**
- **Alternative Gear**
- **Net Modifications**
- **Net Avoidance (sonic, visual)**
- **Fish Attracting Devices (FADs)**



Consultation outcome

Trinidad leatherback bycatch mitigation program timeline



2006 Experiment 1

Modification of net fishing methods

- 1) Conduct an experiment testing conventional surface set gillnets and modified mid-water set gillnets to evaluate bycatch of several species groups.
- 2) Compare the catch rates of target species of finfish for each net type.

FIELD TESTS TO EVALUATE THE TARGET CATCH AND BYCATCH REDUCTION EFFECTIVENESS OF SURFACE AND MID-WATER DRIFT GILLNETS IN TRINIDAD



JEFF GEARHART
SCOTT A. ECKERT

2007



- Local net builders contracted to make experimental and control nets and all gear provided to fishers
- Turtle projects contracted to provide data collection and release entangled turtles

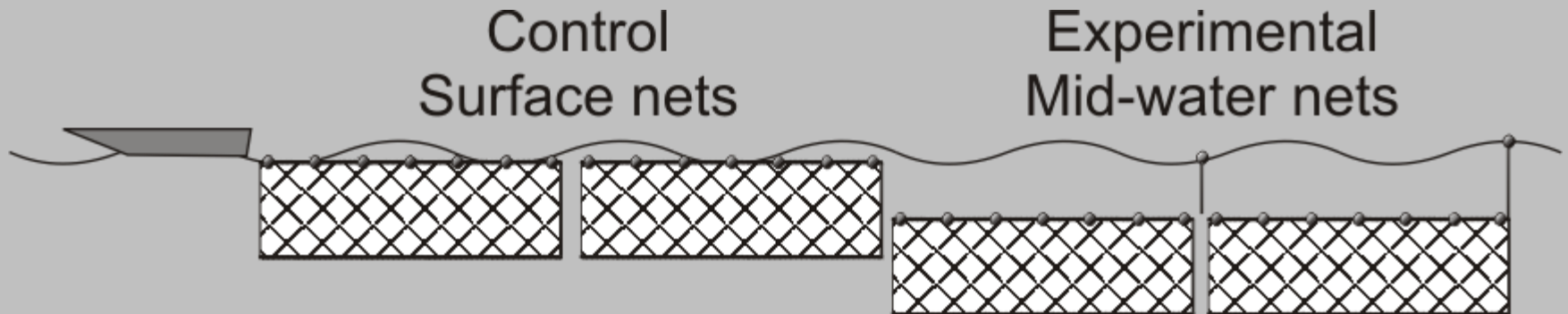


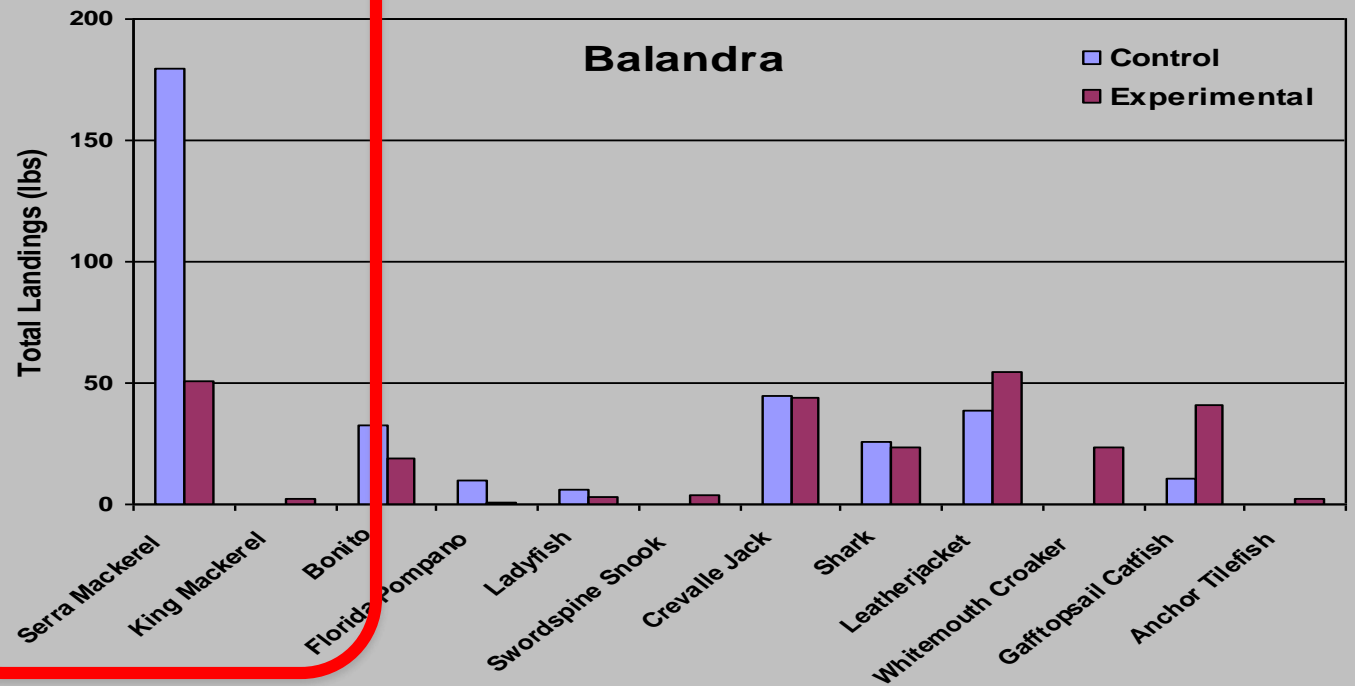
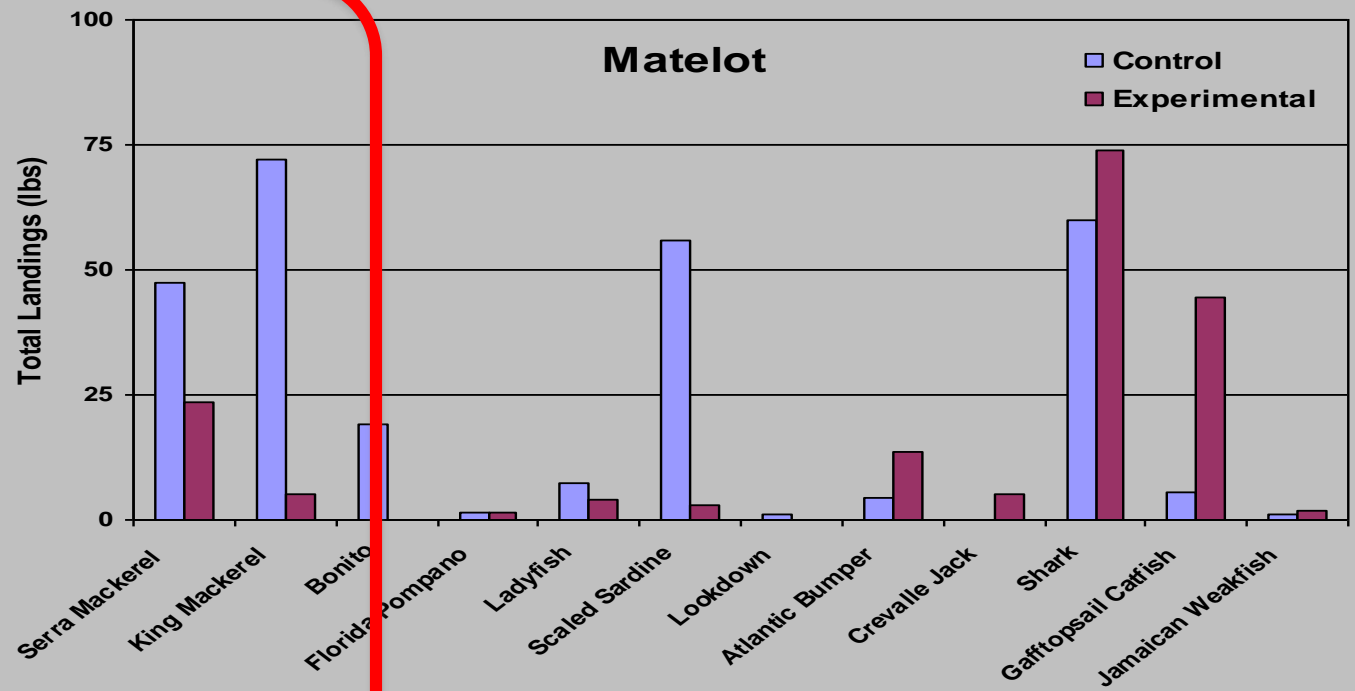
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Methods 2006

- A matched pair experimental design
 - Control Net: a traditional surface drift-gillnet, 125m long x 10m deep
 - Experimental Net: 125m long x 10m deep net suspended 5m below the surface
 - 4 nets linked to form a continuous string of nets





