

Sharks and rays of Belize: preliminary results from the field and fisher interviews

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Introduction

Populations of sharks and rays worldwide are under increasing pressures from unsustainable fisheries with dramatic declines and extirpations in several populations of several coastal and pelagic species documented over relatively short time scales (Baum *et al.* 2003). As the food chain's apex predators with K-selected life history traits and low population recovery rates, sharks and rays may be potent indicators of fishing pressure (Stevens *et al.* 2000) and in coral reef habitats, of high fish biomass and a functional ecosystem (Newman *et al.* 2006).

No broad assessments of coastal elasmobranch diversity, distribution and fisheries exist in Belize due primarily to the lack of importance of the associated fishery. The need for information on the country's top marine predators and desired completion of a National Plan of Action for Sharks (NPOA) prompted our study of elasmobranch diversity, relative abundance and critical habitats throughout Southern Belize, a key transboundary area hosting the majority of shark fishing. Preliminary results have been disseminated in local communities and are being used to raise the profile of sharks and rays in Belize. We envisage that this study's final results will provide the basis for the development of regulations for the shark fishery.

Materials and methods

We are conducting the elasmobranch assessment between January and December 2006 in Southern Belize (Figure 1). Sampling gears used to date included set lines deployed in mangrove cays and estuaries (n = 1,940), longlines in coastal estuarine, reef patch and outer reef areas (n = 275) and drumlines in reef passes (n = 164). Circle 16/0 hooks were used on wire and mono leaders. Soak times for drumlines and longlines were 3 hrs or less. All animals were brought alongside the boat (Fig. 2 and 3), restrained to induce tonic immobility (Fig. 4) and measured for pre-caudal, total and clasper lengths. Fin clips were taken for future population analysis and animals were conventionally tagged near the base of the dorsal fin (Hallprint marker tags).

Local fishers provided traditional knowledge on historical abundance, diversity and critical habitats of elasmobranchs during interviews and six community meetings held for consultative purposes as well as return of study results. A socio-economic survey was administered to 53 coastal fishers from Punta Gorda, Placencia, Hopkins, Dangriga, Belize City and Sarteneja (Northernmost fishing community in Belize) to assess the importance of shark captures to their livelihood.



Figure 1 & 2. Capture of elasmobranchs off the Belize Barrier Reef and conventional tagging following induction of tonic immobility.

Results

259 elasmobranchs were captured over 92 survey days. A total of 15,489 hooks were deployed, resulting in a mean of 1 elasmobranch caught per 60 hooks deployed. The nurse shark, *Ginglymostoma cirratum*, was relatively the most abundant species captured followed by the reef shark *Carcharhinus perezii* and blacktip *C. limbatus* (Fig 3.). Captures were distributed throughout the study area with the exception of sampling sites south of Punta Gorda Town (Fig 4a). Species habitat partitioning appears to occur e.g., *C. perezii* only caught on the barrier reef and *R. porosus* primarily caught in mid-channel and coastal areas (Figs 4 b-e).

