10th WIOMSA Symposium – 30 Oct-04 Nov 2017 – Dar Es Salaam, Tanzania

Toothed whale and shark depredation indicators: a case study from La Reunion Island and Seychelles pelagic longline fisheries

Njaratiana RABEARISOA, P. SABARROS, E. ROMANOV, V. LUCAS and P. BACH

Context

Depredation = damage or removal of fish or bait from fishing gear by marine predators (squid, bird, shark, toothed whale)

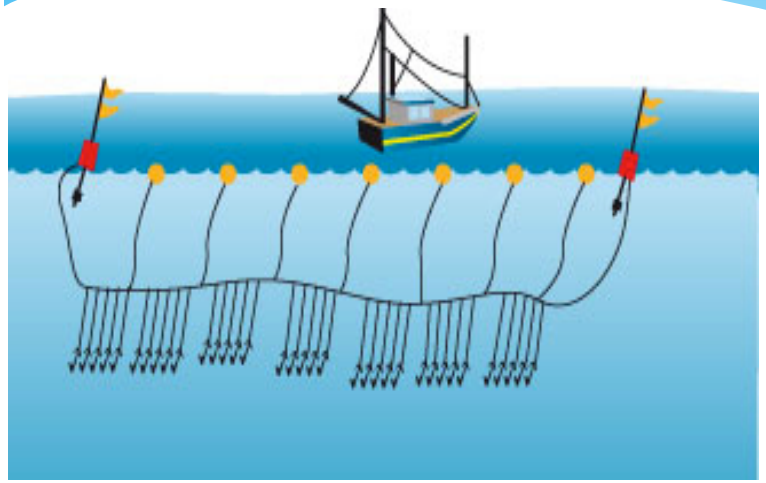
Consequences

IOTC, Seychelles, July 2007: 1st workshop dedicated to depredation in pelagic longline fisheries

No systematic data collection and no standard depredation indicator

Aim of the study: assess the depredation impact on Seychelles and La Reunion pelagic longline catch by implementing depredation indicators

The pelagic longline fishing



- Monofilament mainline equipped with baited hooks
- Length: 10 to 180 km (100-3500 hooks)
- Depth: 50 to 500 m