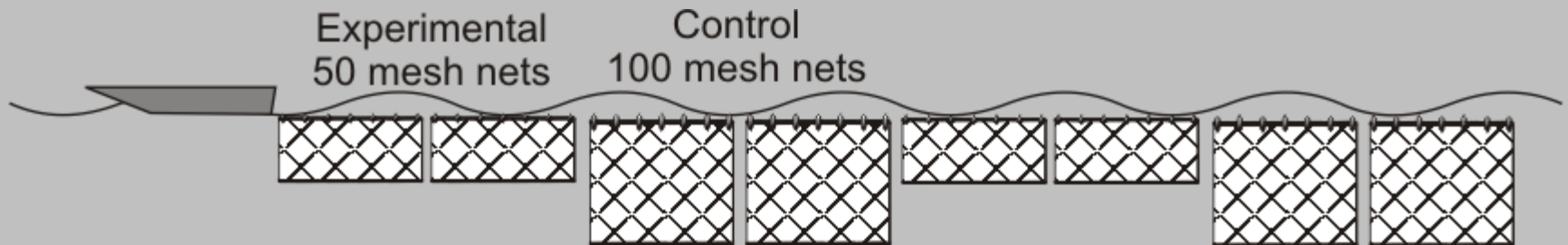
Conclusions: 2006

- **Experimental nets did not improve target species catch.**
- **Results imply that target species can best be caught in upper 5 m of the water column**
- **Possible solution: fish low profile nets**
 - **Improved efficiency, less net, less cost**
 - **Narrower target for turtles – less net to encounter**
 - **Narrow nets are less entangling to turtles**

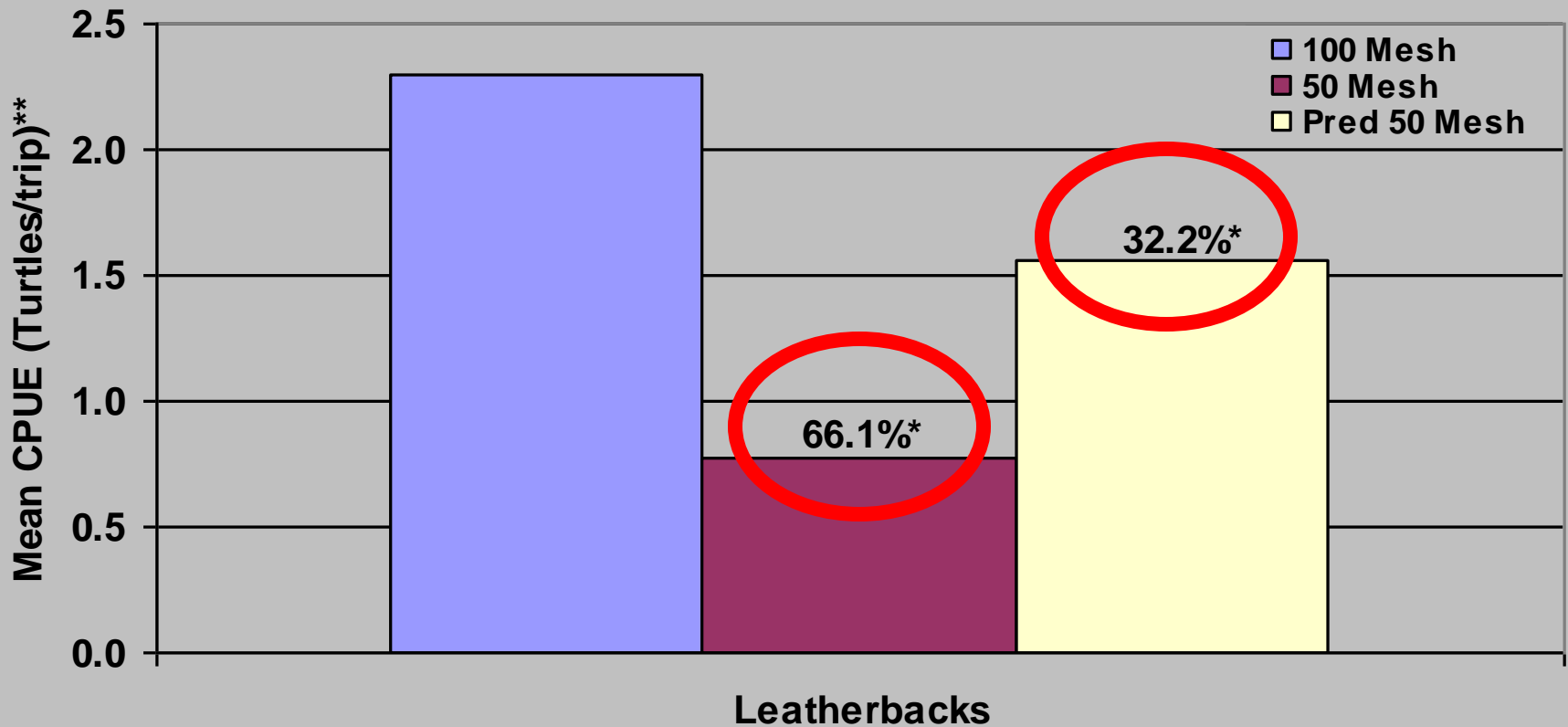


2007

- A matched pair experimental design
 - Control Net: a 100 mesh deep, 4 ¼ inch mesh, surface drift-gillnet, 100m long x 10m deep (25 lbs)
 - Experimental Net: a 50 mesh deep, 4 ¼ inch mesh surface drift-gillnet, 100m long x 5m deep (12.5 lbs)
 - Set = 8 nets, 4 control and 4 experimental
 - Net types were alternated along a continuous string



Leatherback Bycatch CPUE

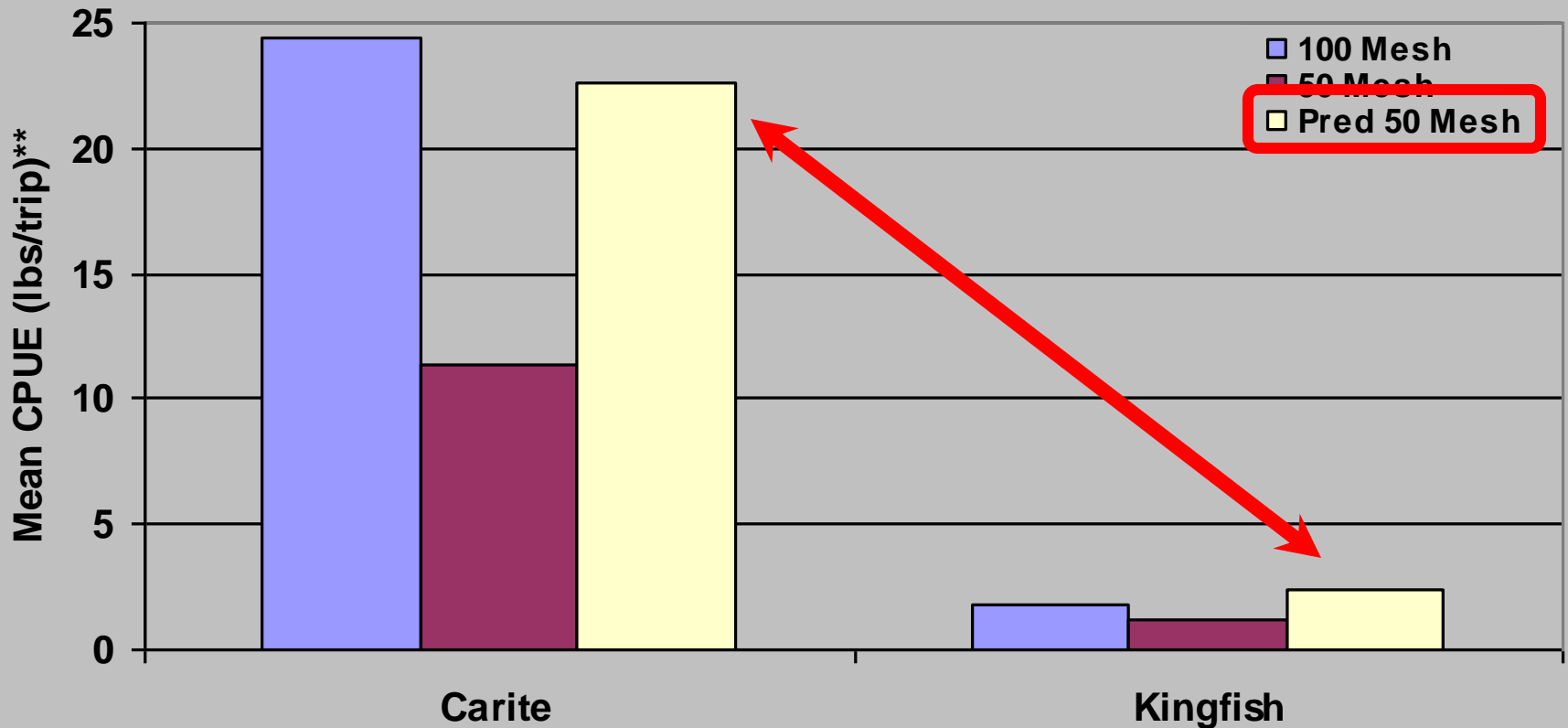


* Leatherback bycatch reduction rates

**100 and 50 Mesh CPUE=Catch/(400mx8hr soak)

100 mesh and Predicted 50 Mesh CPUE=Catch/(4000m²x8hr soak)

Target Catch CPUE



**100 and 50 Mesh CPUE=Catch/(400mx8hr soak)

100 mesh and Predicted 50 Mesh CPUE=Catch/(4000m²x8hr soak)

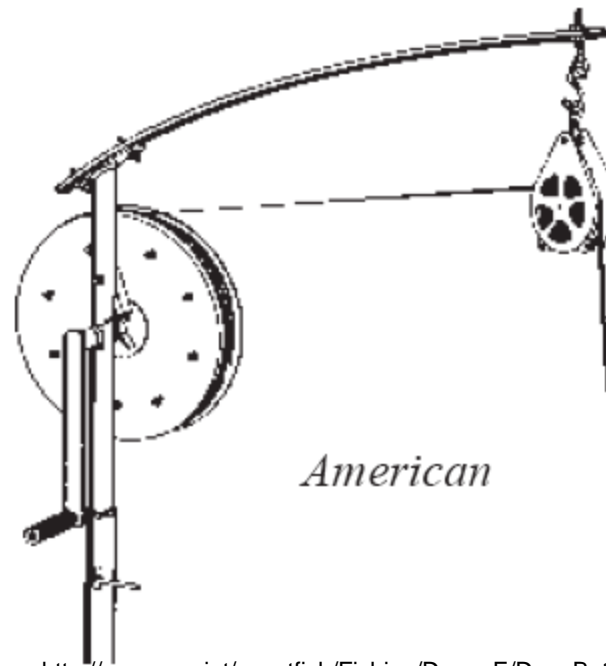
Economic Assessment

- Traditional nets sustained 2.5 times more repair costs than 50 mesh nets
 - Turtles were far easier to disentangle
 - Turtles did not destroy as much net per event in narrow nets
- Using narrow 50 mesh nets will yield 7% more profit per day, when fuel costs and net repair costs are included.





