



Pelagic elasmobranches diversity and abundance in the Western Indian Ocean: an analysis of long-term trends from research and fisheries longline data

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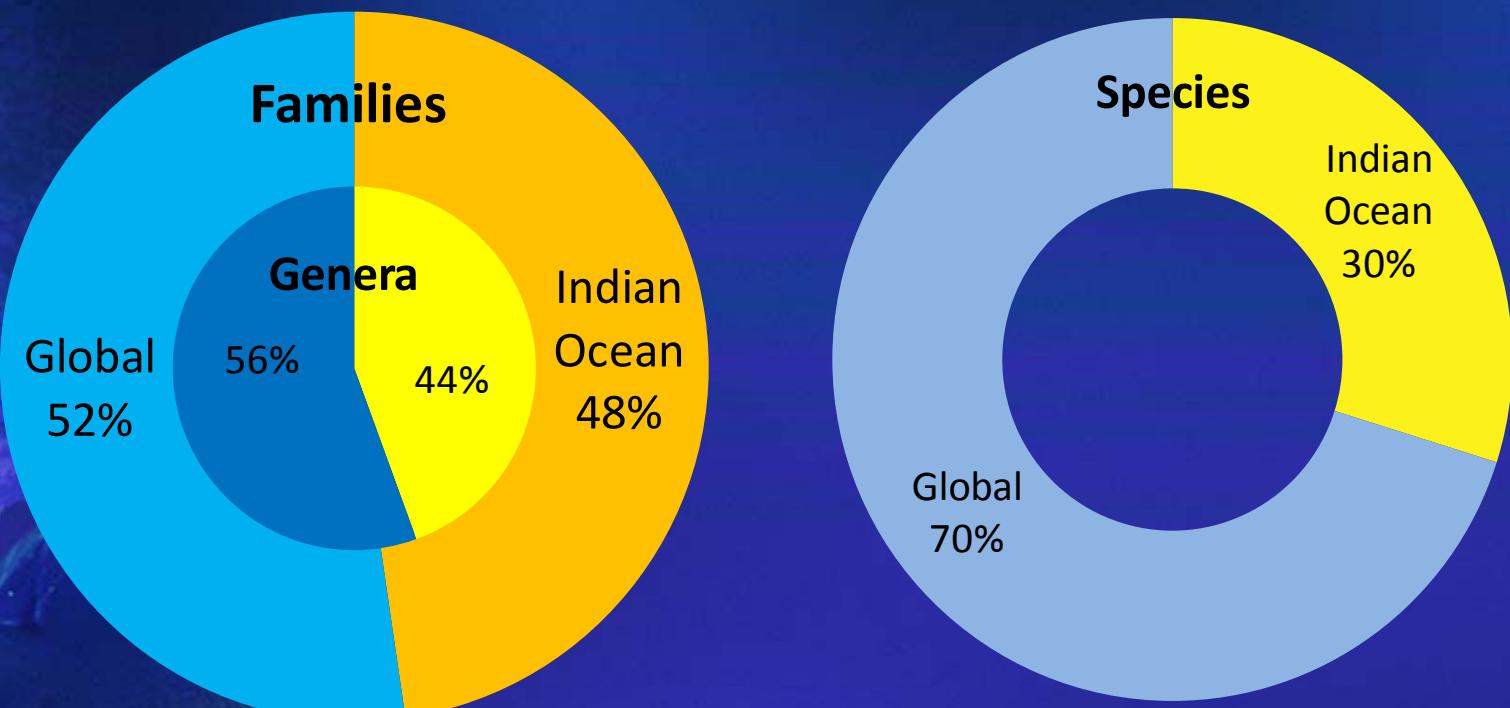
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⁽³⁾ Saint Paul, Ile de la Réunion