SETTING ≈ 3h30

HAULING ≈ 4h30

Swordfish

Yellowfin tuna

Bigeye tuna

Albacore tuna

Species involved on SWIO pelagic longline depredation

❖ Shark depredation

Pelagic sharks

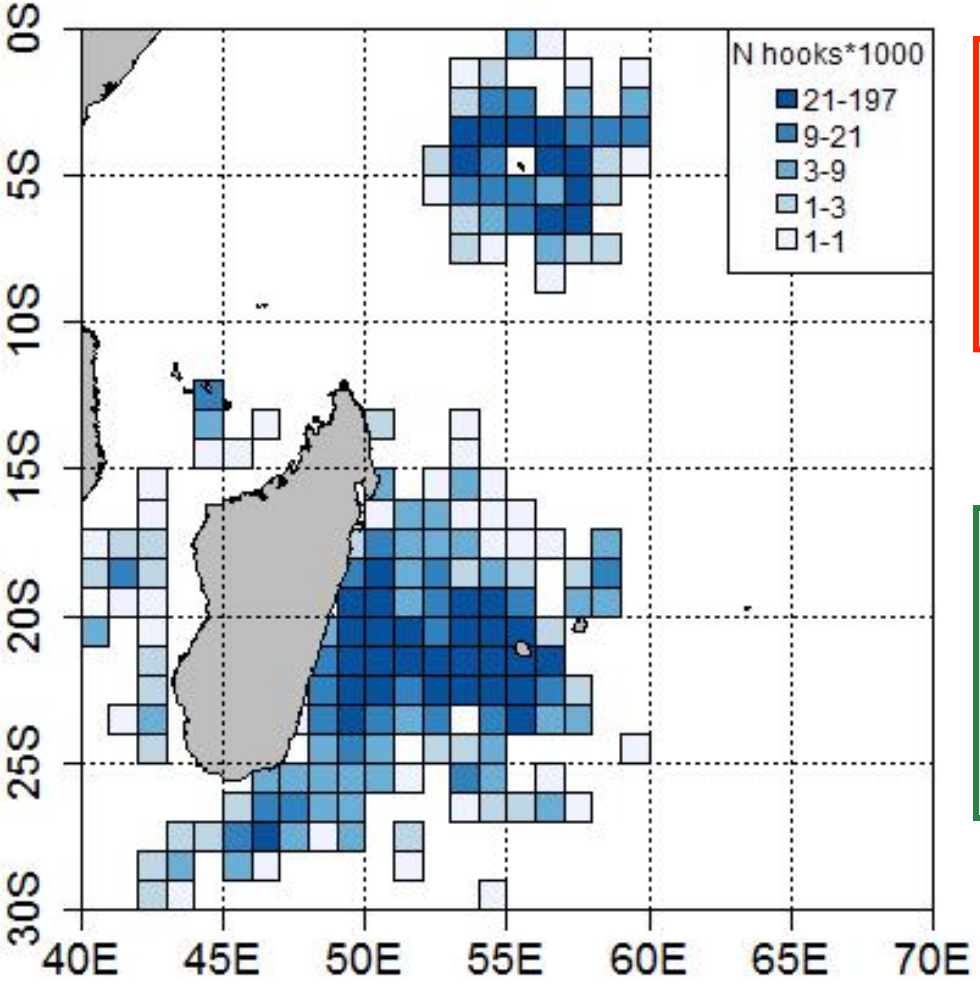
- ✓ few single bites, clear cut edges
- ✓ few damages on the fish

❖ Toothed whale depredation

Short-finned pilot whale False killer whale

- ✓ large bites, torn-off flesh, heavy damages
- ✓ only a small fish part left on the hook

Effort distribution



Seychelles semi-industrial LL fleet

- Activity start: 1995
- 4-6 longliners (2004-2006)
- Time coverage: 2004-2006
- 162 fishing trips (780 sets)

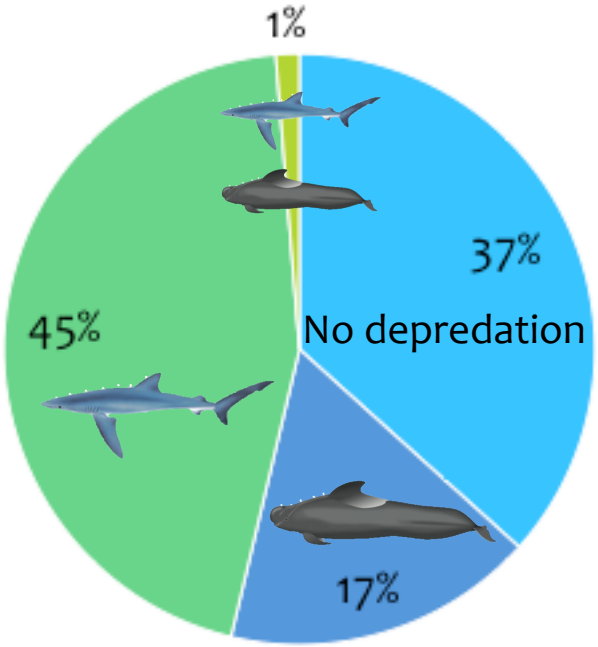
Reunion Is. semi-industrial LL fleet

- Activity start: 1991
- 42 longliners (2015)
- Time coverage: 2007-2015
- 502 fishing trips (2230 sets)