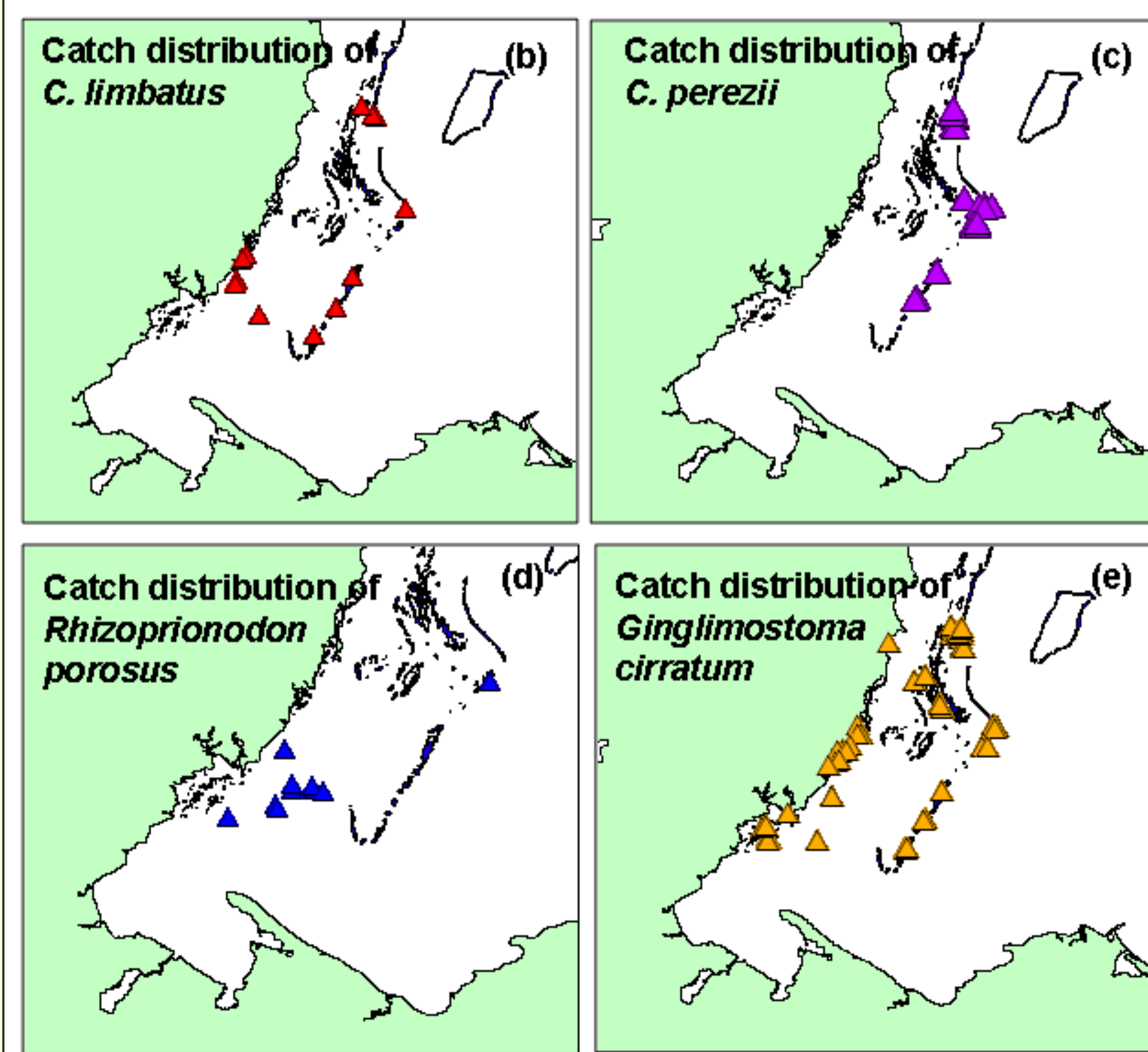