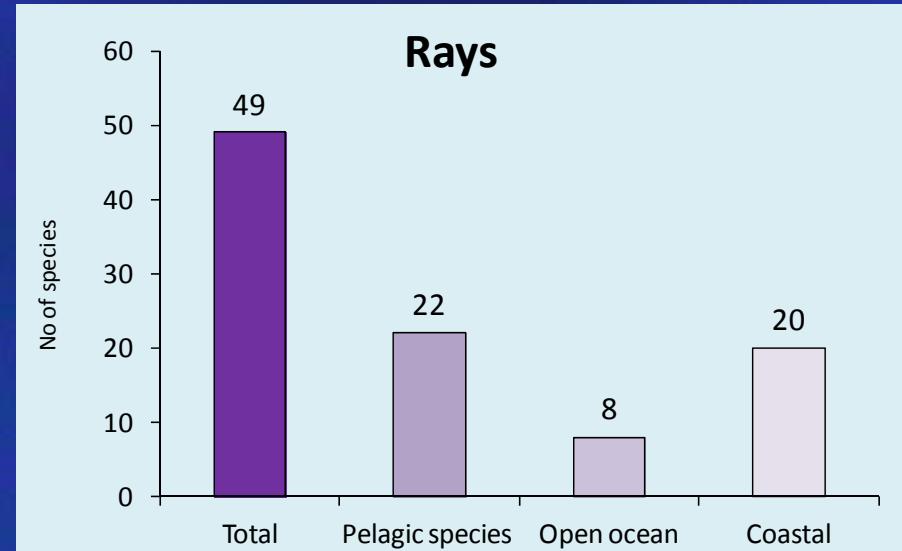
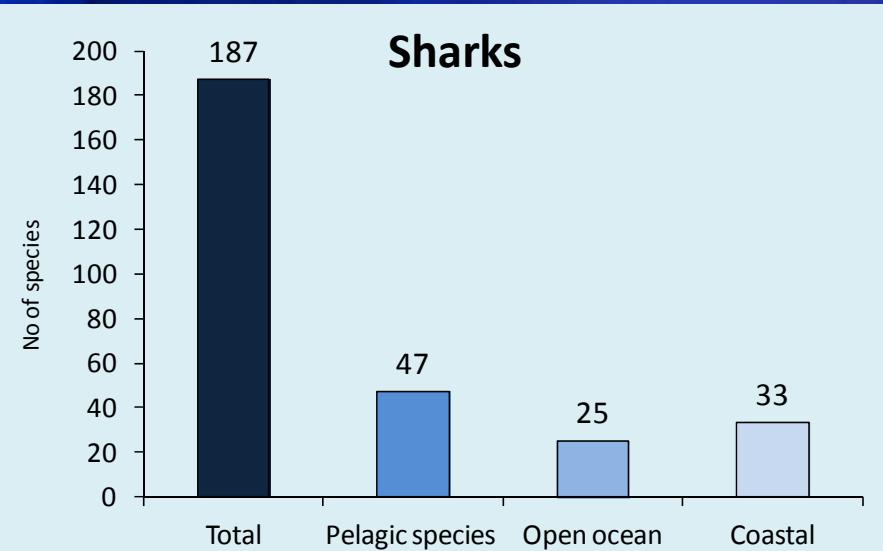
Global diversity of elasmobranches

	World Oceans			Indian Ocean		
	families	genera	species	families	genera	species
Sharks	34	105	~500	31	84	~190
Rays	2	16	~130	2	12	~50



Source: Compagno, 1984, 2001; Froese & Pauly, 2010 (FishBase); Appeltans et al., 2010 (WoRMS)

Diversity of pelagic elasmobranches IO



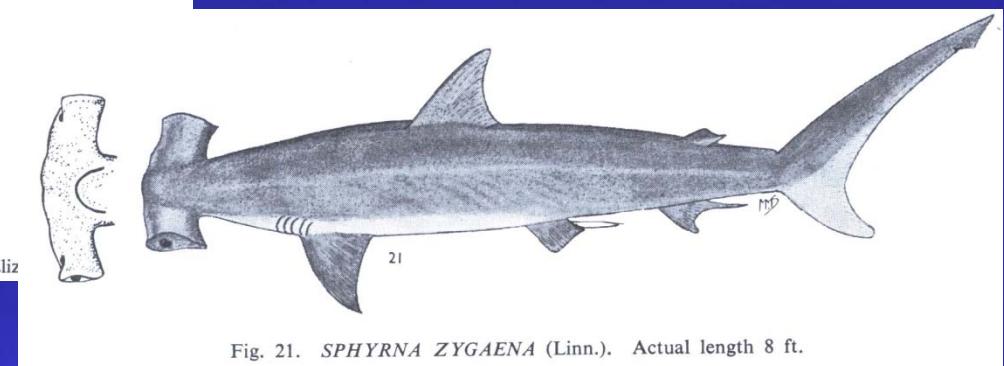
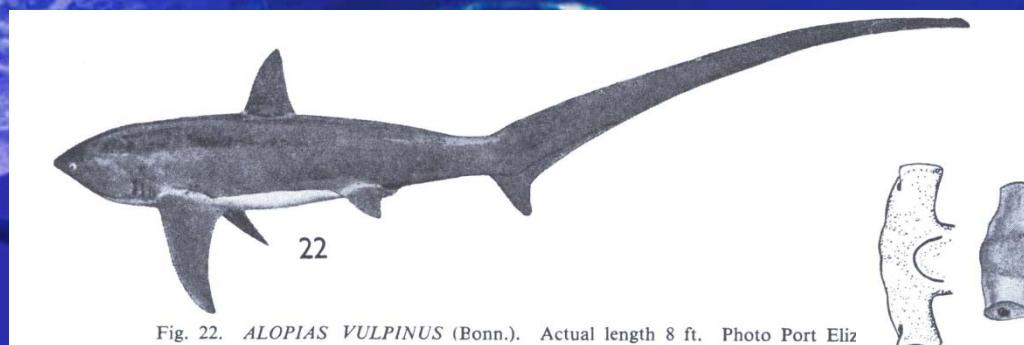
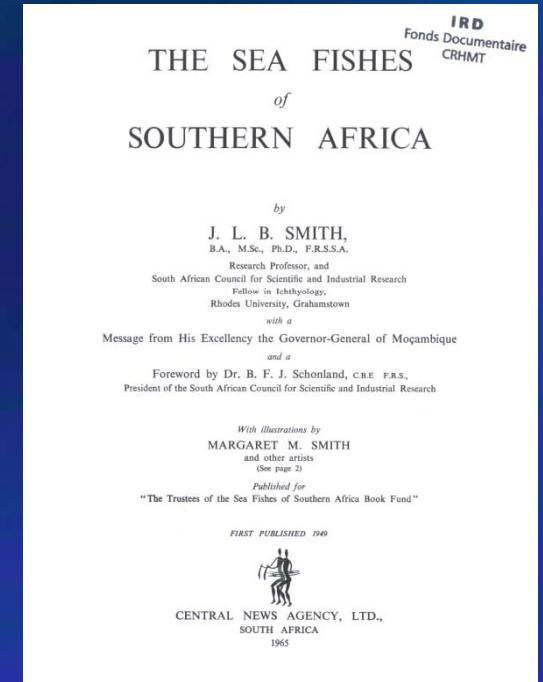
- Pelagic species: 25% of sharks and 45% of rays
- Open ocean species: <15% of sharks and <20% of rays

