

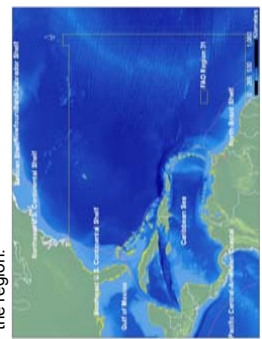
A summary review of sea turtle bycatch in the wider Caribbean

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Introduction

Sea turtle bycatch in fisheries has been identified as a source of mortality for many sea turtle populations in the West Central Atlantic. However, existing assessments have not encompassed large scales and have focused on a particular section of the basin (e.g. Trinidad and the Guiana-shield nations) and certain fisheries (e.g. industrial or semi-industrial trawls and longlines). Our objective is to develop a region-wide assessment of sea turtle bycatch as a first step in assessing the potential population impacts of bycatch for the region.

Figure 1. Spatial limits for this bycatch assessment correspond to FAO Area 31.



Methods

We conducted a comprehensive survey of extant literature to prepare a regional profile for fisheries and bycatch by country, target fishery, habitat and gear type for all territories in FAO Region 31 (Figure 1), excluding US and Mexican fisheries in the northern Gulf of Mexico. However, estimates from those fisheries were used for comparative purposes. We reviewed published literature, technical reports, fisheries management plans, symposia, field and fisheries observer survey data. We solicited comments and opinions of in-country experts regarding individual draft national summaries. Where available, we used estimates of bycatch rate and fishing effort to obtain a sea turtle catch per unit effort (CPUE).

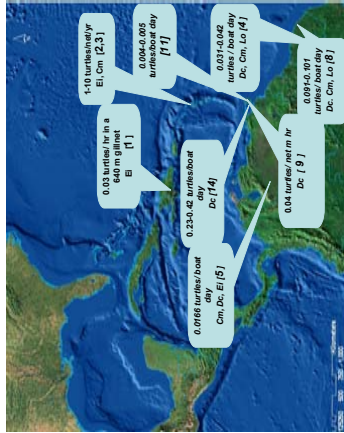
Results

We found information on bycatch for 37 of the 41 territories. In many cases, the information was sparse or limited to a few observations over many years. Nevertheless we identified 23 studies on bycatch in the wider Caribbean). Of these, 16 collected either CPUE estimates or we gathered sufficient fishing effort data to derive a rate or CPUE estimate (Figure 2). The greatest number of countries reported leatherback (*Dermochelys coriacea*) sea turtle bycatch, followed by greens (*Chelonia mydas*) and hawksbills (*Eretmochelys imbricata*). Results are set out in Table 1.

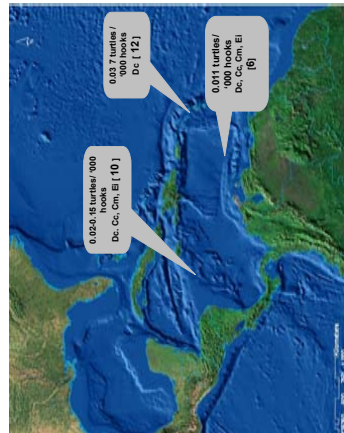
Species	Gear			
	LONGLINES	TRAWLS	GILLNETS	TRAPS
<i>Dermochelys coriacea</i> (Dc)	7	4	9	5
<i>Caretta caretta</i> (Cc)	5	3	3	25
<i>Chelonia mydas</i> (Cm)	2	6	9	11
<i>Leiodonelys kempi</i> (Lk)	1	1	0	2
<i>Lepidochelys olivacea</i> (Lo)	3	3	3	6
<i>Eretmochelys imbricata</i> (Ei)	2	3	8	4

Table 1. Number of countries with reported bycatch by species and gear.

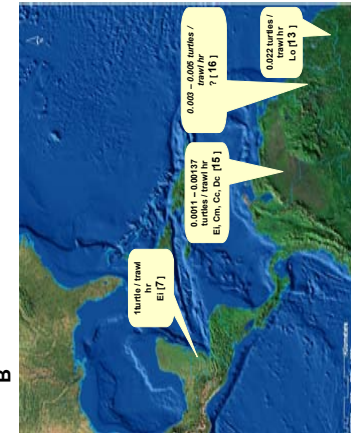
Leatherbacks and loggerheads are the most frequent bycatch species in longlines. Information collected suggests that bycaught animals are primarily large juveniles or adults. Leatherbacks, greens, hawksbills and ridleys are reported as gillnet and trawl bycatch. Immature greens are the vulnerable life stage, in contrast to the other species.