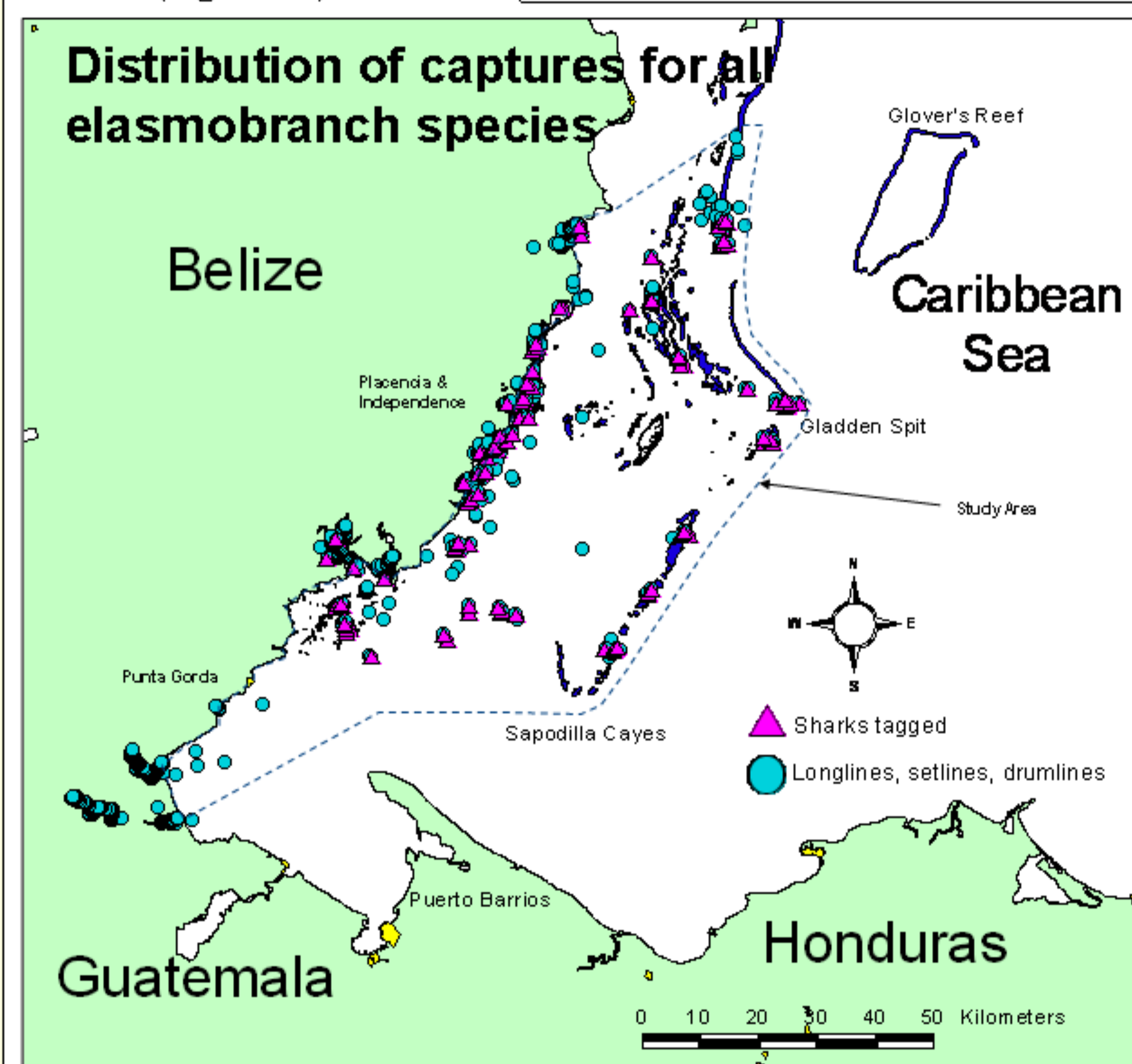