Fisheries threats

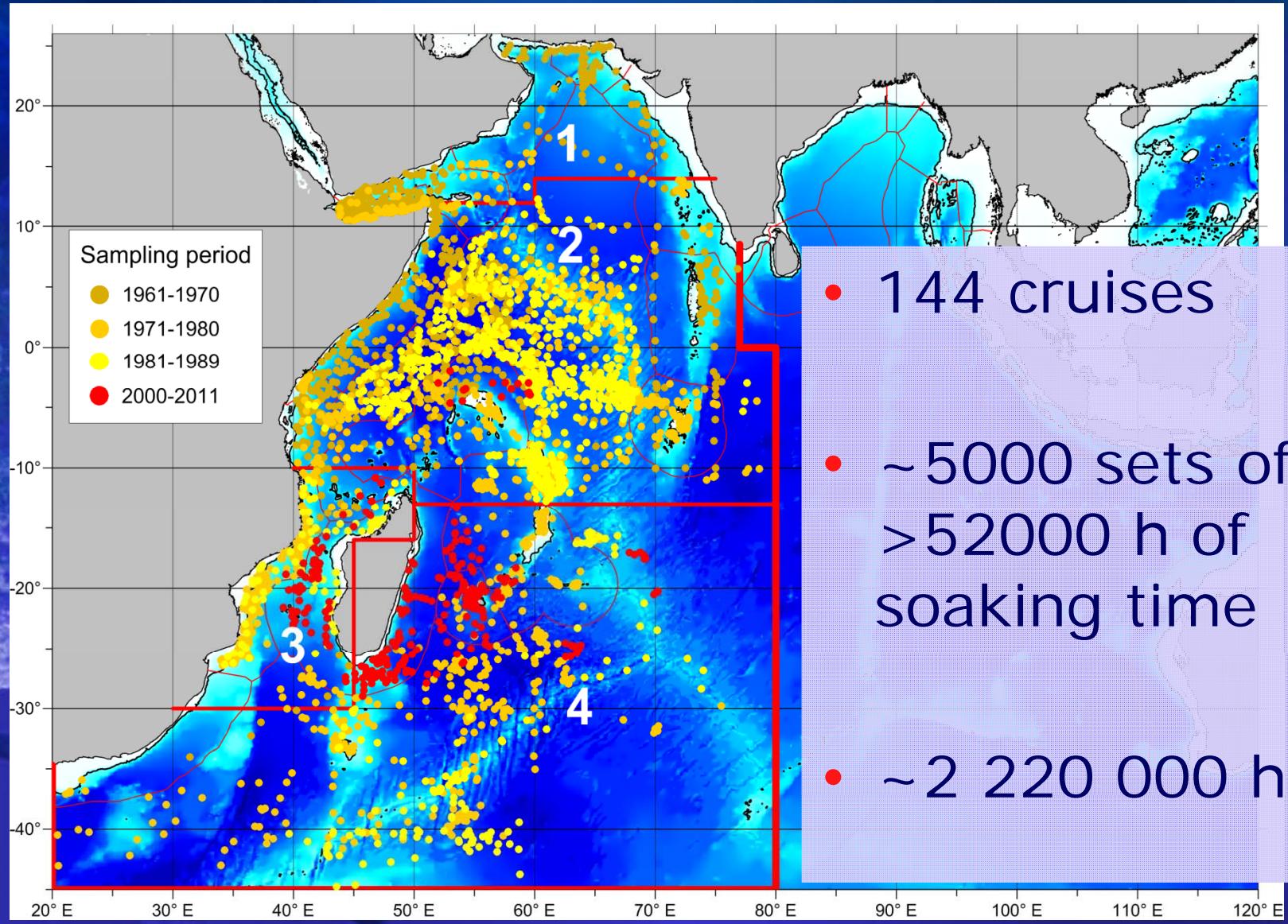
Order	Family	Species	Environment		Impact of fisheries		
			Open ocean	Coastal	LL	PS	Artisanal
Sharks							
Squaliformes	Dalatiidae	1	1		+	+	+
Orectolobiformes	Rhincodontidae	1	1	1	-	+	++
Lamniformes	Odontaspidae	3	1	2	+	-	+
	Pseudocarchariidae	1	1		+++	-	+
	Megachasmidae	1	1		-	...	-
	Alopiidae	3	3		++	...	+
	Cetorhinidae	1		1	-	-	...
	Lamnidae	4	4		+	+	+
	Carcharhinidae	28	~10	~25	+++	+++	+++
	Sphyrnidae	4	3	4	+++	++	+++
Rays							
Rajiformes	Dasyatidae	1	1		+++	+	-
	Myliobatidae	13		13			++
	Mobulidae	7	7	7	+	+	+++

