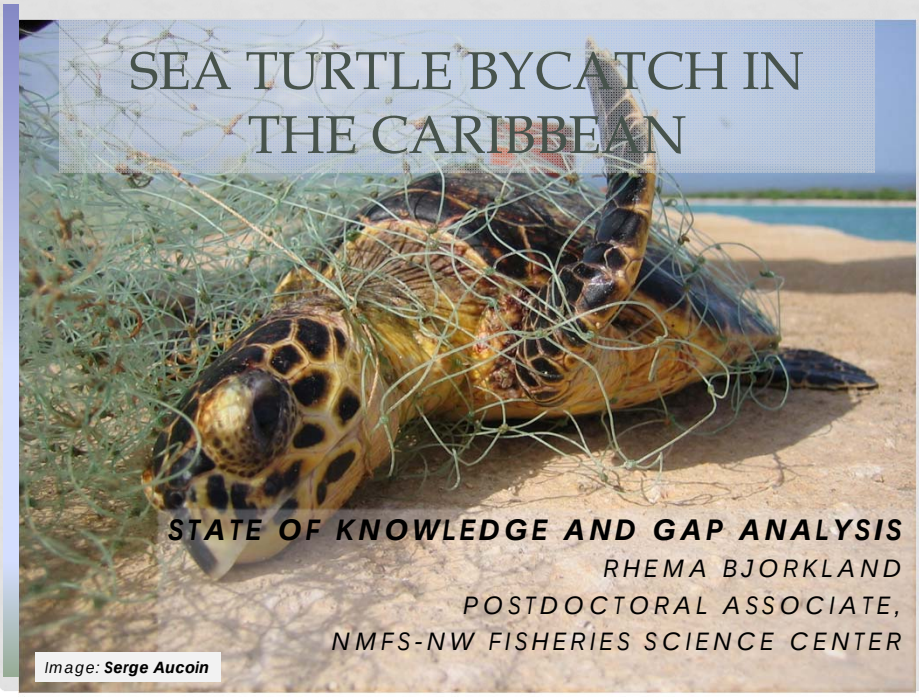


SEA TURTLE BYCATCH IN THE CARIBBEAN

STATE OF KNOWLEDGE AND GAP ANALYSIS

RHEMA BJORKLAND
POSTDOCTORAL ASSOCIATE,
NMFS-NW FISHERIES SCIENCE CENTER

Image: ***Serge Aucoin***

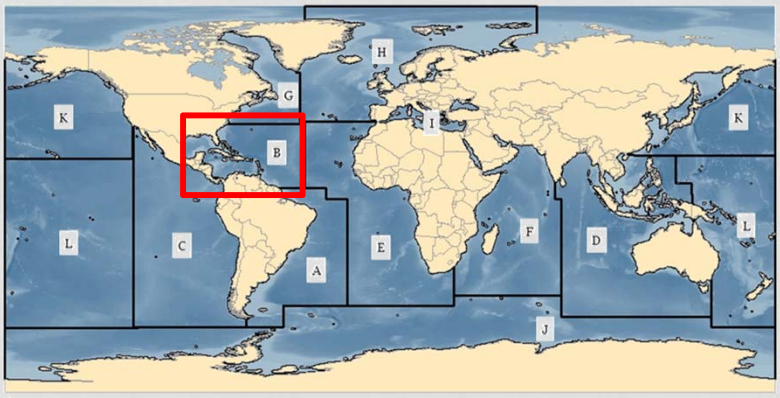
BYCATCH, A MAJOR FACTOR FOR SEA TURTLES

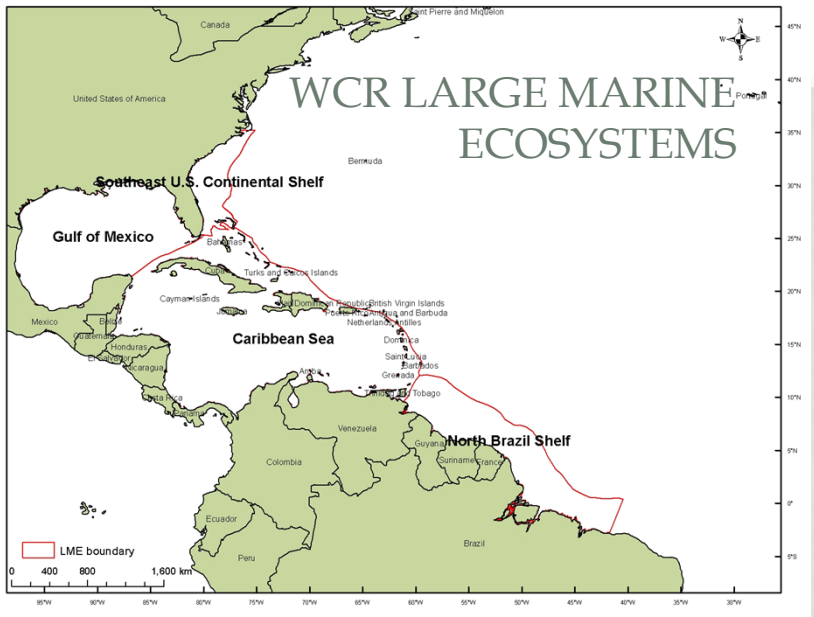
- Lewison *et al.* (2004)
  - 200,000 loggerheads
  - 50,000 leatherbacks annually
- Wallace *et al.* (2010)
  - ~ 1,000,000(1990-2008)

Source: NOAA image library

Project GloBAL

Global Bycatch Assessment of Long-Lived Species





METHODOLOGY

- Literature review
- Analysis of fisheries and bycatch datasets
- Expert and stakeholder consultation
- Rapid bycatch assessment case studies
  - Southeast Asia
  - West Africa
  - **Jamaica**