A



B



C

Figure 2. Sea turtle bycatch rates for gillnets (a), longlines (b) and trawls (c). Italicized values are our estimates based on reported fishing effort rates.

Results (cont.)

The current data do not support more cross-gear or inter-territorial comparisons. The studies cited employ a variety of protocols, and with the exception of Trinidad and Tobago, repeat assessments have not been conducted and there are no multi-gear assessments. Effort measures are also not uniform (Figure 2) and present challenges to determining gear-effect across national jurisdictions or various sections of the region. The US and Venezuelan longline observer data provide an opportunity to examine a basin-wide fishery target fishery (Figure 3).

We also found several instances of bycatch in trap fisheries. Sea turtle bycatch in fish and lobster traps has not been investigated. Given the predominance of this gear in Caribbean fisheries, we recommend that efforts to assess bycatch also include these fisheries.

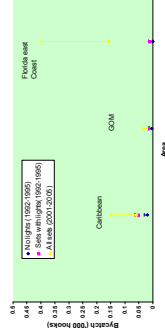


Figure 3. Comparison of the range of longline bycatch rates by the US fleets in the wider Caribbean, 1992-1995 and 2006 [7]. Bycatch rates calculated with and without light sticks ('No lights'). Caribbean bycatch rates are mid-range between the Gulf of Mexico (GOM) and the Florida east coast, but higher than those reported for the Venezuelan long line fishery.

Discussion

This research represents the first-ever analysis of bycatch at the ocean-basin scale for the wider Caribbean region. Incidental capture in fishing gear is widespread and highly variable. Gillnet fisheries in proximity to nesting beaches or coral reef and sea grass habitats pose the most significant risk. Bycatch probability for sea turtles is related to the overlap between fisheries and sea turtle foraging and nesting habitat. Several nesting populations in the Caribbean are increasing and bycatch rates might rise in coastal fisheries adjacent to nesting beaches in these areas.

There are increasing efforts within the region to assess and manage bycatch, especially in artisanal fisheries, but greater collaboration between fisheries managers, fisheries biologists, taxon experts, and conservationists is needed to develop and sustain monitoring of sea turtle interactions in fisheries. Given the number of legal sea turtle fisheries in the region, assessing sources of mortality for marine turtles should become a priority for sustainable management of fisheries and ocean resources.

Literature cited

1. Aloom, S. Unpublished (2007).
2. DeMarco, E. & Chalaller, J. In International Sea Turtle Symposium (International Sea Turtle Society, Crete, Greece, 2006).
3. Madril, E. & Chalaller, J. In International Sea Turtle Symposium (International Sea Turtle Society, Crete, Greece, 2006).
4. Madril, E. & Chalaller, J. In International Sea Turtle Symposium (International Sea Turtle Society, Crete, Greece, 2006).
5. Guada, H. In Venezuelan Ecological Congress (Caracas, 2007).
6. Bjorkland, R. et al. (Duke University, 2007).
7. Delamar, A. 44 (AgroCampus Rennes, 2005).
8. Eckert, S. & Lien, J. 7 (Duke University Marine Laboratory, Beaufort, NC, 1999).
9. Fairfield Walsh, C. & Garrison, L. P. In NOAA Technical Memorandum NOAA NMFS-SEFSC-600-54 p (2007).
10. Gass, J. In Nicholas School of the Environment and earth Sciences 29 (Duke University, 2006).
11. Gass, J. In Nicholas School of the Environment and earth Sciences 29 (Duke University, 2006).
12. Gass, J. In Nicholas School of the Environment and earth Sciences 29 (Duke University, 2006).
13. Gueguen, F. In Environment, Food and Rural Affairs and the Foreign and Commonwealth Office, 2004).
14. Lunn, L. In Assessment of the impact of the catch in the artisanal gillnet fishery in Trinidad and Tobago, West Indies. (2000).
15. Macagno, L. A. & Añel, J. In Eighteenth International Sea Turtle Symposium (eds. Abreu-Grobois, F. A., Bristow, R., Márquez, R. & Sarti, L.), 283 (U.S. Department of Commerce NOAA Technical Memorandum NMFS-SEFSC-436, Mexico, 2000).
16. Zanatta, C. R. In Proceedings of the Fourteenth Annual Symposium on Sea Turtle Biology and Conservation, 1-5 March 2004, San Juan, Puerto Rico, USA. (National Marine Fisheries Service, Southeast Fisheries Science Center, NOAA Technical Memorandum NMFS-SEFSC-351, 1994).

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