Problems of shark biodiversity studies

- Identification issues in the past and present
- Evolution of taxonomy (synonyms, new species)
- Taxonomic uncertainty:
TU=species/all taxa*100

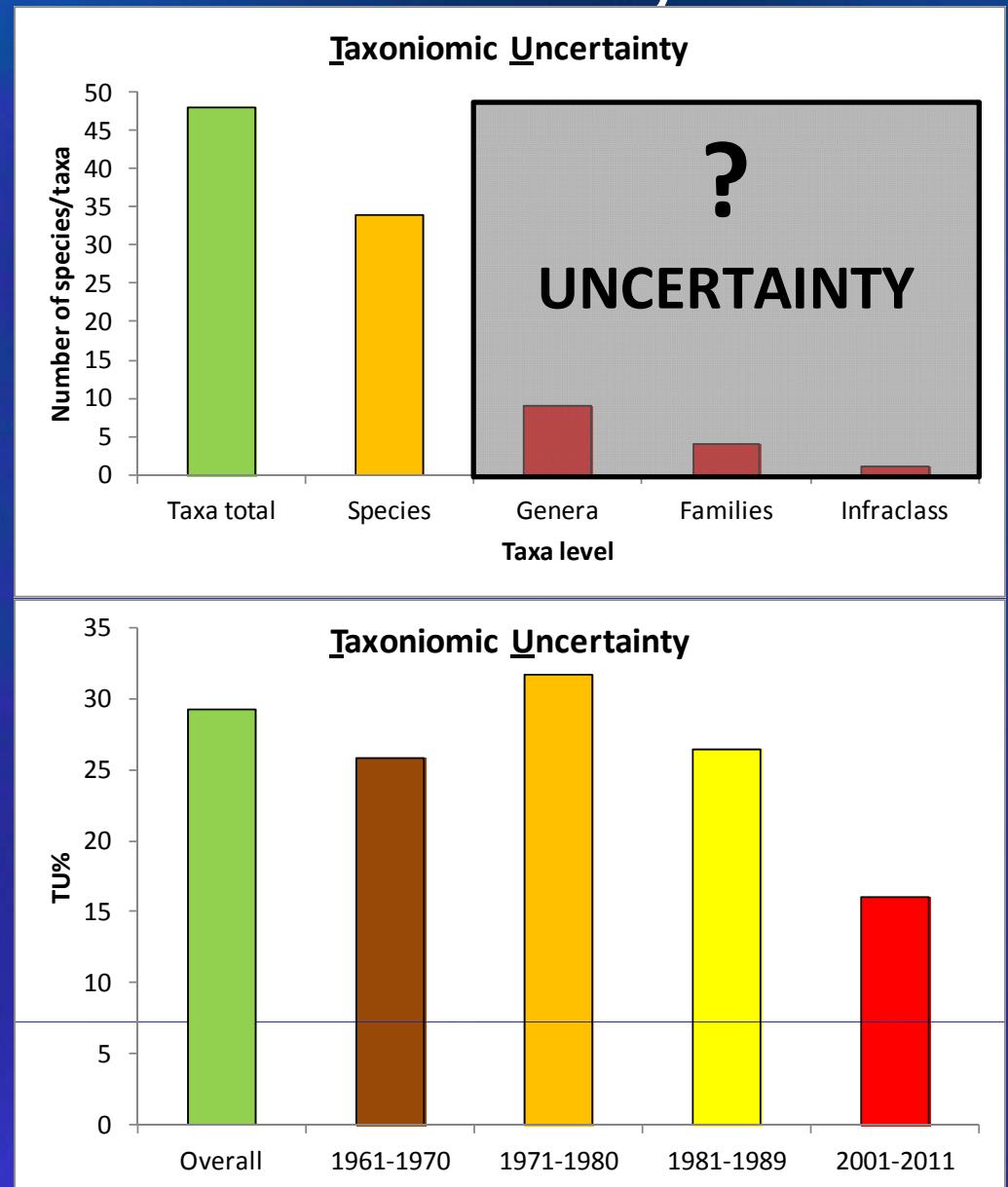


Sampling area: Western Indian Ocean



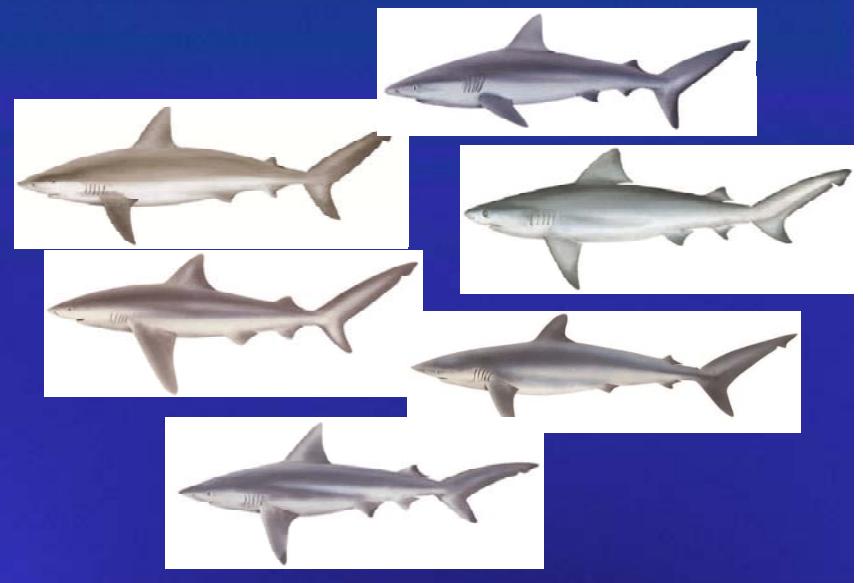