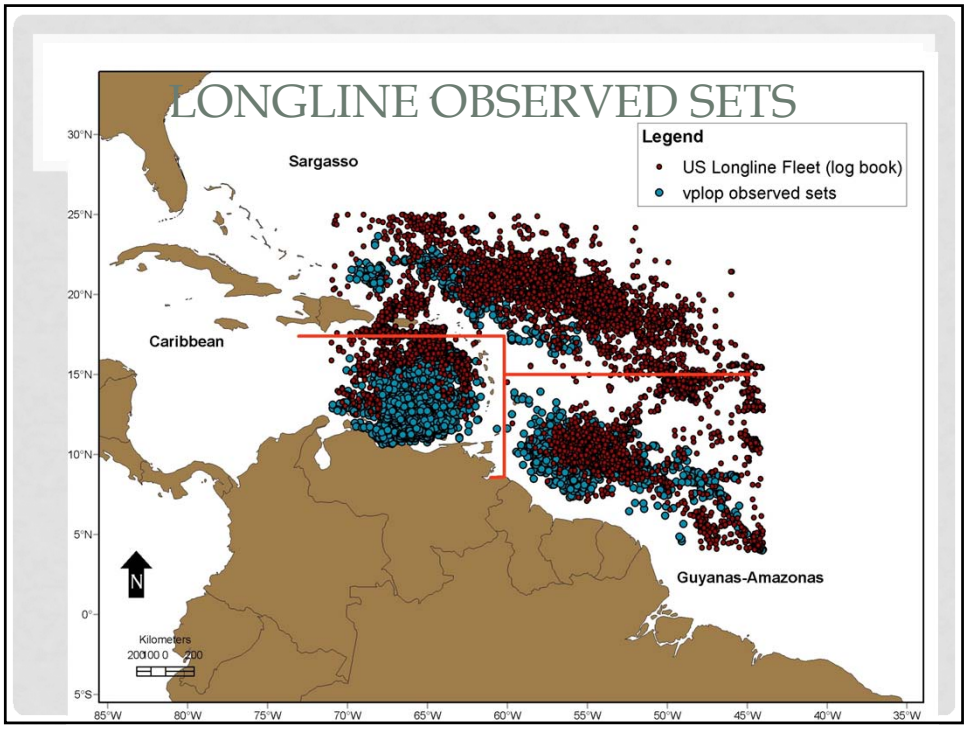
Image: Charlene Thomas

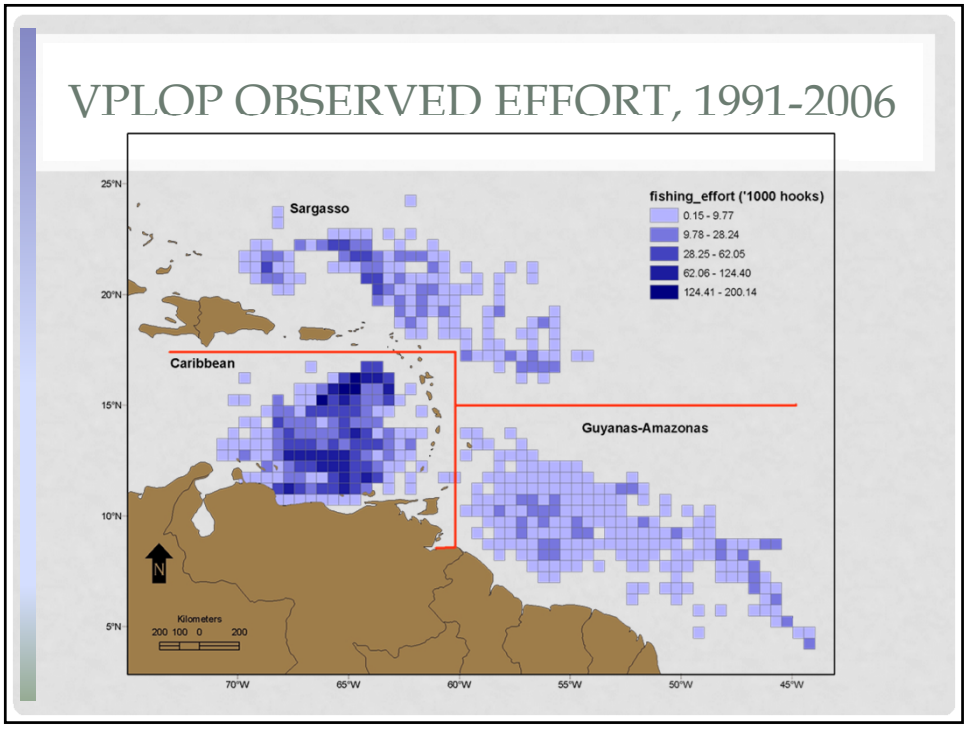
INDUSTRIAL LONGLINE FISHERIES

Source: F. Arocha

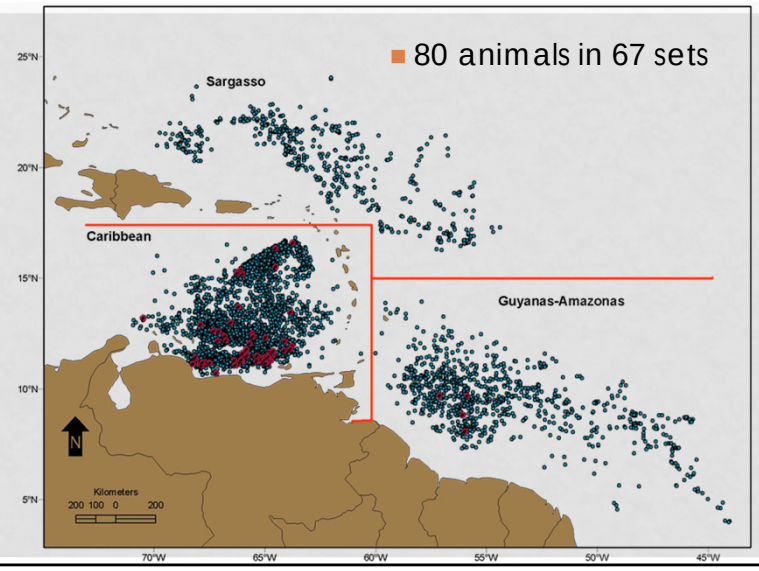
Source: http://hannahboden.com/vessel/

- US and Venezuelan Fleets main fleets within the basin
- Mexican Fleet in the Gulf of Mexico
- Cuba's fleet in international waters significantly reduced/ halted

