# By-catch in a tropical shrimp fishery: are TEDs and BRDs effective in excluding elasmobranchs?

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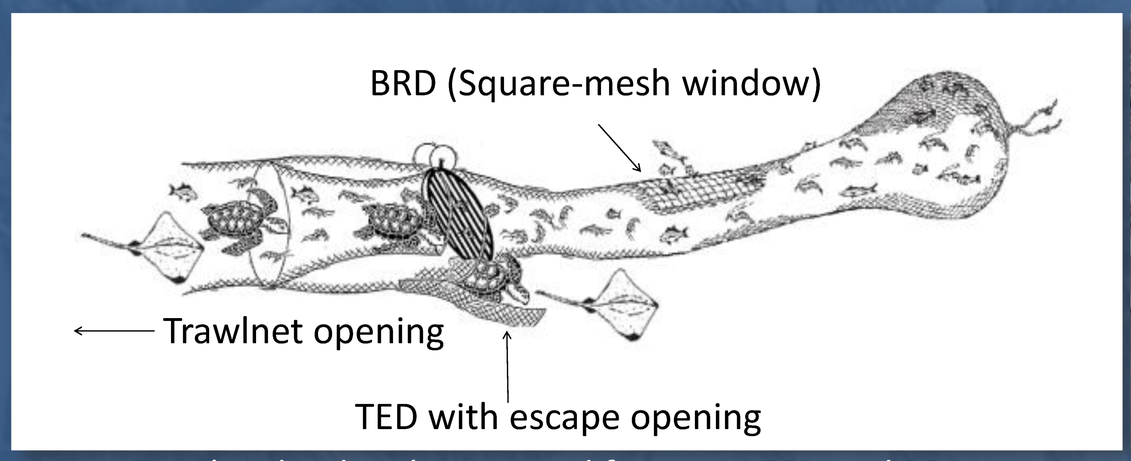
## *INTRODUCTION*

**TROPICAL SHRIMP FISHERIES** are highly wasteful. Using fine-meshed demersal trawl nets, they generate a third of the world's fisheries by-catch, mostly thrown back overboard dead or dying. Technical gear adaptations are often applied to tackle this problem. A **TED** (Turtle Excluder Device) excludes large organisms, mainly seaturtles, from the net while a **BRD** (Bycatch Reduction Device) reduces by-catch of small fish. **ELASMOBRANCHS** (Chondrichthyes) are cartilaginous fish including rays and sharks. In general, their reproductive biology makes them highly vulnerable to overfishing: many species occuring on tropical shrimp fishing grounds are **IUCN red listed.** A **CASE STUDY** on trawling for Atlantic seabob-shrimp *Xiphopenaeus kroyeri* in Suriname is presented here. We assessed the effectiveness of existing gear adaptations (TED and BRD) in reducing elasmobranch by-catch.

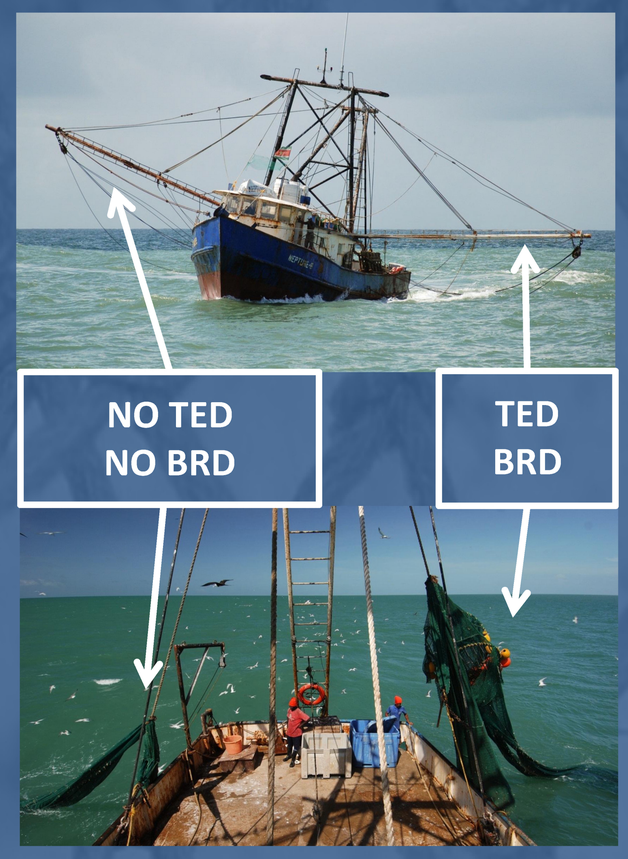



Trawl codend with gear modifications: TED and BRD

By-catch of rays

## *DATA COLLECTION*

- Commercial shrimp trawler
- Offshore Suriname
- 34 comparative hauls of 1 h
- February – July 2012
- All elasmobranchs identified and measured