Eliminating gillnets with new methods of trolling



http://www.spc.int/coastfish/Fishing/Deep_E/DeepBottom2.pdf

Vessels outfitted with
Bandit reels (manual reels)
2 Outriggers (hand retrieved)
with planer
Fish finders (Hummingbird
portables)
Kingfish sized spoon baits
and a variety of plastic
“feather” bait.

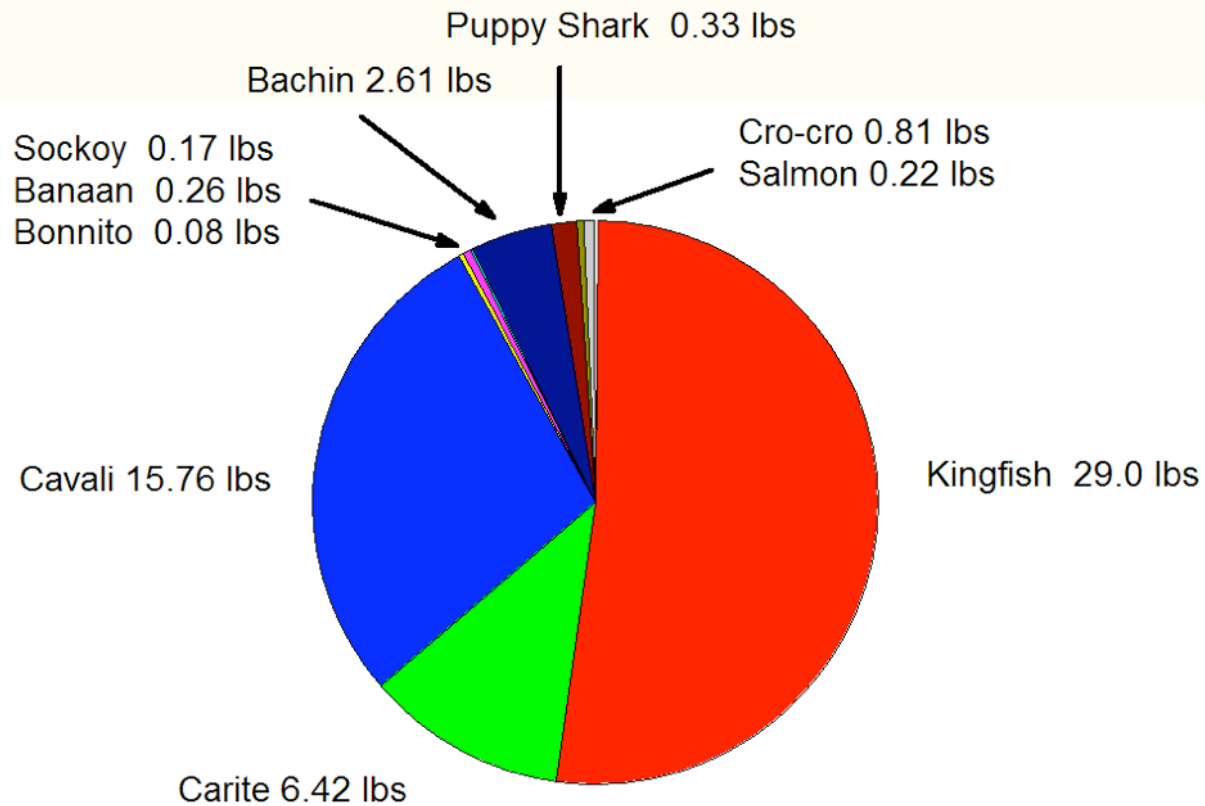


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Troll Fishing caught less fish, but a far higher amount of high market value fish.

Average Weight of Fish Catch per Troll-Fishing Trip



Average Total Catch Weight = 55.76 lbs

Trolling economic assessment

- Trolling produced same income as traditional gillnets, when all costs are factored into the analysis.
- Equipment costs are lower (1/2 that of net fishing)
- Fuel costs and operational costs were equivalent
- No turtles are caught





Fisher Reaction/Response

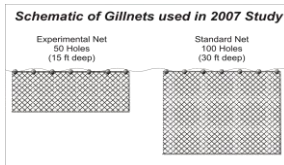
WORKING DOCUMENT, NOT FOR PUBLICATION OR DISTRIBUTION

Catch more fish, Catch fewer leatherbacks. New fishing methods, will they work for you?

This summer from June – September, six Trinidad fishers from Matelot, Toco and Balandra targeting Carite and Kingfish tested two new fishing methods and compared those methods against traditional fillette nets. The objective was to catch fewer turtles without losing fish.

Method 1: Shallow Fishing 50 Mesh Nets

When targeting Carite or Kingfish most fishers along the Northern and Eastern Coasts of Trinidad use fillette (green web) nets that are 100 or more meshes deep that fish to depths greater than 30 feet. Leatherbacks often travel along the bottom as they leave nesting beaches and Mackerel fish spend much of their time near the surface. **If we fished nearer to the surface, could we catch the same amount of fish and fewer turtles?**

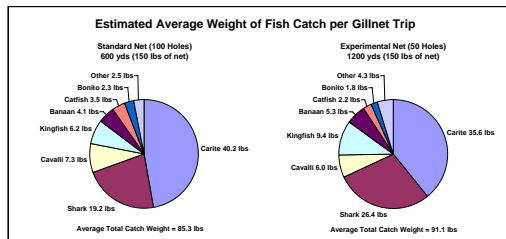


Results

Based on the catch rates measured in this project, **using 50 mesh nets will reduce leatherback turtle catch by greater than 30% and will catch approximately the same amount Kingfish, Carite and Cavalli as 100 mesh nets.**

Economic Assessment

Estimates of average catch per trip based on the catch rates of comparable amounts (lbs of net) of 100 and 50 mesh nets show that catch loss would be minimal. In fact, catches may actually increase if the reduction in leatherback entanglements are factored. **Total daily profit should average 445 TT for 50 mesh nets**, when we include fuel costs, net repair costs and time lost during net repair. **This is better than similar calculations for 100 mesh nets which will provide 406 TT per day.**



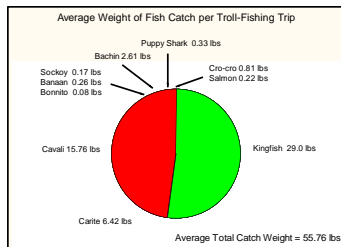
Method 2: Bandit Reel Line Trolling

Another traditional method used to target Carite and Kingfish is trolling with live or cut-bait. However, during leatherback nesting season the availability of Joshua bait prevents the use of this method. An alternative is line trolling with artificial baits.

The great advantage of troll fishing is that it does not catch turtles and the quality of the fish is better. **Can troll fishing with modern equipment (including electronic fish finders) replace traditional gillnets?**

Economic Assessment

Based on the average weight and type of fish caught we would expect troll fishers to make an average of 521 TT per day. Fuel consumption average 9.6 gallons per day, so at a cost of 12 TT per gallon fuel costs should be 115 TT. **Total profit each day (excluding the cost of fishing tackle) should be 406 TT per day using artificial bait with Bandit reels.**



Results:

Four vessels operating from 3 ports: Balandra (1), Toco (2), Matelot (1) were equipped with bandit reels, and electronic fish finders. Each vessel fished from 30 – 31 days each. **Total catch averaged approximately 56 lbs. per day of primarily Kingfish, Cavalli and Carite, and no turtles were caught.**

Scott A. Eckert, – WIDECAST
Jeff Gearhart – U.S. NOAA Fisheries, Southeast Fisheries Science Center
Charles Bergmann – U.S. NOAA Fisheries Southeast Fisheries Science Center
Dennis Sammy – Nature Seekers

Special Thanks go to study participants: Sheldon Achong, Alwin Garcia, Clifford Guy, Anderson Inniss, Sheldon Johnson, Dawson Joseph, Desmond E. Joseph, Anthony "Stien" Julien, Eric Miller, Renwick Roberts, Edith "Jill" Rogers, Anthony "Galba" Stewart.