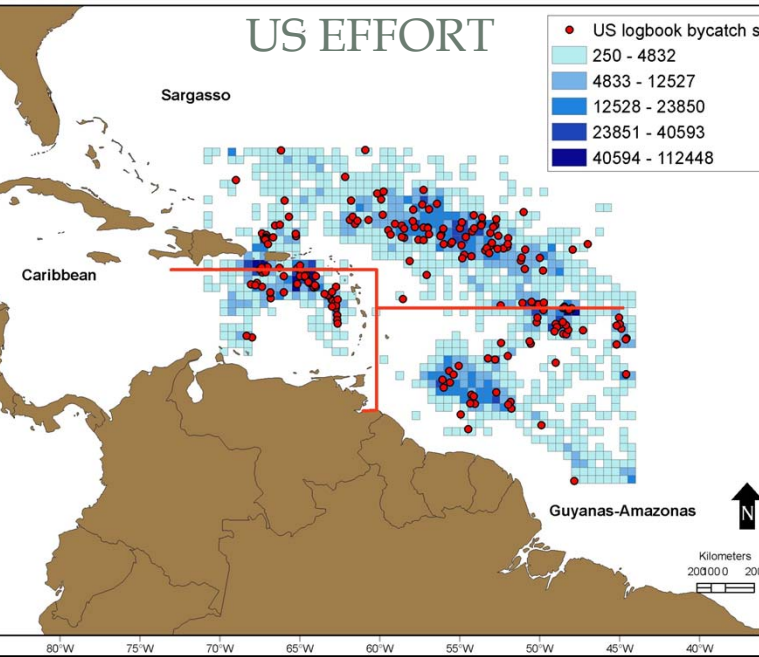

LONGLINE OBSERVED SETS
Legend
US Longline Fleet (log book)
vplop observed sets
Sargasso
Caribbean
Guyanas-Amazonas
N
Kilometers
200 100 0 200
30°N
25°N
20°N
15°N
10°N
5°N
0°
5°S
85°W
80°W
75°W
70°W
65°W
60°W
55°W
50°W
45°W
40°W
35°W


VPLOP OBSERVED EFFORT, 1991-2006
fishing_effort ('1000 hooks)
0.15 - 9.77
9.78 - 28.24
28.25 - 62.05
62.06 - 124.40
124.41 - 200.14
Sargasso
Caribbean
Guyanas-Amazonas
N
Kilometers
200 100 0 200
25°N
20°N
15°N
10°N
5°N
70°W
65°W
60°W
55°W
50°W
45°W

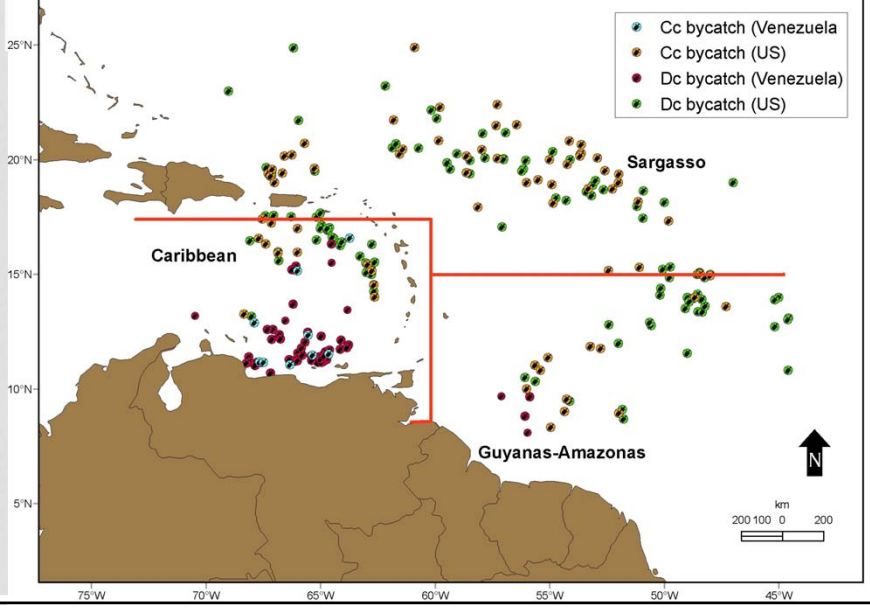
VPLOP OBSERVED BYCATCH (1991-2006)