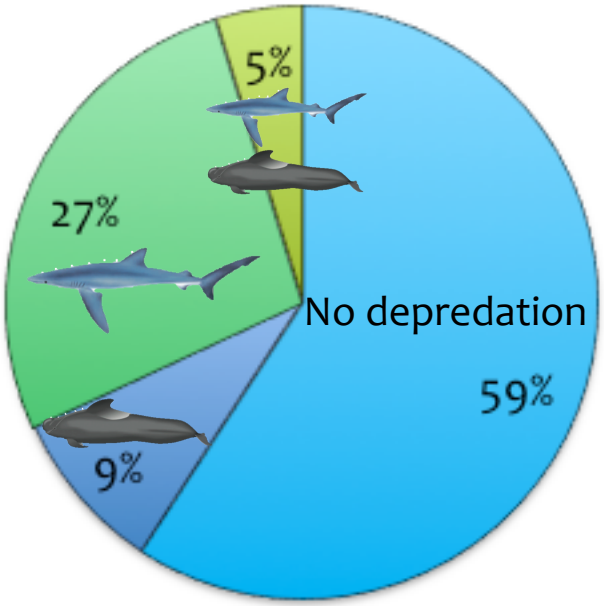
Indicator #1: Interaction Rate

Interaction Rate = proportion of depredated sets among the overall fishing operations

$$IR = \frac{\text{Number of depredated sets}}{\text{Number of fishing operations}}$$



Seychelles



Reunion Island


Shark


Toothed whale

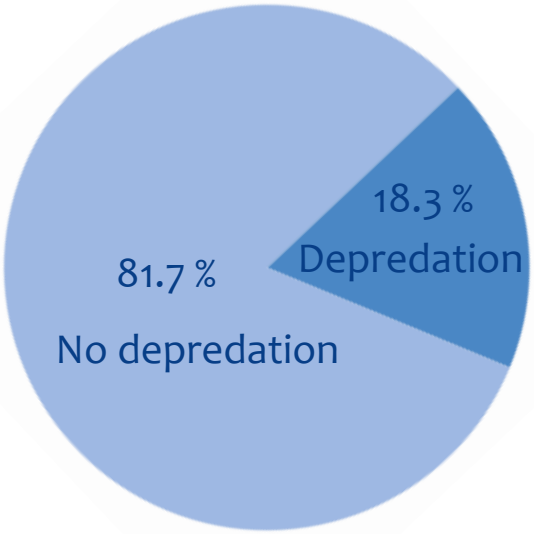
⇒ Shark depredation is 3 times more frequent than toothed whale depredation

Indicator #2: Gross Depredation Rate

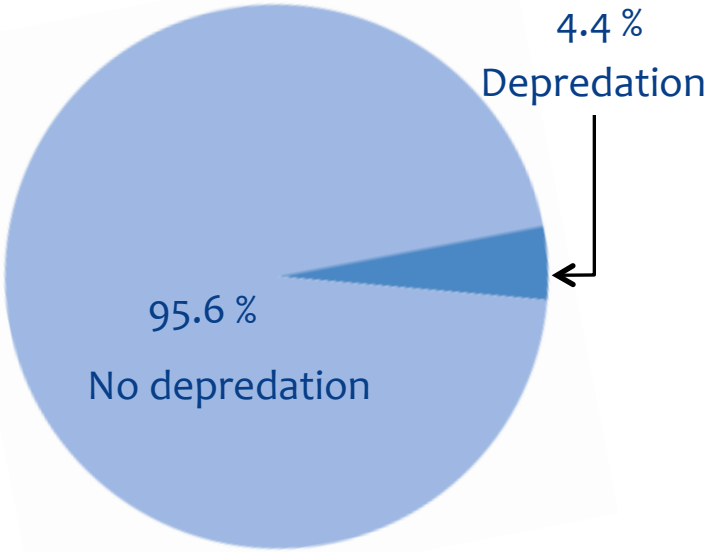
Gross Depredation Rate = proportion of depredated fish among the overall catch