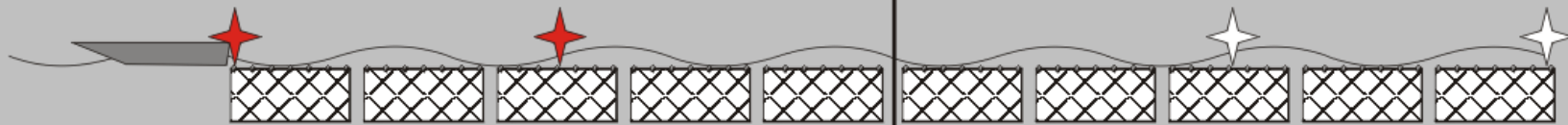


2008 Net Marking Light Study

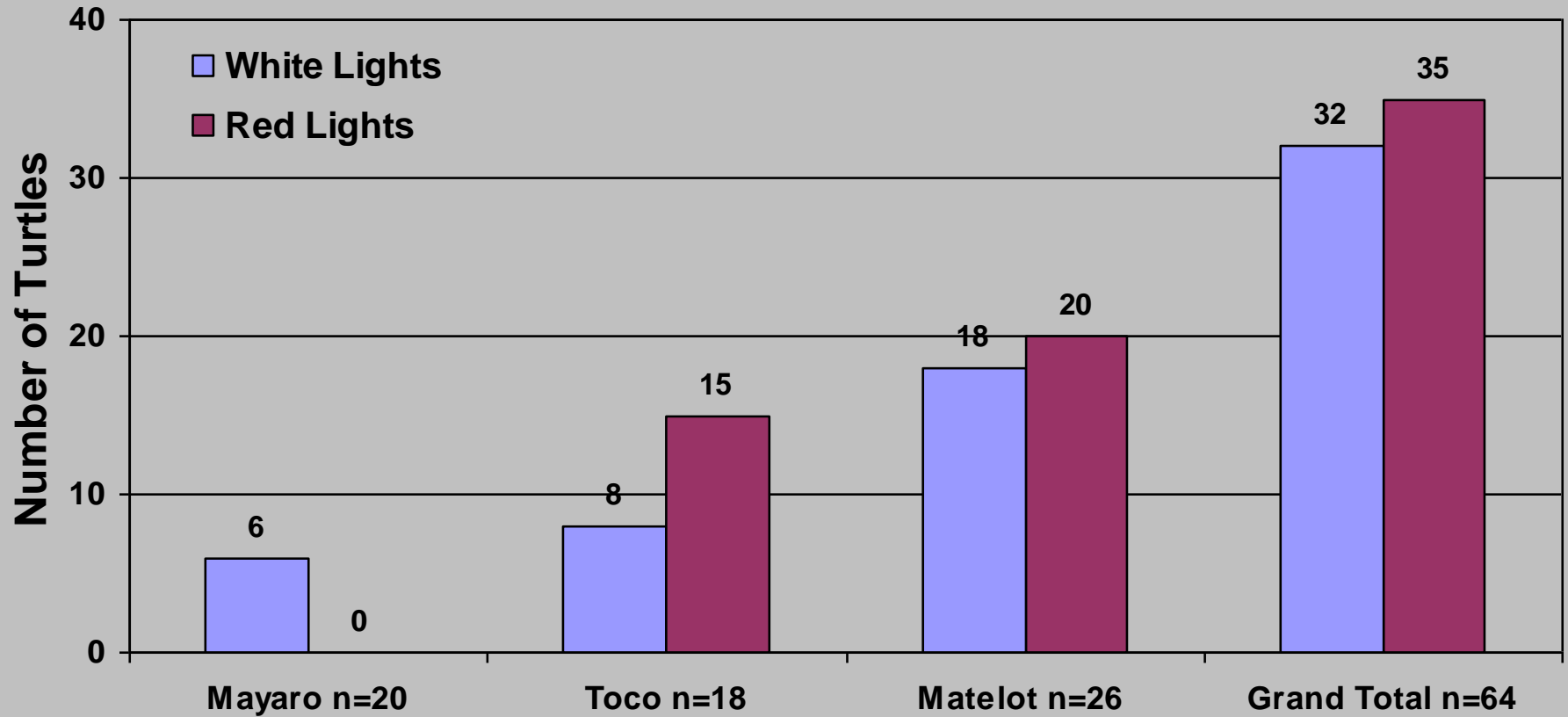


Experimental
Red Lights

Control
White Lights



Leatherback Bycatch Gillnet

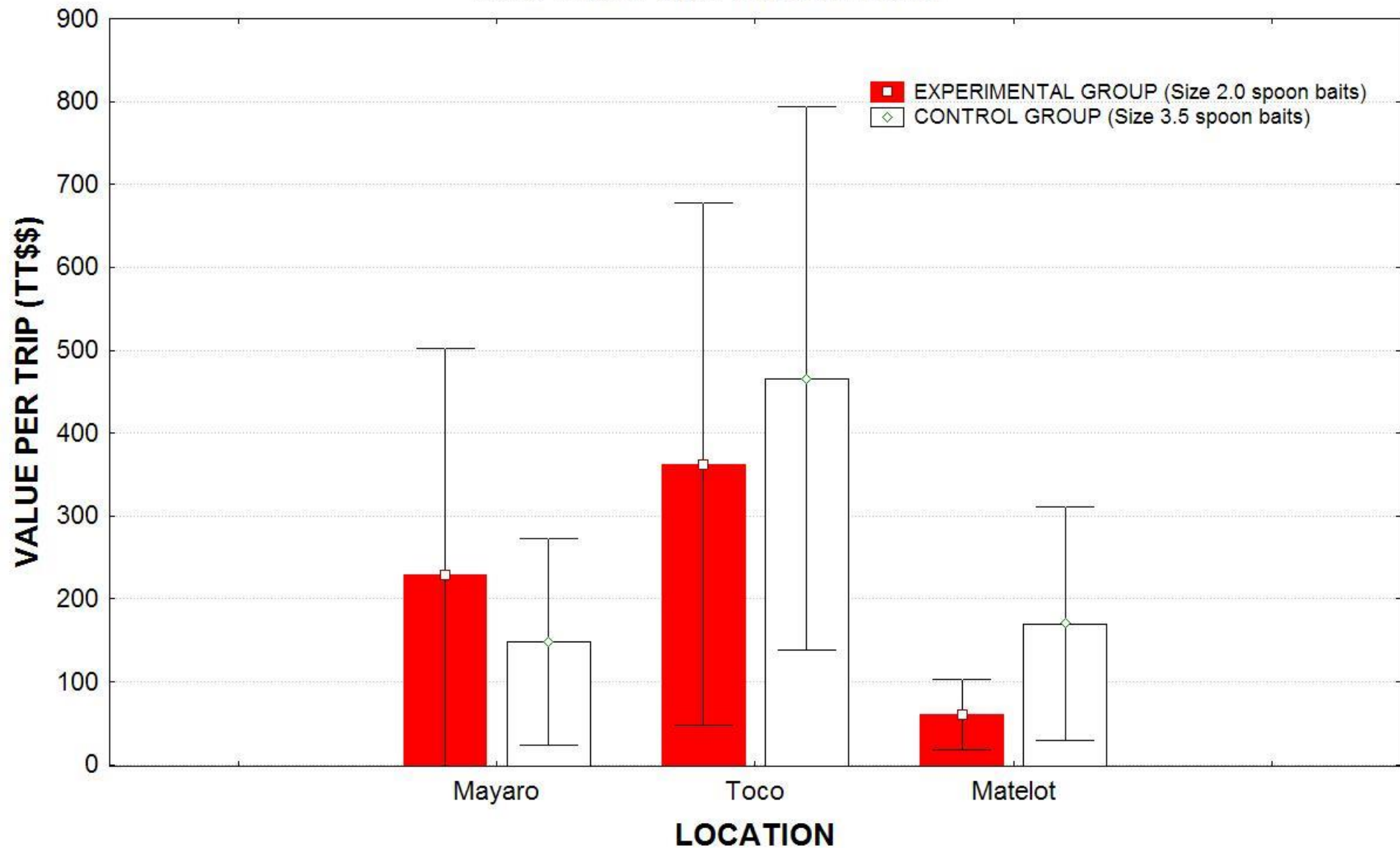


2008 Trolling Tests: Spoon-bait sizes



MEAN VALUE OF CATCH PER TRIP FOR TROLLING VESSELS OPERATING FROM 3 FISHING DEPOTS IN TRINIDAD MAY - AUGUST 2008

Mean; Whisker: Mean \pm 0.95 Conf. Interval



Net Trade-in program

- Turn in nets for the summer
- Provide trolling gear and training
- Return nets at end of summer and fisher keeps trolling gear



Stock market crashed!

- Funding delayed 2 months
- Fishers were not catching turtles and
- Fishers were catching record numbers of fish.....
- Not interested in trading in nets!



Leading the Way



2010

- Can we confirm the data that narrow nets reduce leatherback entanglement if we fish the same area of net?
- Can we improve fisher response to the use of trolling as a replacement for gillnets?
- Does location of nets make a difference in turtle catch?
- Are regulatory means available to promote the use of turtle safe fishing methods?