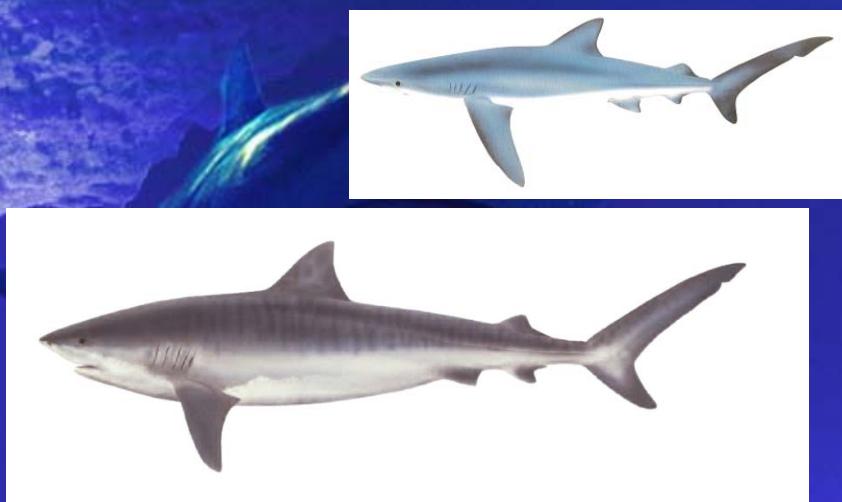
Diversity and taxonomic uncertainty

- A total of 48 species or higher taxa
- TU is high = 29%
- Slow evolution of TU index



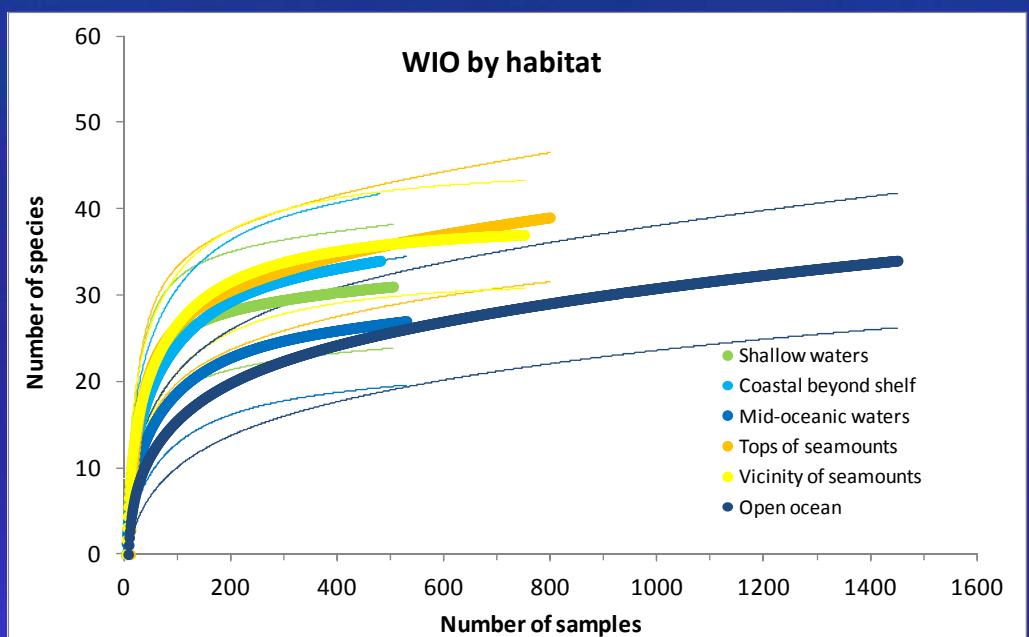
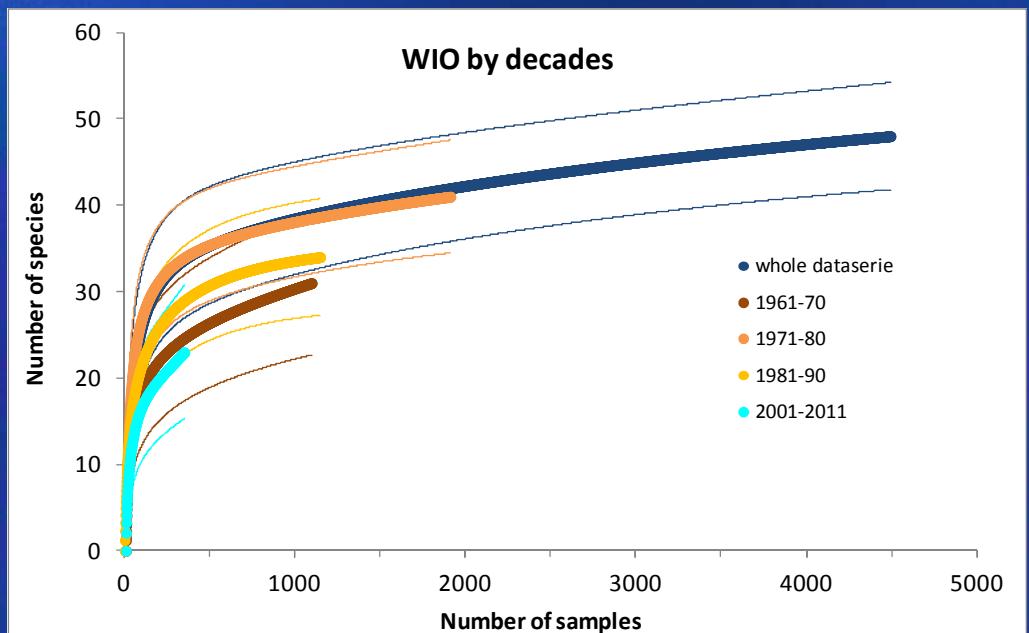
Species diversity