US EFFORT



SPECIES CAPTURED IN LONGLINES



LONGLINE ESTIMATES

- US and Venezuelan fleets (1992-2005)
  - US fleet bycatch ~ 11,888 (8554-16,253)
  - Venezuelan bycatch~ 1899
  - bycatch in the CLME sub-area similar (1500 vs 1126)
- Dearth of information on bycatch in artisanal/ semi industrial longlines
  - Bottom longlines for demersal fish taxa in Venezuela capture a relatively large number of loggerheads. Generalizable for continental areas in the WCR?

TRAWL FISHERIES

- Assessments/ information from:
  - French Guiana
  - Venezuela*
  - Belize*
  - Cuba
  - Guyana
  - Suriname
  - Nicaragua
  - Central America (multiple territories)

** Banned trawl fisheries*

TRAWL FISHERY BYCATCH RATES

Country	Spp.	Rates	Time	Source	Notes
Belize	Ei Cc, Cm	1 turtle/trawl hr	?	experimental fishing trials	*Pers com* R. Carcamo
French Guiana	Lo	0.022 turtles/ trawl hour	1992-1993	experimental fishing trials	Gueguen (2000)
Guyana	Mainly *L. olivacea*	-	1992	interview data	1300 per annum (Tambiah, 1994)
Suriname	Mainly *L. olivacea*	-	1992	interview data	3200 per annum (Tambiah 1994)
Venezuela	Ei,Cm, Cc, Dc	0.0011- 0.00137 turtles trawl hr	1991-1993, 2000	Observer data	Alio et al. (2010)
Cuba	Mainly Cm	-	2000-2001	Interviews/ landings data	619 turtles per annum (Moncada et al.(2003)
Nicaragua	Unsp.	-	1994		140 per annum (Arauz, 1996)
Central America		-	1994		514 per annum (Arauz, 1996)

TRAWL FISHERIES

- Sea turtle bycatch rates and numbers in shrimp trawl fisheries on the continental margins are among the lowest reported.
  - In some areas (e.g., Trinidad)- maybe related to the relatively low spatio-temporal overlap fisheries and sea turtle migratory corridors*
  - Challenges: sensitivity of government agencies regarding data on bycatch in trawls?
  - Several governments have banned or made significant changes (Belize, Venezuela)

** Kuruvilla, S. 2001 Impact of shrimp fisheries in Trinidad and Tobago, FAO Fisheries Circular N0. 974*

GILLNETS

- Some form of assessment/information in
  - French Antilles
  - French Guiana
  - Suriname
  - Trinidad & Tobago
  - Dominican Republic
  - Mexico
  - Jamaica

COMPOSITION OF GILLNET BYCATCH

- Species assemblage in gillnets bycatch is less about the gear and more about where and when.
  - Proximity to nesting beaches will catch the nesting species, proximity to nearshore foraging habitat will catch foragers, e.g.
    - Leatherbacks and olive ridleys in Trinidad and the Guianas, Hawksbills in Mexico, Dominican Republic, Guadeloupe.