2011 Vessel Monitoring System

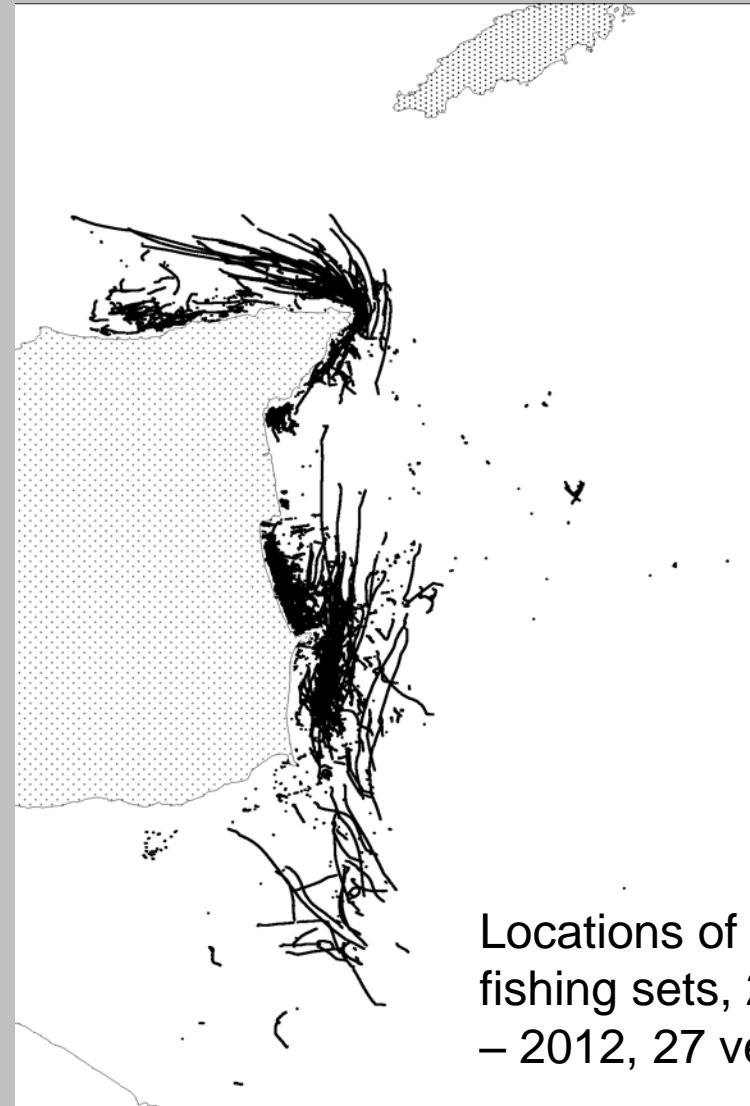
- Instituted a vessel monitoring system on gillnet vessels operating from ports on north and east coasts (Matelot to Manzanilla)
- 27 fisherman were paid \$6.00 USD per day to carry a small autotracking GPS unit and log (single button push entry logged time and location) for every turtle entangled

- Tracking GPS's were collected weekly and downloaded for one year.
- Fishing sets were separated from transit by rate of travel (fishers drift with nets)



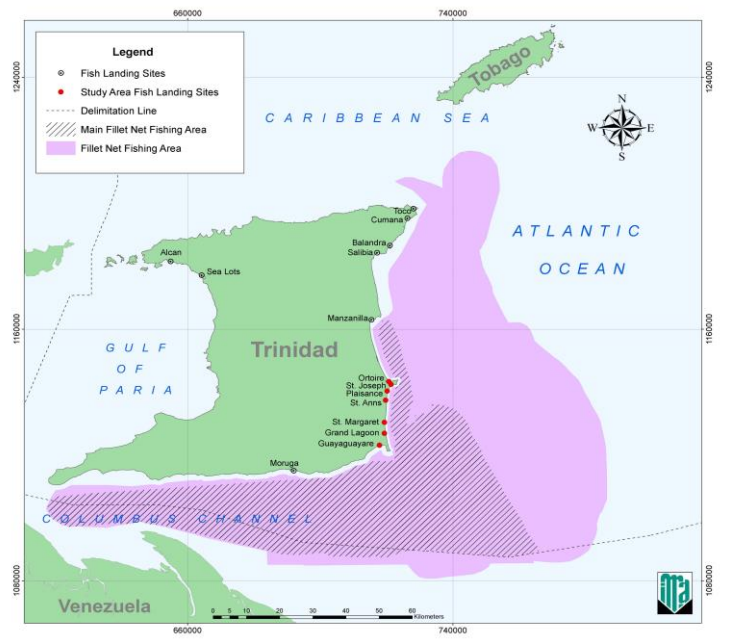
Distribution of Fishing Effort

- 1,357,922 locations were logged

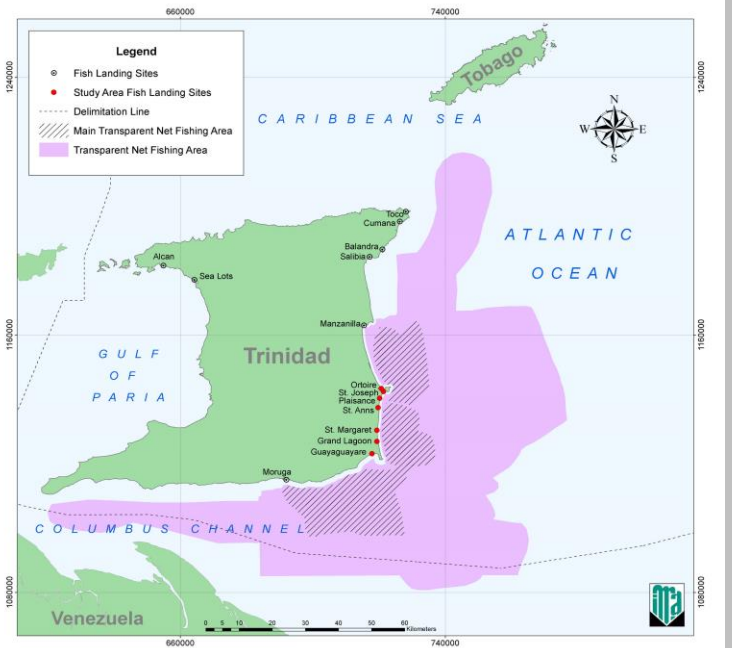


Locations of all
fishing sets, 2011
– 2012, 27 vessels

Fillet Net Fishing Areas



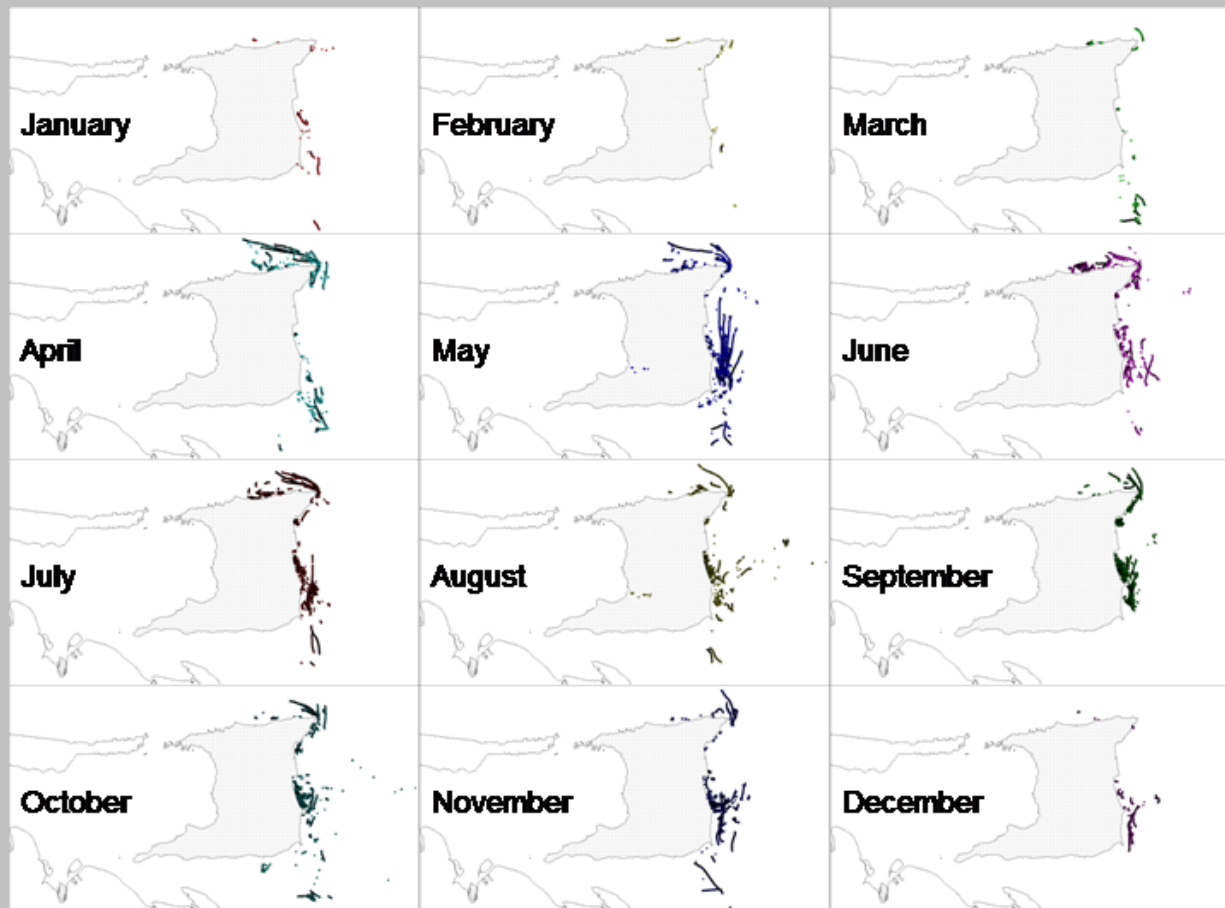
Transparent Net Fishing Areas



Kishore et al (2008)