- Most diverse group: pelagic sharks 28 species
- Fam. **Carcharinidae** dominates by 15 species of the ***Carcharhinus*** genus and by two monospecific genera ***Galeocerdo*** and ***Prionace***



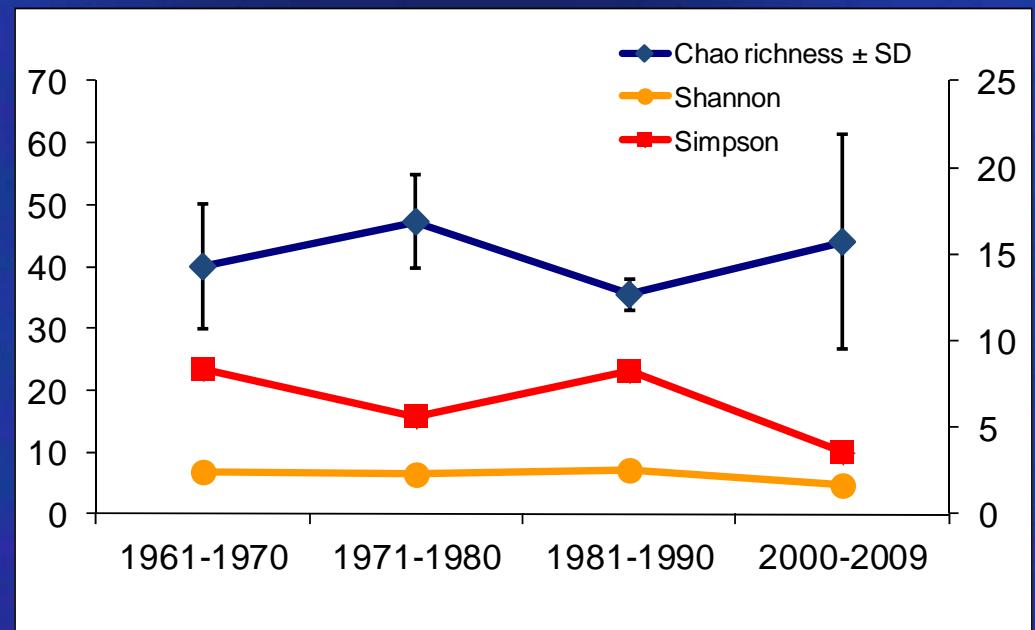
Data needs LL

- Minimum sample size for LL data analysis should be at least 200-250 LL
- Environment as variable (open ocean, seamounts, coastal) needs similar sample size for each stratum