GILLNET RATES

Country	Rate	Year	Source	Notes
Dominican Republic	0.03 turtles/ hr in a 640 m long gillnet	2006	experimental fishing, direct observation, trials and interviews	
Guadeloupe	1-10 turtles/net/year	2003	interview date for annual estimate	
Suriname	0.035-0.048 turtles/boat day	2006	interview	Effort calculated as ranging from 18-28 days/ month- individual monthly rates averaged
Venezuela	>0.0166 turtles/ boat day	1997-1998	interview data	Calculated from estimates of effort and bycatch numbers. Symposium abstract
French Guiana	0.091-0.101 turtles/boat day	2004-2005	interview	Calculated from estimates of effort (20 boat days per month per boat for 6 months) and sea turtle bycatch numbers
Trinidad and Tobago	0.157-0.196 turtles/boat day	2001-2002	interview	Calculated 217 gillnet fishers , 16-20 days/month and 7000 captures (Lum, 2006)
Trinidad and Tobago	0.09-0.12 turtles/boat day	2005	interview and strandings	Interview and stranding data. Calculation based on 38 reported captures in 2 months (10 fishers at 32-40 boat days each)
Trinidad and Tobago	0.04 turtles/net m hr.	1992	Interviews	Calculated from statistic: 10 Dc in 61 m of net- and average soak time of 4 hrs.

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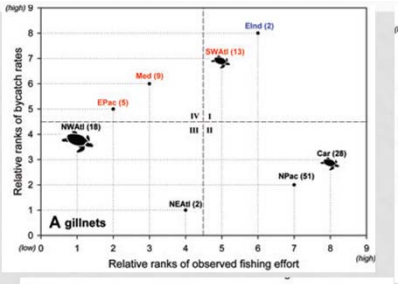
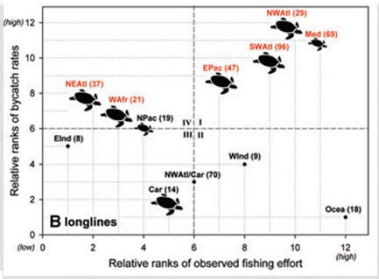
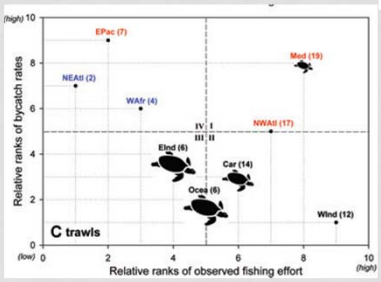
OTHER GEAR

- Trap fisheries?
- Hook and line fisheries
- Beach seine

RELATIVE REGION-GEAR RANKING FOR SEA TURTLE BYCATCH,







From: ***Wallace et al., 2010****. Global Patterns of marine turtle bycatch. Conservation Letters 3(3): 131-142*

SUMMARY

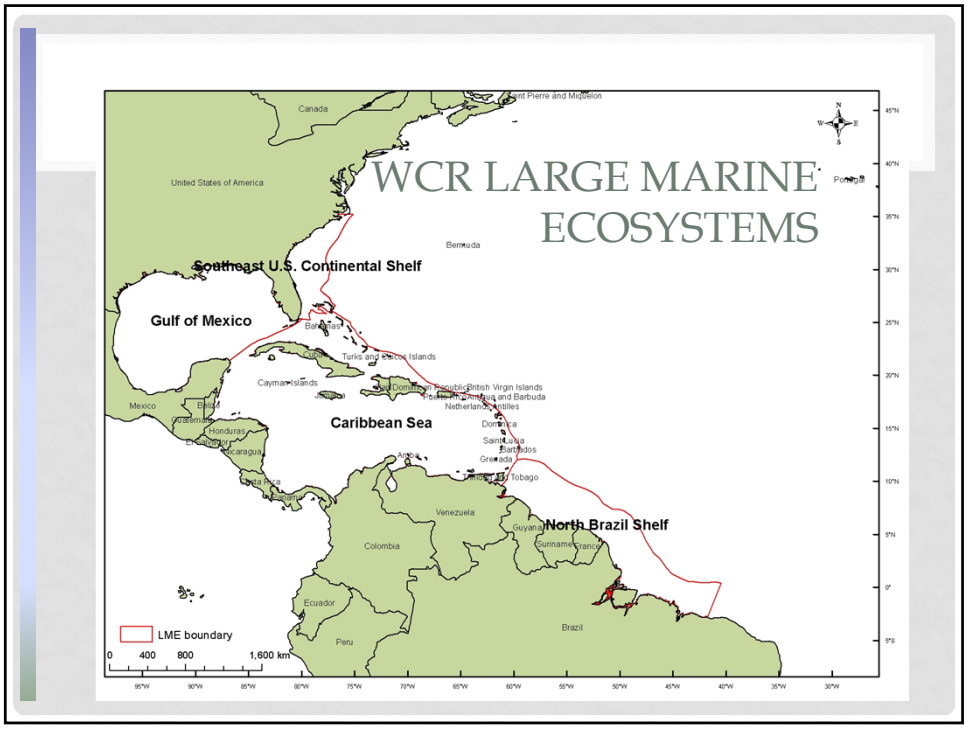
- WCR limited in number of bycatch studies
  - fisheries and independent, on- board monitoring is limited
  - Need multi-gear studies such as undertaken in Yucatan, Mexico
- Fishery-wide estimates unavailable for most fisheries
  - Annual estimates for at least one gear in 14 non-US territories, representing ~ 37,000 sea turtles
- Within the Caribbean basin,
  - gillnet fisheries in proximity to nesting beaches, in shallow soft bottom habitats and longlines targeting demersal resources may warrant greatest focus