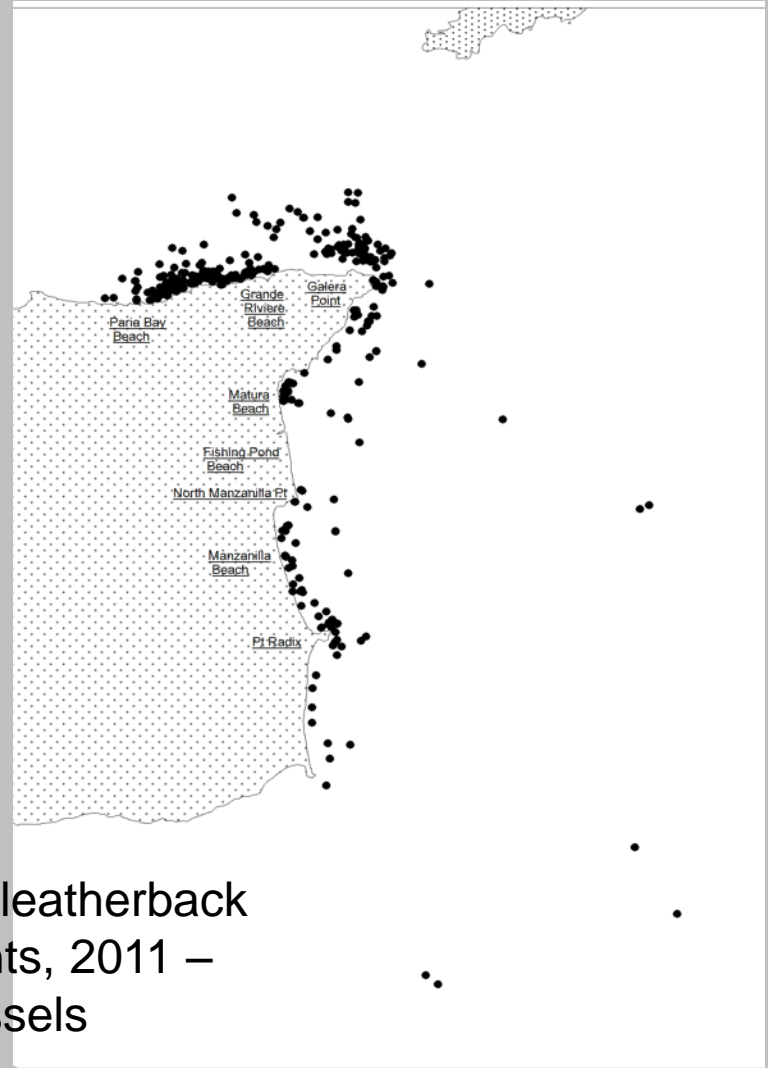
Fishing effort, monthly

- Geographic distribution of fishing effort varied by month – with much of the effort during peak leatherback nesting season



Leatherback Turtle Entanglements

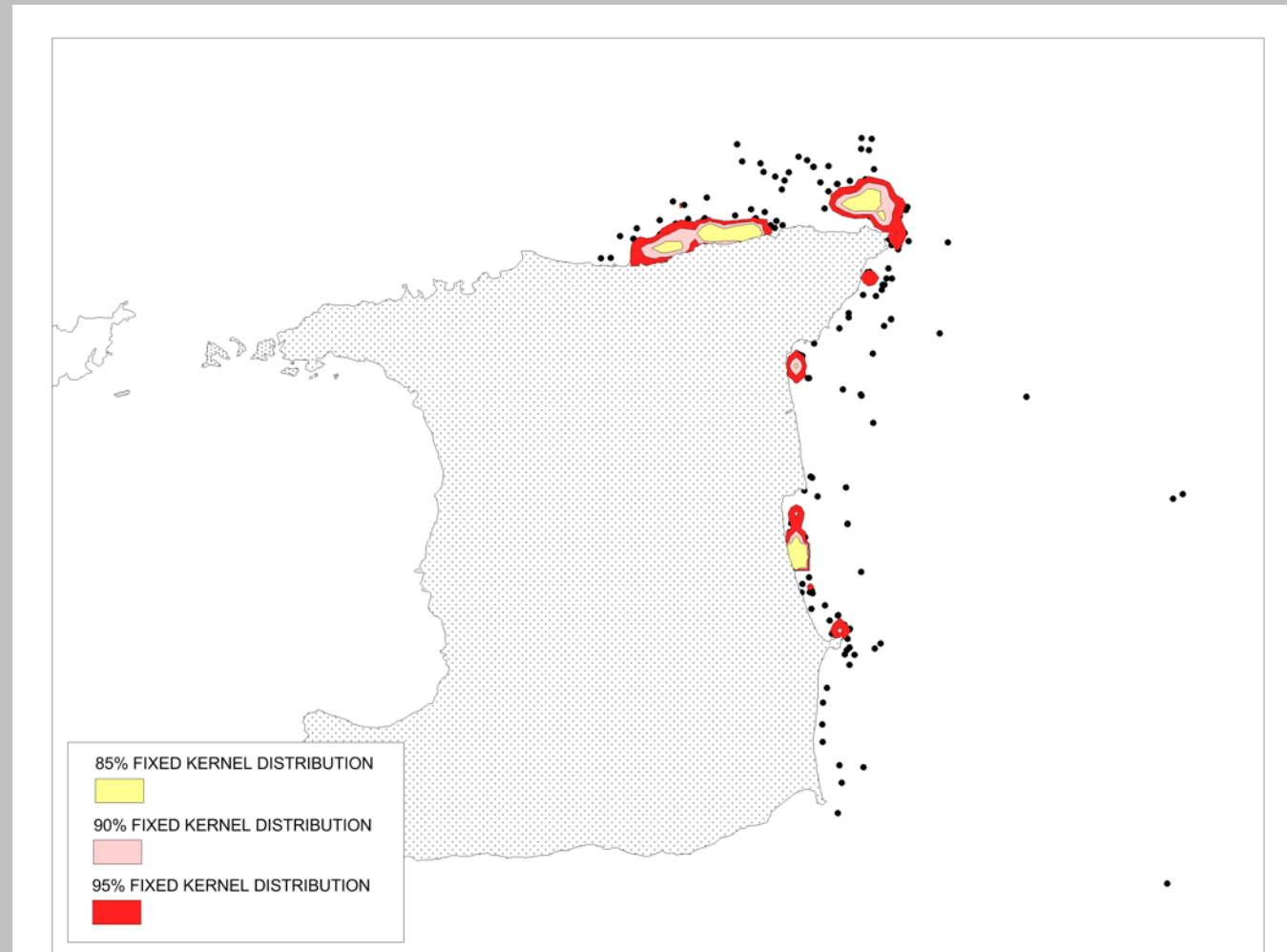
- 482 turtles were captured
- Most leatherback entanglements were along the north coast.



Locations of leatherback entanglements, 2011 – 2012, 27 vessels

Leatherback capture hotspot analysis

- Using a kernel density estimation tool, mapped turtle capture hotspots
- As might be expected, north coast had largest hotspot areas as well as east coast nesting beaches



Location of captures against 85 – 95 % fixed kernel utilization distributions

CONCLUSIONS: HOTSPOT ANALYSIS

- LEATHERBACKS ARE ENCOUNTERED BY FISHERS THROUGHOUT THE YEAR IN TRINIDAD'S WATERS
- HOTSPOT ANALYSIS SUGGESTS THAT THE HIGHEST PROBABILITY OF CAPTURE IS WITHIN 2.5 KM OF THE EAST COAST, AND 4 - 8 KM OF THE NORTH COAST

SOLUTIONS



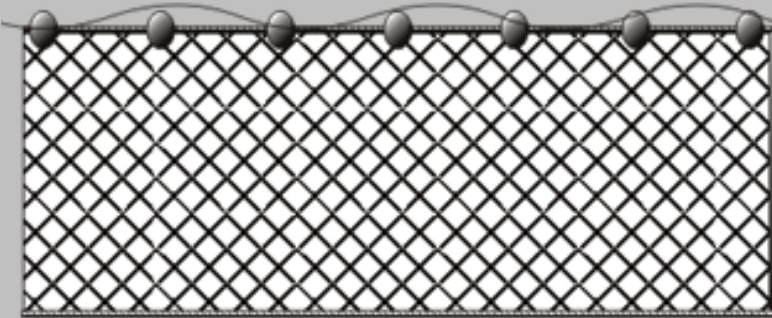
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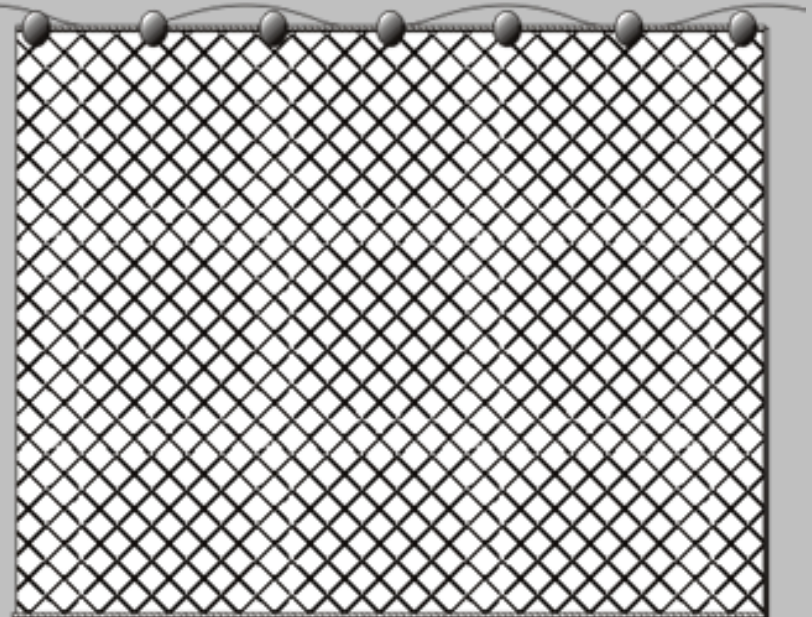
SOLUTION 1

Replace traditional deep setting surface drift gillnets (100 – 200 “hole”) with shallow set “narrow nets” and panel construction.