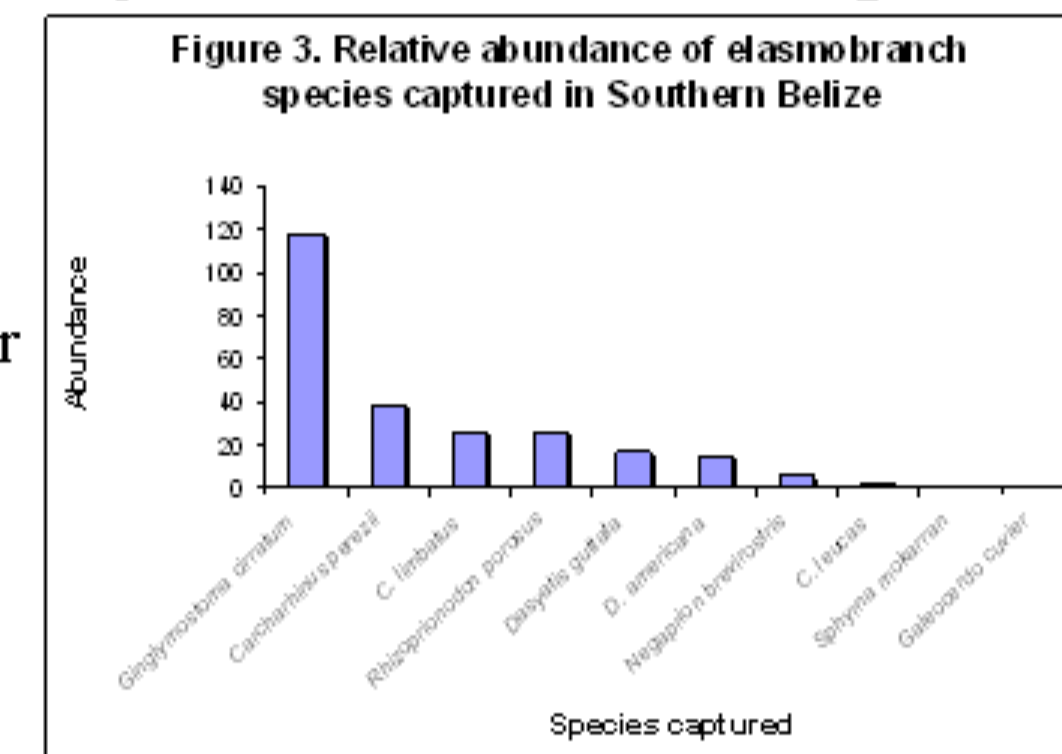