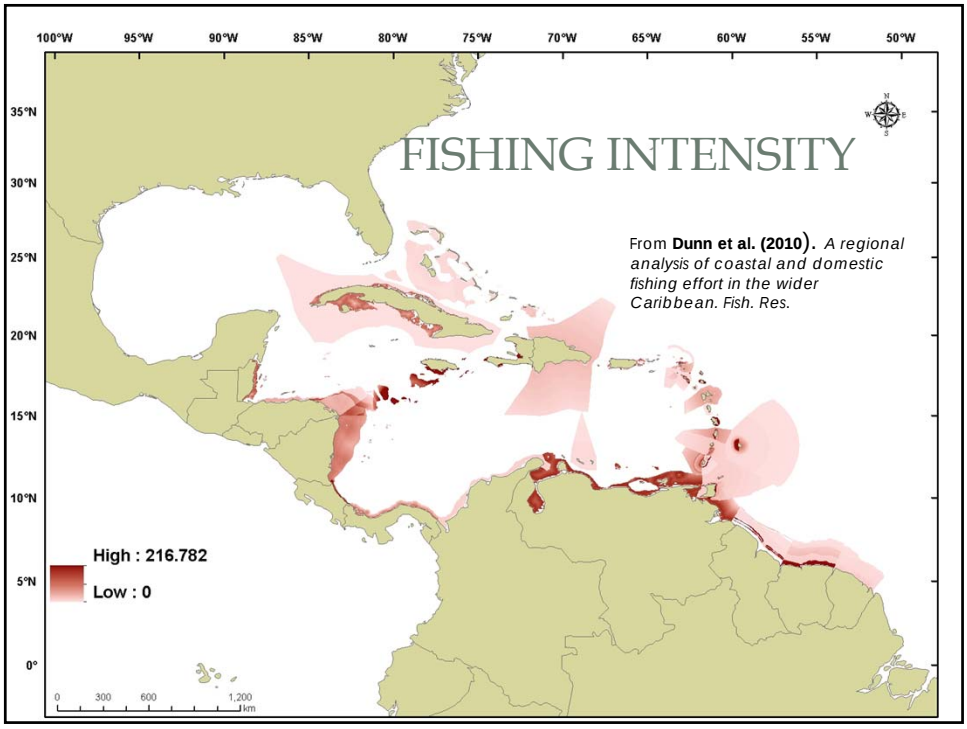
SUMMARY: ASSESSMENT CHALLENGES

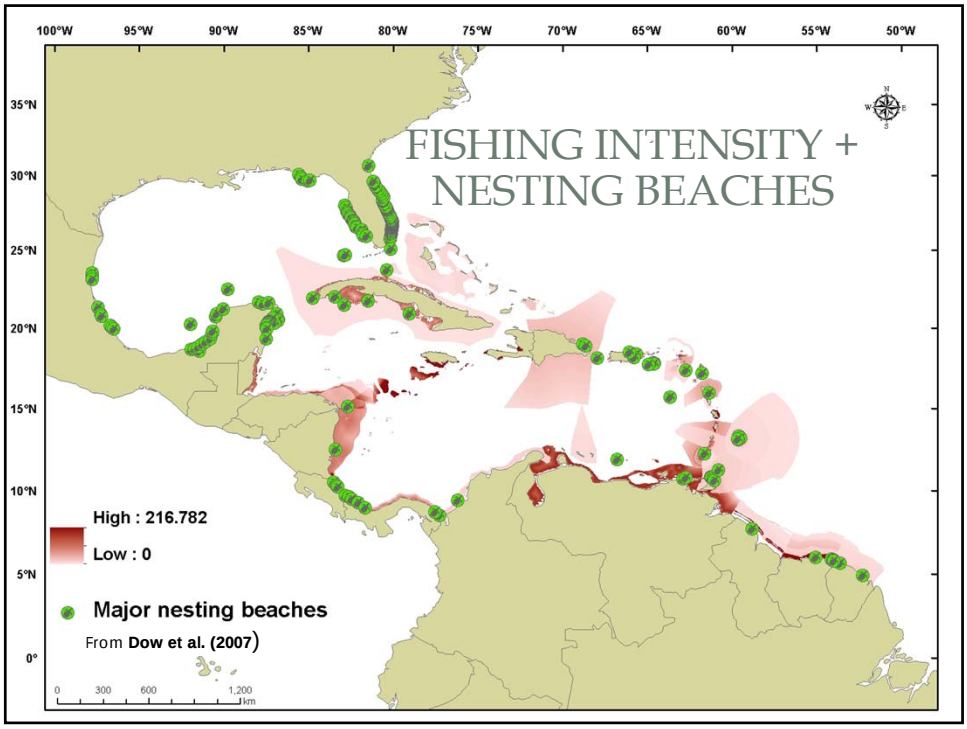
- Opportunistic take confounds assessment
- Very little information available on turtle bycatch rates for those countries now using TEDs
- Very little information out of Mesoamerica
- Hard to extract the gear effect (differing effort metrics)
- Ghost of bycatch past
  - Low numbers in fishery concurrent declining population trends hint at bycatch in the past
    - E.g. olive ridleys in the Guianas

SUMMARY (CON'T)

- Sea turtle bycatch widespread and highly variable
- Insufficient information on other taxa to formulate multi-taxa approach.
- Productivity of LMEs, proportion of shelf to total area maybe be indicators of fishing pressure and hence bycatch risk.


WCR LARGE MARINE ECOSYSTEMS
Southeast U.S. Continental Shelf
Gulf of Mexico
Caribbean Sea
North Brazil Shelf
Canada
United States of America
Bermuda
Mexico
Belize
Guatemala
Honduras
El Salvador
Nicaragua
Costa Rica
Panama
Cayman Islands
Jamaica
Haiti
Dominican Republic
Puerto Rico
Turks and Caicos Islands
British Virgin Islands
Netherlands Antilles
Dominica
Saint Lucia
Barbados
Grenada
Trinidad and Tobago
Venezuela
Guyana
Suriname
French Guiana
Colombia
Ecuador
Peru
Brazil
LME boundary
0 400 800 1,600 km


FISHING INTENSITY
From Dunn et al. (2010). A regional analysis of coastal and domestic fishing effort in the wider Caribbean. Fish. Res.
High : 216.782
Low : 0
0 300 600 1,200 km
100°W 95°W 90°W 85°W 80°W 75°W 70°W 65°W 60°W 55°W 50°W
35°N 30°N 25°N 20°N 15°N 10°N 5°N 0°



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- Project GloBAL & Duke University Marine Lab
  - Special thanks to the
  - Karen and Scott Eckert
  - Turtle Team,
  - Daniel Dunn
  - MGEL, Duke University
- WIDECAST network
- Gordon and Betty Moore Foundation


Thank you