$$GDR = \frac{\text{Number of fish depredated}}{\text{Number of fish caught}}$$

Seychelles



Reunion Island

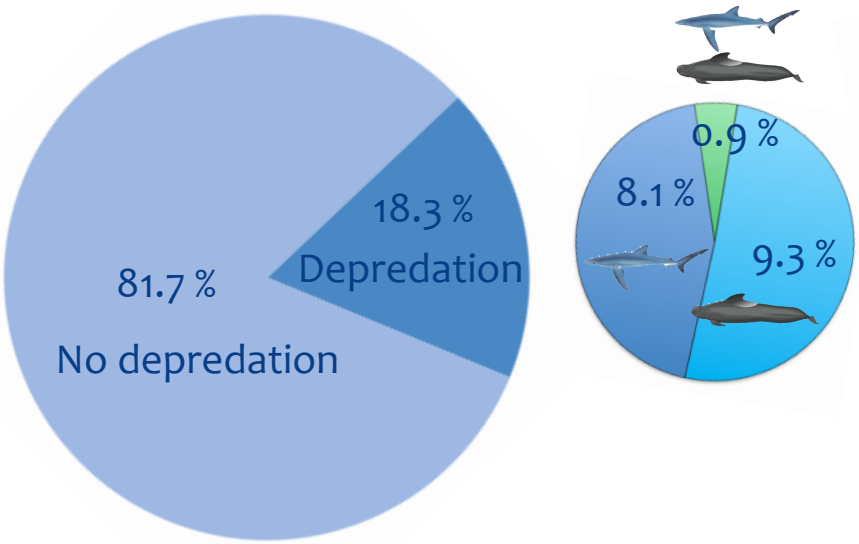


Indicator #2: Gross Depredation Rate

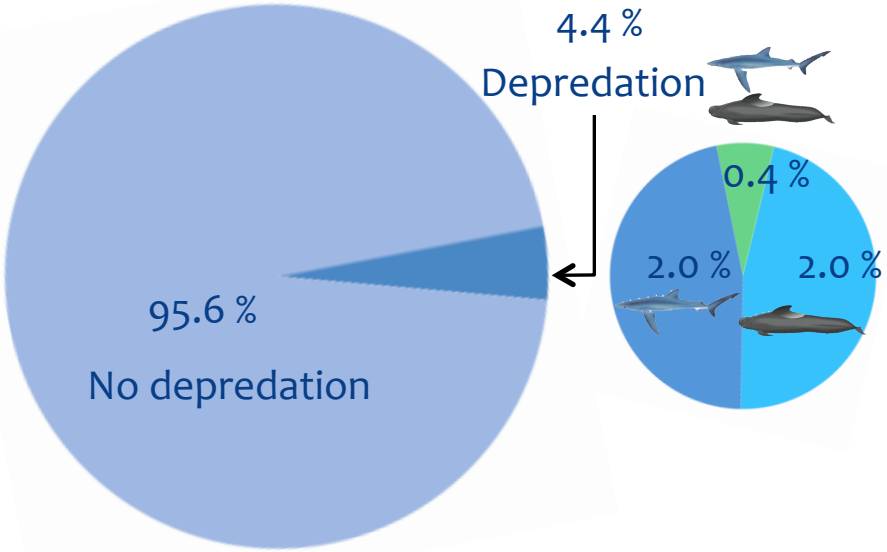
Gross Depredation Rate = proportion of depredated fish among the overall catch