Figure 4 (a-e). Distribution of captures for all elasmobranchs during the 92 days of sampling with distributions (b-e) for the four most commonly caught species.

Shark fisher survey results

Of the 53 socio-economic surveys of coastal fishers conducted, 26 fishers surveyed regularly fish sharks. Rays are not targeted in Belize.

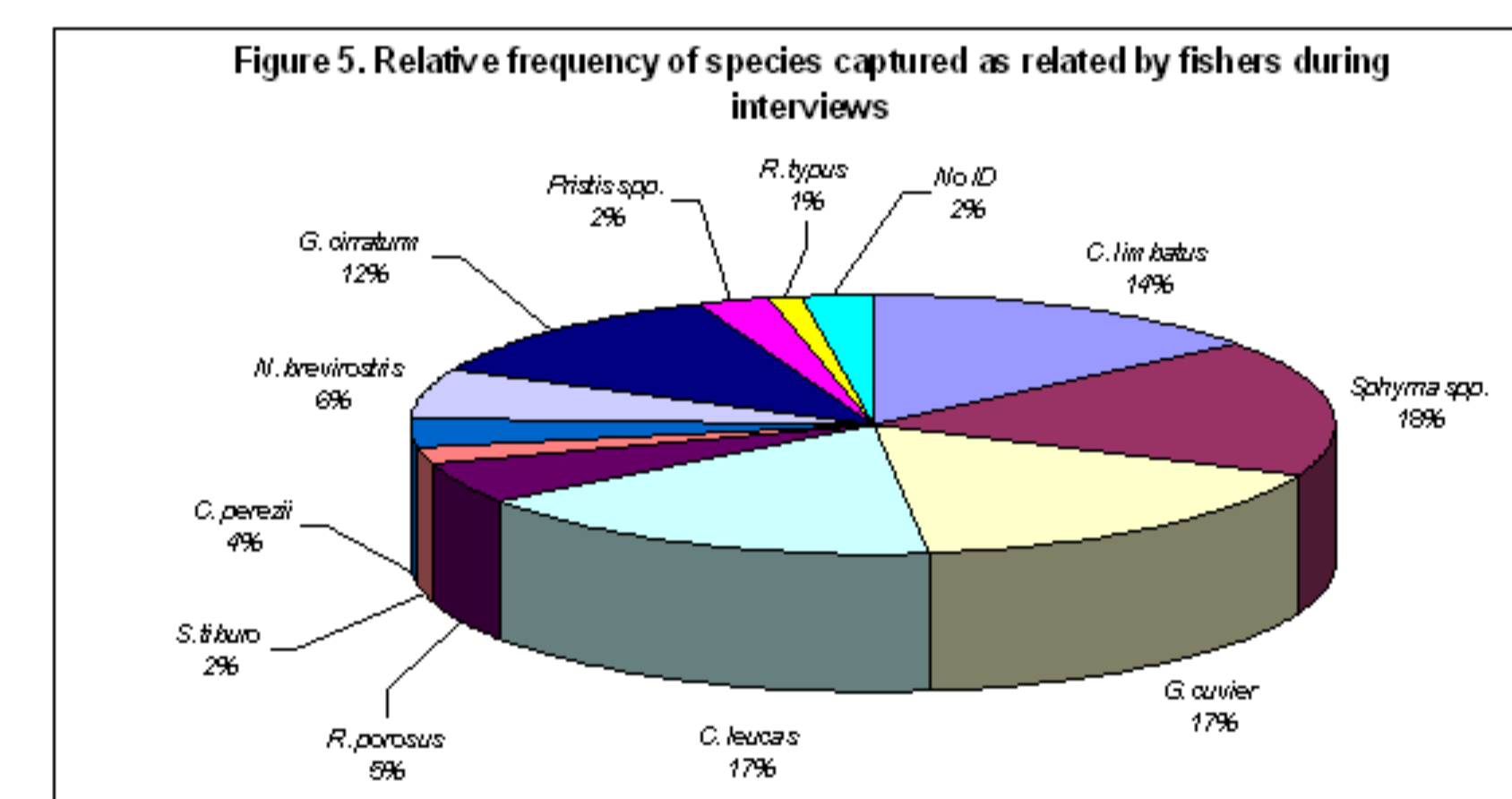


Shark fisher profiles

- 2 females, 24 male shark fishers;
- Age range 16-57;
- Fishing for 1-40 years with an average of 21.4 years fishing;
- 44% did not complete primary school;
- 54% captains working with 2-14 fishers during each trip.

Fishing methods and landings

- 74% fish with nets, the gear of choice for shark capture;
- Coastal bights and reef channels are preferred set locations;
- 42% catch shark especially for the Lenten season with other fishers capturing shark occasionally or all year;
- Species targeted and frequently caught (Fig. 5) include blacktip (*C. limbatus*), nurse (*G. cirratum*), hammerhead (*Sphyrna* spp.), tiger (*Galeocerdo cuvier*), bull (*C. leucas*);
- Deepwater sharks captured include dusky smoothhound (*Mustelus canis*) and bigeye sixgill (*Hexanchus nakamurai*);
- Four species unknown by fishers but identified through photos and/or jaw sets: blue sharks (*Prionace glauca*), goblin shark (*Mitsukurina owstoni*), bigeye sixgill and dusky smoothhound.



Markets and prices

- 64% engage in transboundary sales to Mexico, Honduras and Guatemala, mostly timed with Lent;
- Shark meat fetches US\$0.45-1.13/kg;
- Oil sells for US\$5/L;
- Shark fins fetch up to US\$22.73/kg;
- Preferred species include blacktip and hammerhead spp.;
- Avoided species include nurse sharks and tiger sharks.

Perceptions of the resource

- 55% note a decline in the abundance of sharks;
- 52% have to travel farther to find sharks.