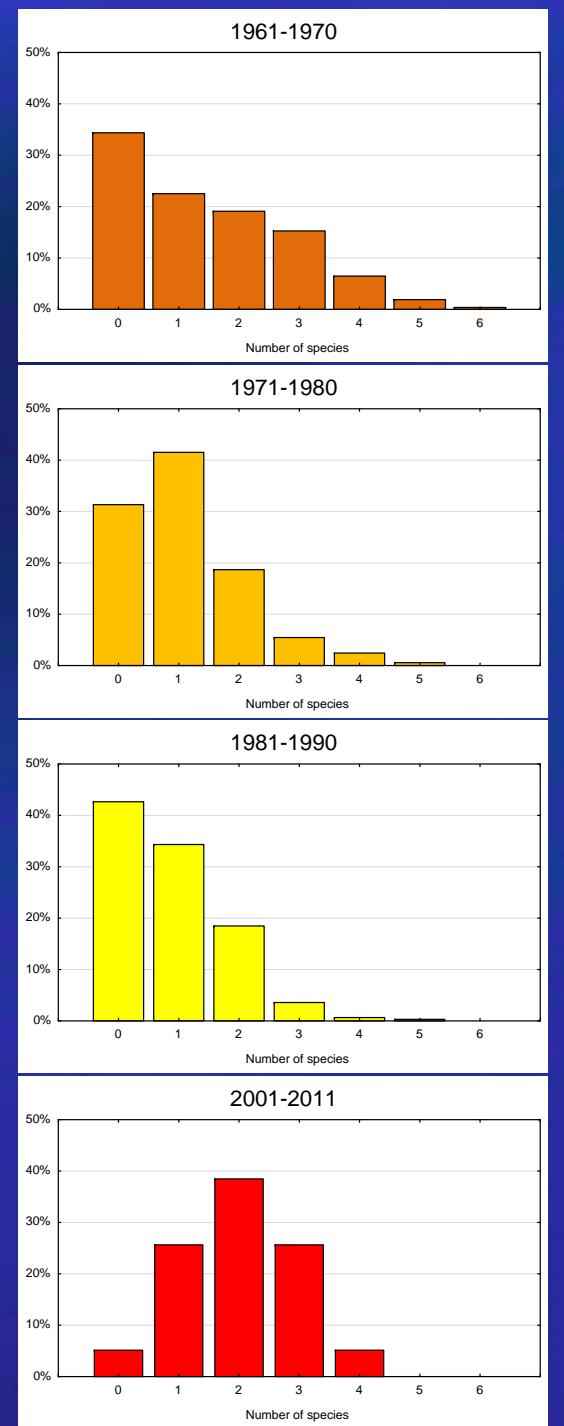
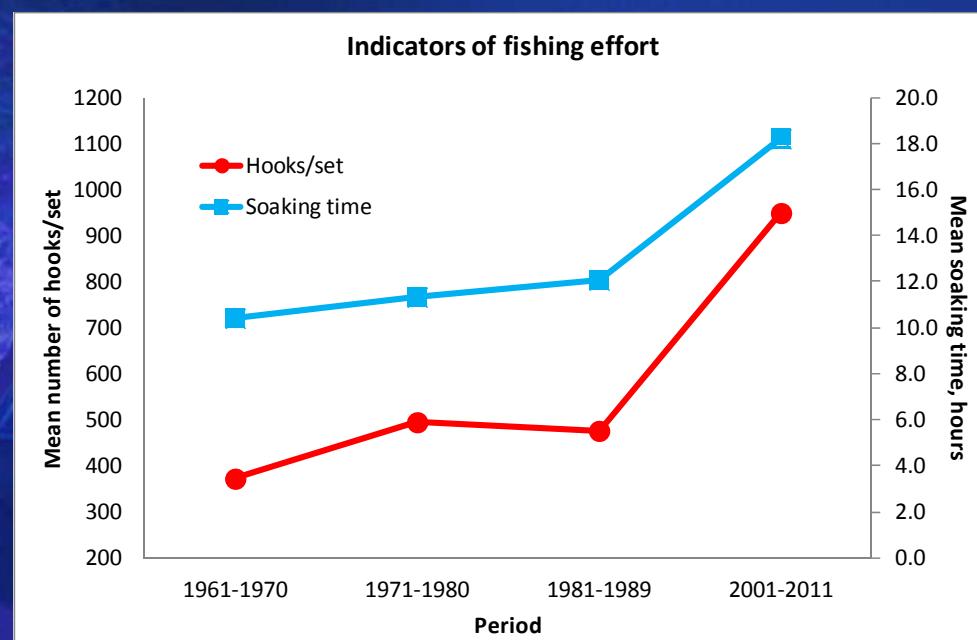
Erosion of elasmobranches' diversity

- Decreased number of species
- Used to be common species becomes rare
- But better recording of rare species contribute also (e.g. Romanov et al., 2013 in press)