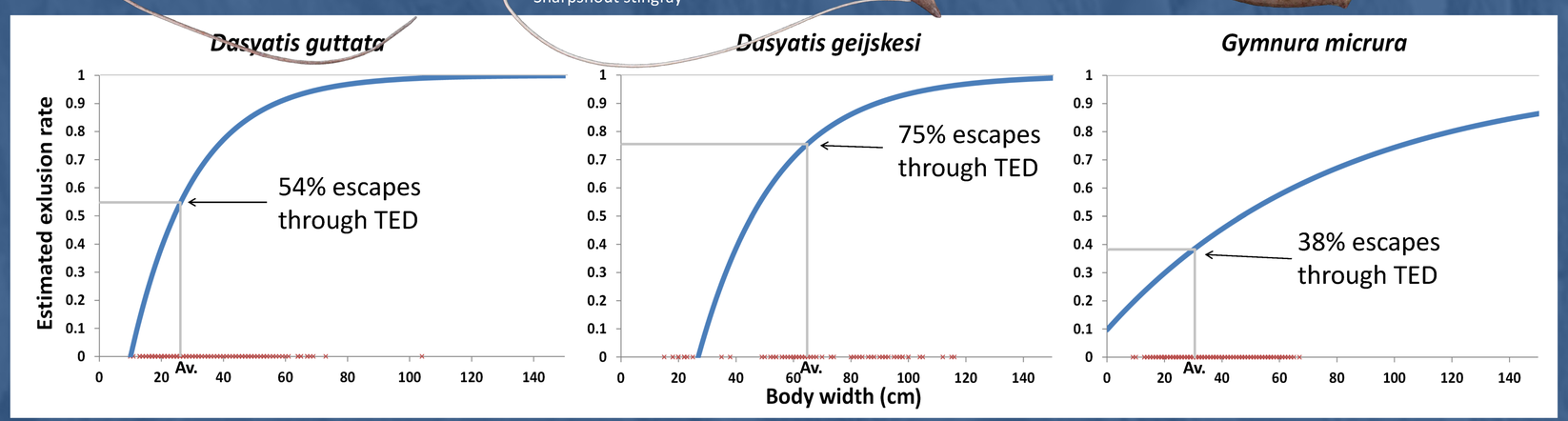



## *MAJOR FINDINGS*

**8 SPECIES** of rays and sharks occur in by-catch. Overall, TED and BRD cause a **40%-REDUCTION** in elasmobranch by-catch. This reduction is mainly caused by the exclusion of **3 LARGE RAY SPECIES** which are commonly caught (83% of by-catch). Hence, by-catch is the result of the **TED** and **NOT BRD**, through which only small-bodied species could possibly escape. **ESCAPE THROUGH THE TED** is *highest* for *D. geijskesi* and *lowest* for *G. micrura*. Escape through the TED is size-dependent.

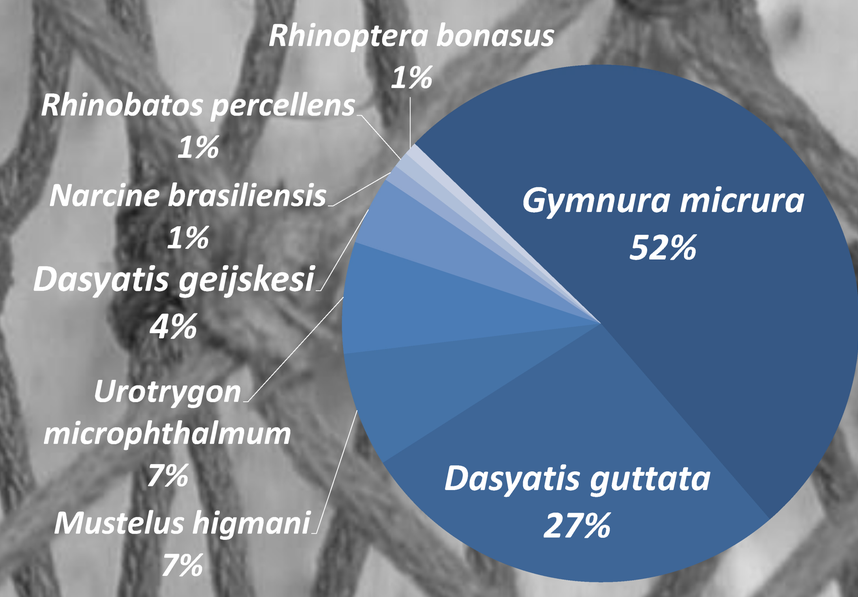
| Species | By-catch with TED and BRD |
|---|---|
| All species | - 40.0 % * |
| *Dasyatis guttata* | - 51.5 % * |
| *Dasyatis geijskesi* | - 69.7 % * |
| *Gymnura micrura* | - 38.6 % * |

* Exact binomial test, $p<0.001$


Exclusion rates at different sizes for three ray species : output of logistic regression model on body width measurements. X's on x-axis indicate individual measurements (n = 548, 86 and 1033 respectively, Av. = average body width)

## *COMPOSITION OF ELASMOBRANCH BY-CATCH*




## *CONCLUSIONS*

A TED prevents **LARGE-BODIED RAYS** from being captured. It is least effective, however, for the most abundant ray in by-catch, *G. micrura*.

**SURVIVAL AFTER ESCAPE** through TED remains completely unknown.

TEDs nor BRDs exclude **SMALL-BODIED ELASMOBRANCHS**. Development of new devices reducing by-catch of small and juvenile elasmobranchs is desirable, since they make up a major part of the total by-catch in the Suriname seabob trawl fishery.

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