50 Holes
(15 ft deep)



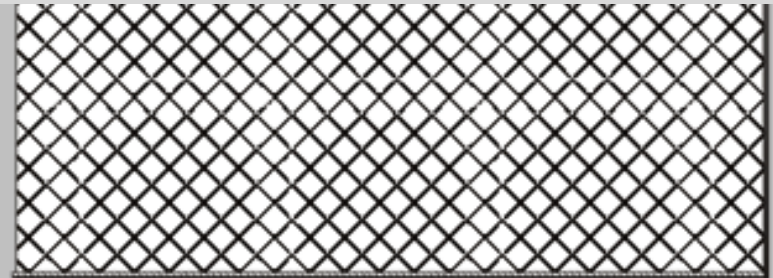
100 Holes
(30 ft deep)



SOLUTION 1

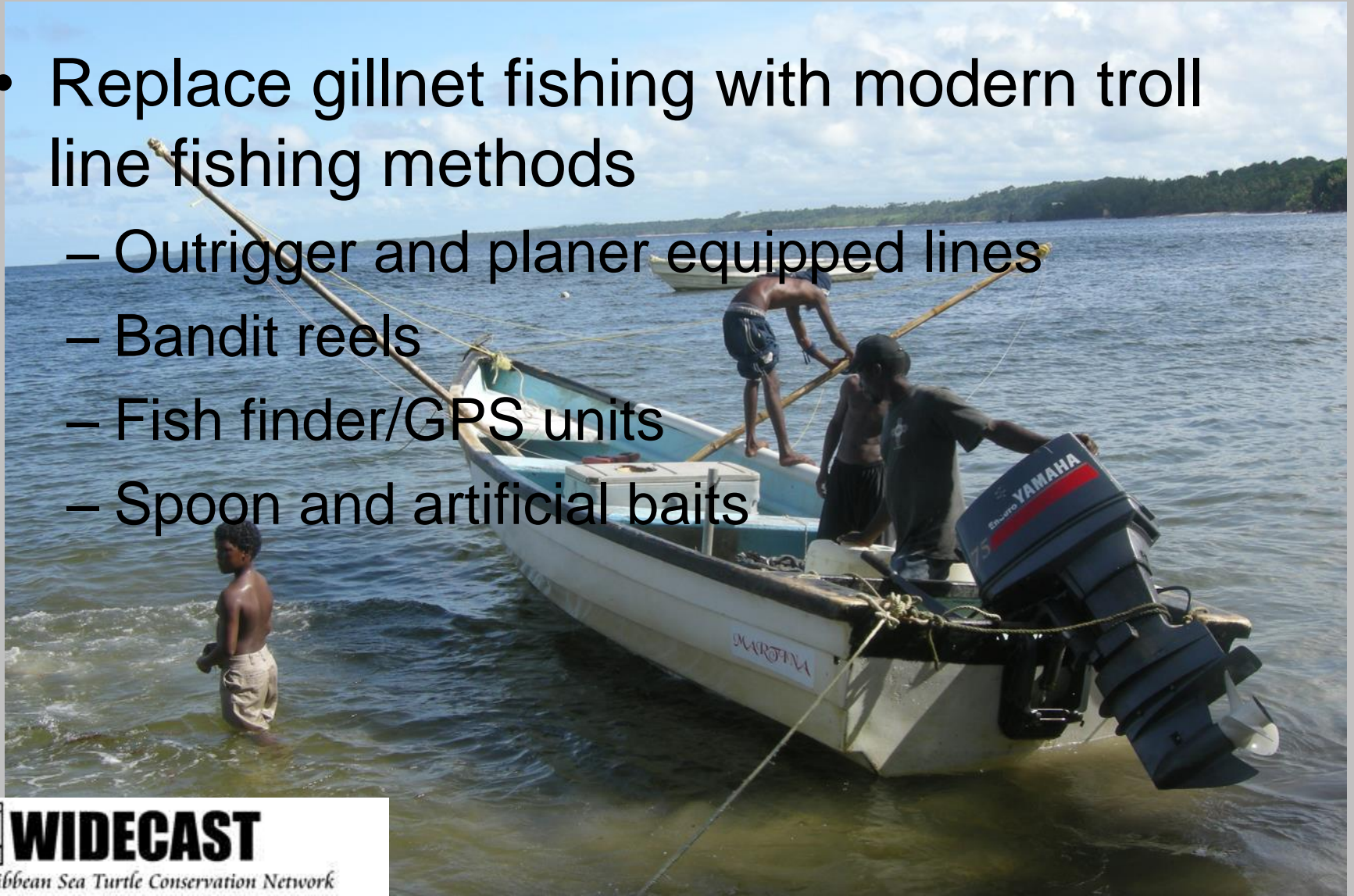
Replace traditional deep setting

**32% - 50% reduction in turtle
capture rates, no reduction
in fisher income,
80% - 90% reduction in turtle
mortality!**



SOLUTION 2

- Replace gillnet fishing with modern troll line fishing methods
 - Outrigger and planer equipped lines
 - Bandit reels
 - Fish finder/GPS units
 - Spoon and artificial baits