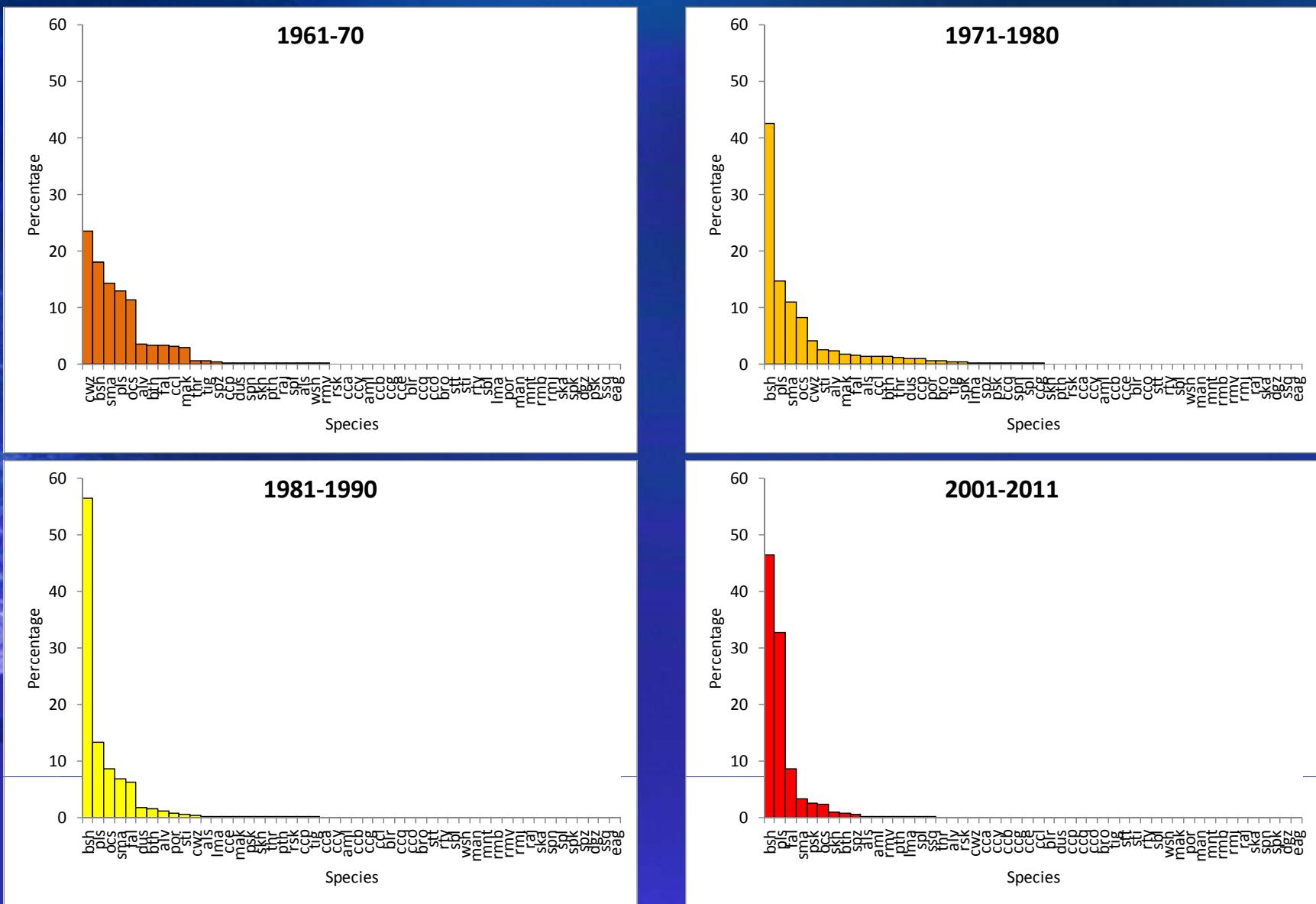


Sampling gear matters

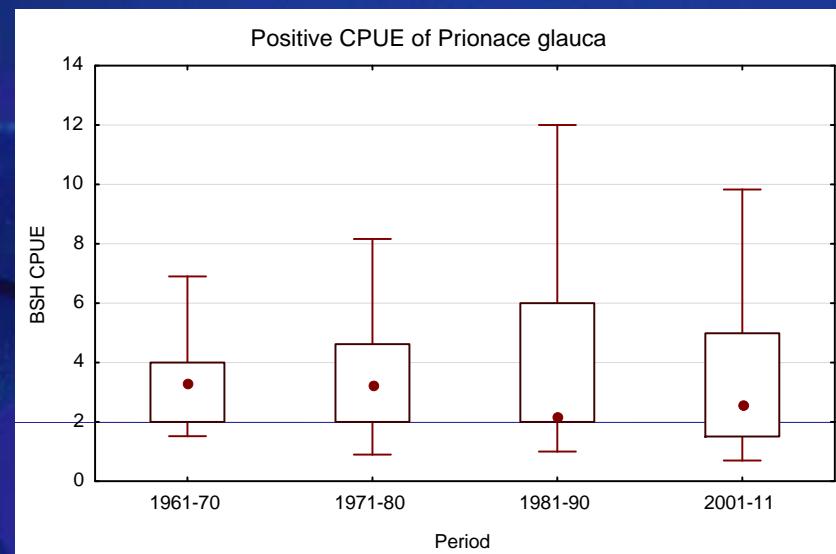
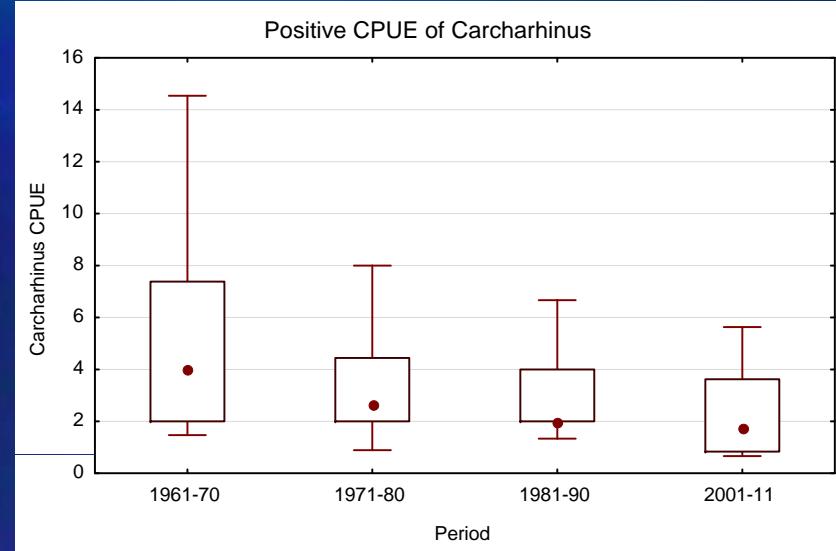
- LL set in 2000s are different:
Increased effort (soaking time,
no of hooks, night surface sets)
- Higher efficiency: species
occurrence



Dominance vs. Abundance



Dominance vs. Abundance



Conclusion

- Erosion of pelagic elasmobranches diversity are evident
- Shark protection regulation and mitigation measures are necessary
 - Facilitation of live release of sharks: circle hooks + monofilament gear
 - Decrease of shark bycatch: modification of fishing strategy/gear: deep fishing, buoy fishing

Research perspective

- Improved monitoring of shark populations (sampling effort in higher scale and better quality)
 - Increase observer coverage
 - Profession: observer
 - Training of observers
 - Identification sheets of high quality: IOTC or FAO
 - Avoid non detailed ID: SPC (good but...)
 - Certainly avoid ICCAT identification sheets!!!
 - Photo identification.



Acknowledgements