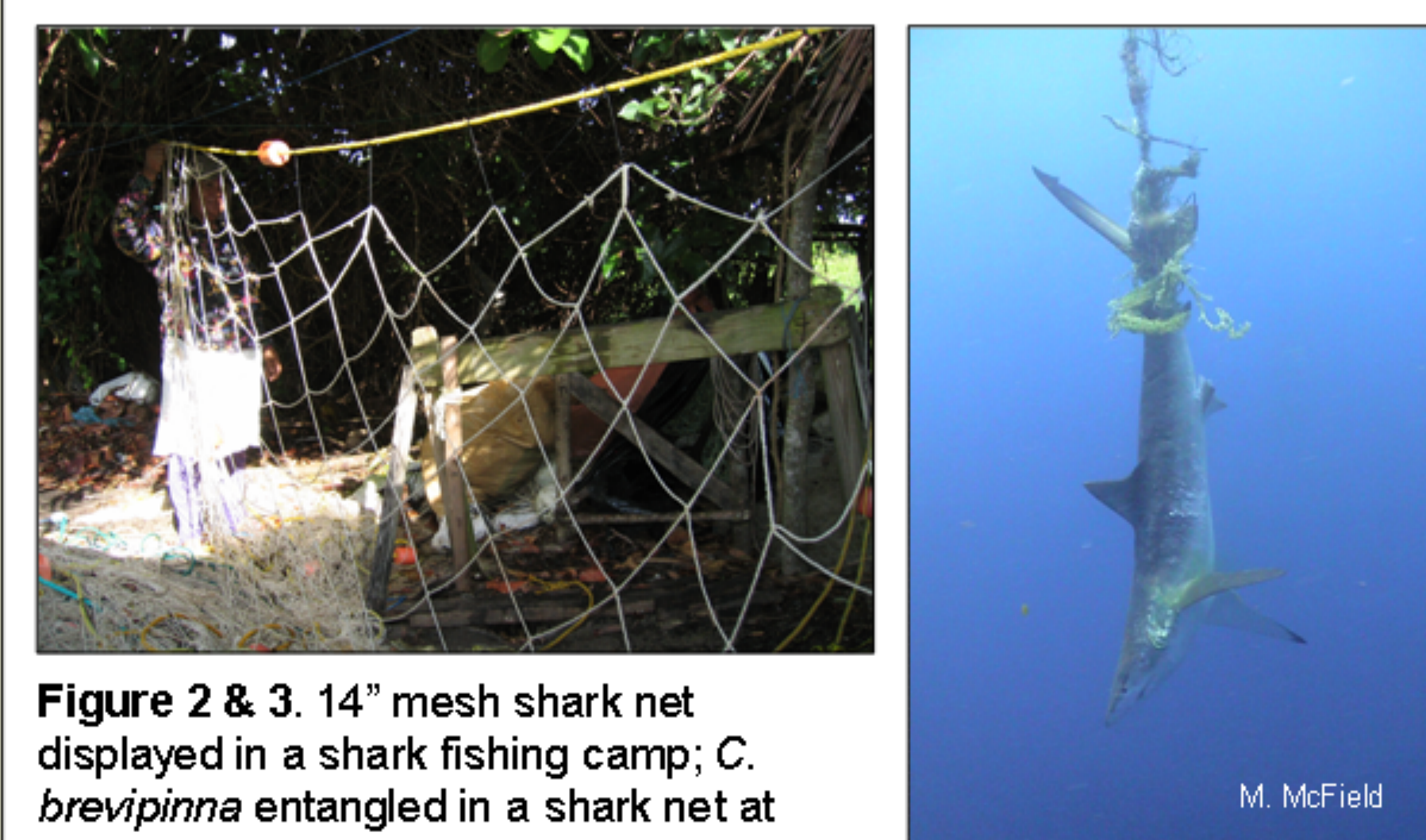


Figure 2 & 3. 14m mesh shark net displayed in a shark fishing camp; *C. brevipinna* entangled in a shark net at Turneffe Atoll.

Summary

- Elasmobranchs were captured throughout Southern Belize except for the heavily fished area south of Punta Gorda Town;
- Captures were dominated by nurse sharks;
- Shark is rarely consumed in country relative to finfish; consumptions, is not purchased by the Belize's cooperatives and is primarily destined for international markets;
- Nets are the favored shark fishing gear;
- Belize's shark fishery is currently unregulated.

Conclusions

Low catch rates of historically abundant species during our Southern Belize field assessment support fisher accounts of declines in both abundance and diversity of elasmobranch species throughout the country. Although Belize's shark fishery is small (with an estimated 75 fishers), it is almost entirely geared towards supplying the growing populations of three neighboring countries (Mexico, Honduras and Guatemala) with corned fish, particularly during the religious Lenten season. Additionally, pressures on remaining shark populations are increasing due to rising interest in supplying Asia's lucrative fin market. According to fishers interviewed, there is an increasing shift towards the capture of previously avoided species such as nurse sharks and rays as preferred species decline. Preliminary study results suggest that elasmobranchs require specific regulations to foster the recovery of populations and that such regulations need to include provisions for curbing or eliminating the use of nets and longlines.

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Acknowledgments

We wish to thank all fishers and guides interviewed, especially those in Southern Belize. Many thanks to fishers and UB students and in particular Dan Castellanos, Manuel Martinez, Norman Gutierrez, Polo Westby and Christina Conrath for their assistance in the field. We thank the Department of Fisheries for extending permit 00002/06 to conduct this study. Funding for this project was provided by the National Fish and Wildlife Foundation, the Summit Foundation and B. Dorian.

For further information

Please contact rgraham@wcs.org for more information on this study and related projects.