SOLUTION 2

Reduces turtle catch by 100%

**Requires $\frac{1}{2}$ the capital costs
of net fishing**

**Reduced maintenance and
fuel costs**

No reduction in fisher income

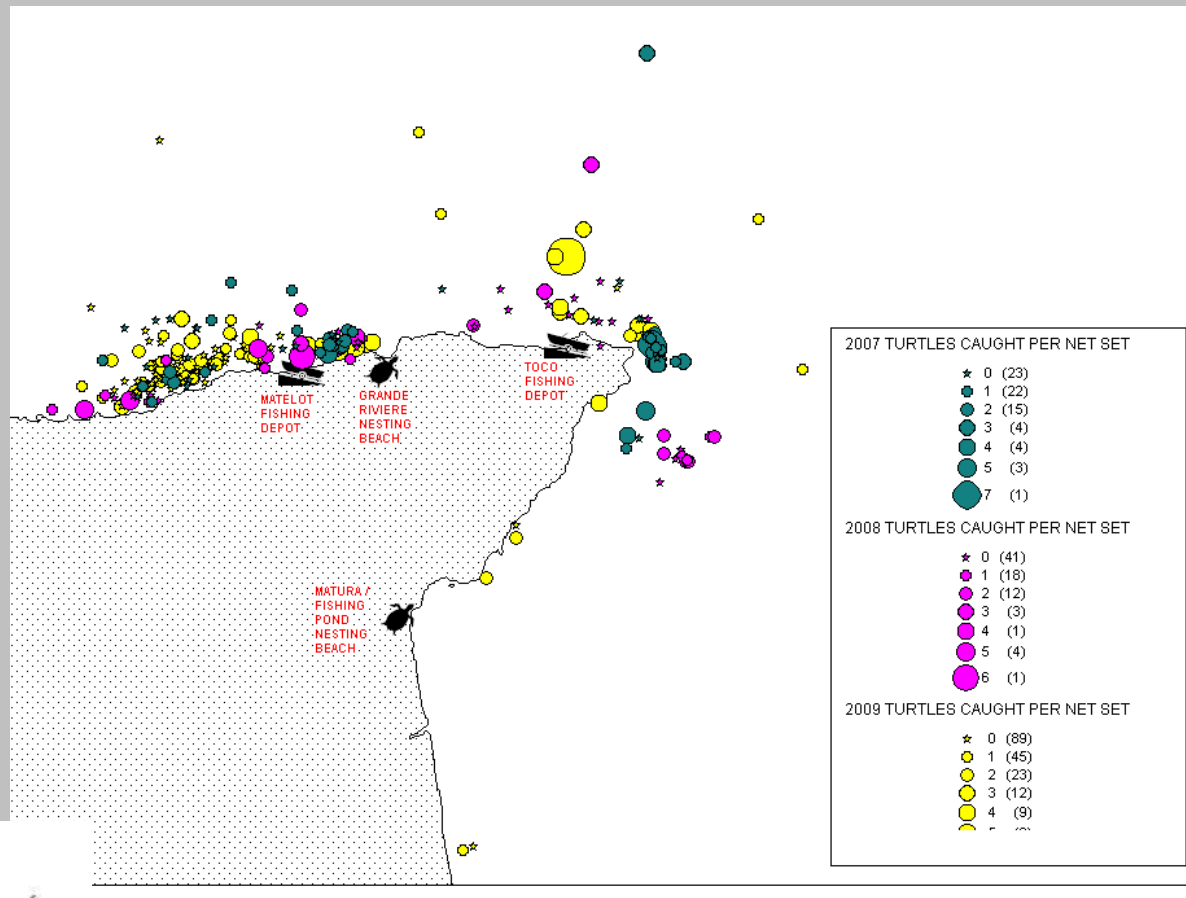


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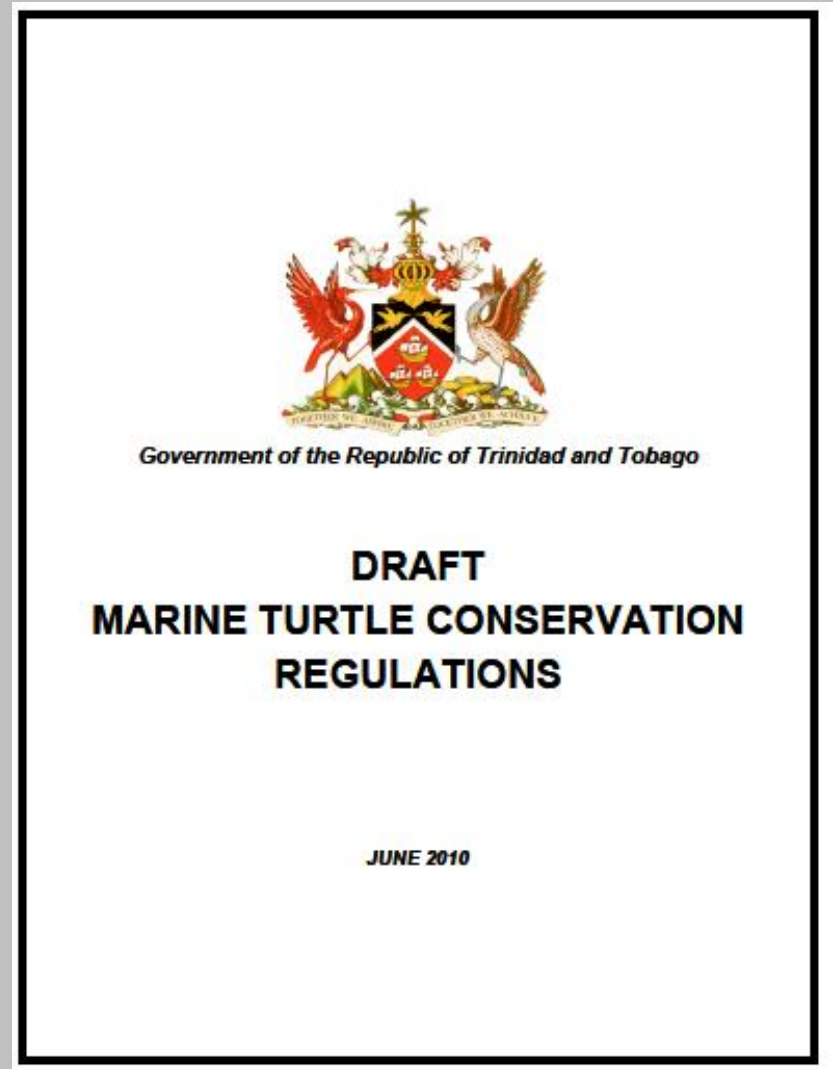
SOLUTION 3

- Modernize outdated fishery regulations to include the provision of time-area closures of leatherback 'hot-spots'.



Model Fisheries Legislation

- Environmental law professor, Brent Plater on Fullbright at UWI
- Developed model fisheries legislation based on Trinidad regulatory structure



Model Fisheries Legislation

- *“....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.”*

SOLUTION 4

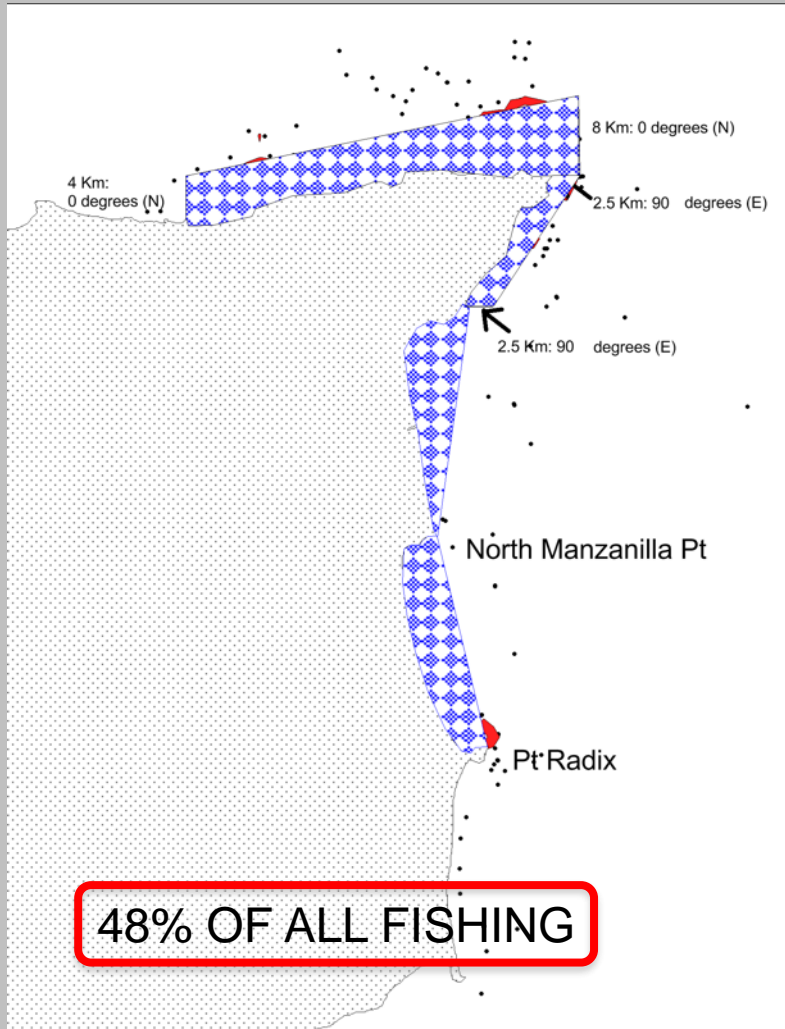
Our fishery and radio tracking data demonstrate that there are areas of high turtle capture probability.

We have developed model legislation that would close those areas to turtle-dangerous fishing methods during parts of the nesting season.

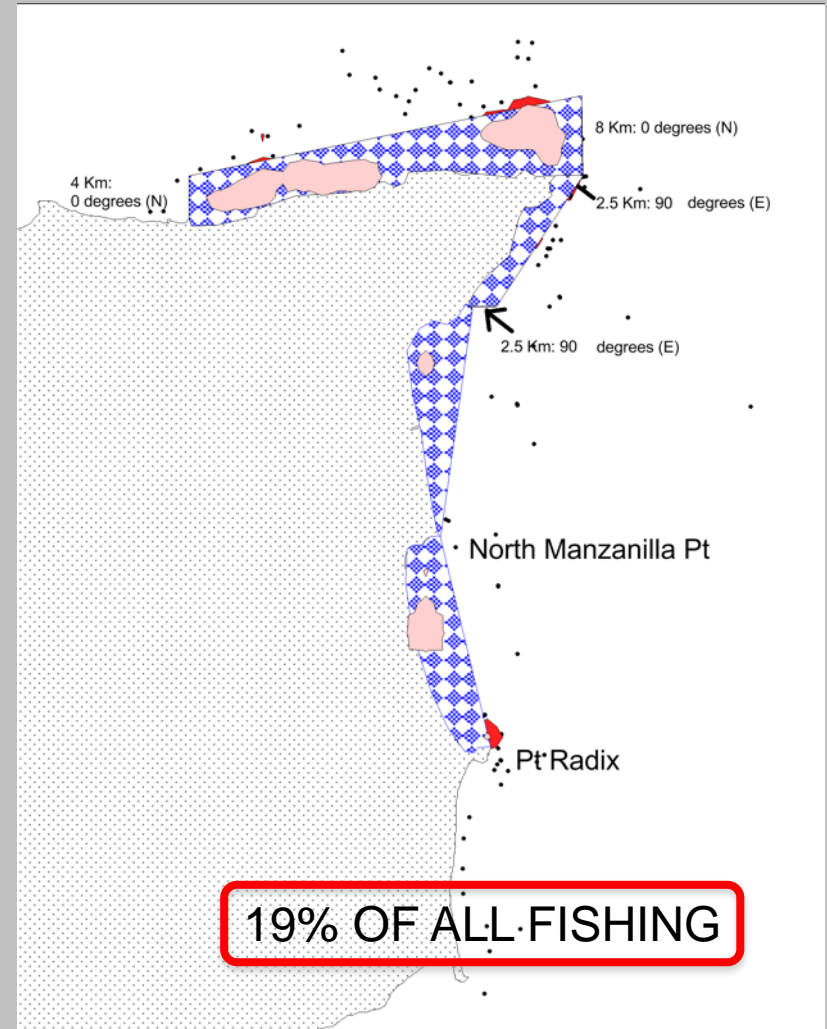


PROPOSED GILLNET CLOSURES AREAS

NO GILLNETS ALLOWED IN ALL AREAS



NARROW NETS ONLY EXCEPT HIGH RISK AREAS WHERE NO GILLNETS ARE ALLOWED



Conclusion: Regulatory Reform

- Based on our hotspot analysis, we recommend complete closure to gillnet fishing of all types in a zone out 2.5 km off nesting beaches designated as hotspots
- Closure to drift-gillnets fishing deeper than 15 mesh and all demersal nets out to 2.5 km on the east coast from Pt. Radix to Galera Pt., and out to 4.5 km off the north coast from Galera Pt. to 1 km east of Paria beach and out to 8 km around Galera Pt. All other fishing e.g. lines, pots and trolling will be allowed in this closure area.

Benefits of Closure

- Turtle mortality will be reduced by 95% according to our analysis
- Entanglement rates will also decline by more than 95% thereby reducing costs of repairs and fishing down time to fishers.
- Increased use of improved modern fishing methods (e.g. trolling, live bait, improved drop-line (banking))

Recommendations

- Need for fishery regulatory actions and the application of incentive programs.
 - Gear Restrictions... net size / type?
 - Incentive programs... Gear exchange or conservation gear subsidies
 - Support regulatory reform based around time area closures and gear restrictions