$$GDR = \frac{\text{Number of fish depredated}}{\text{Number of fish caught}}$$

Seychelles



Reunion Island



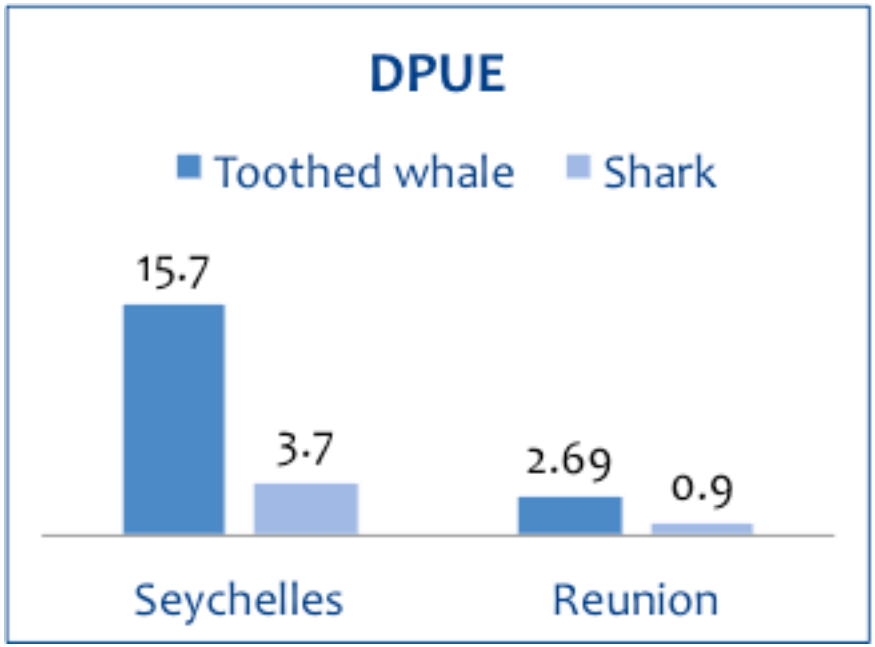
Indicators #3 & #4: DPUE & Damage Rate

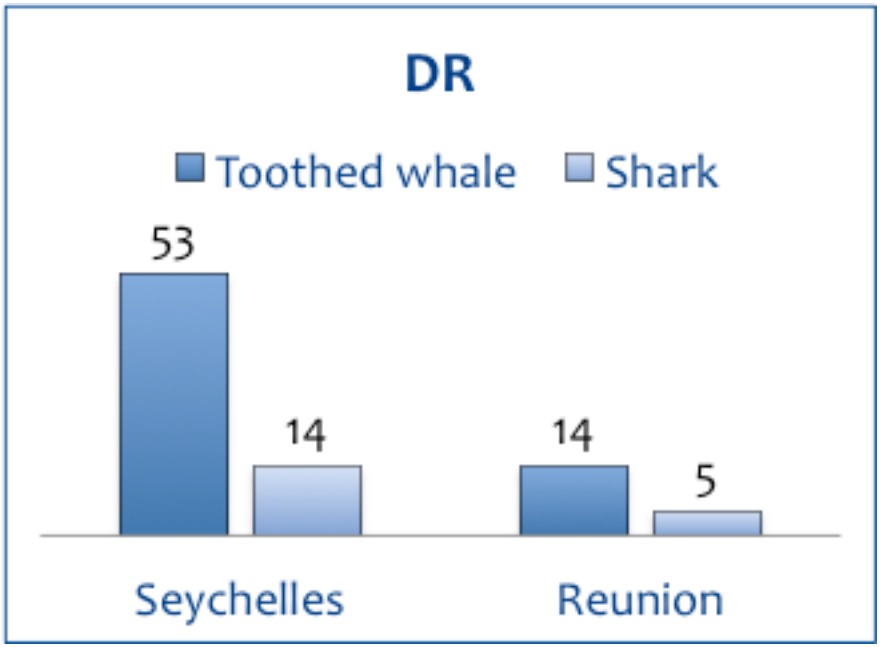
Depredation Per Unit Effort = number of fish lost per 1000 hooks per depredated set

$$DPUE = \frac{\text{Number of fish depredated}}{\text{Number of hooks set}} * 1000$$

Damage Rate = average percentage of fish lost per depredated set (%)

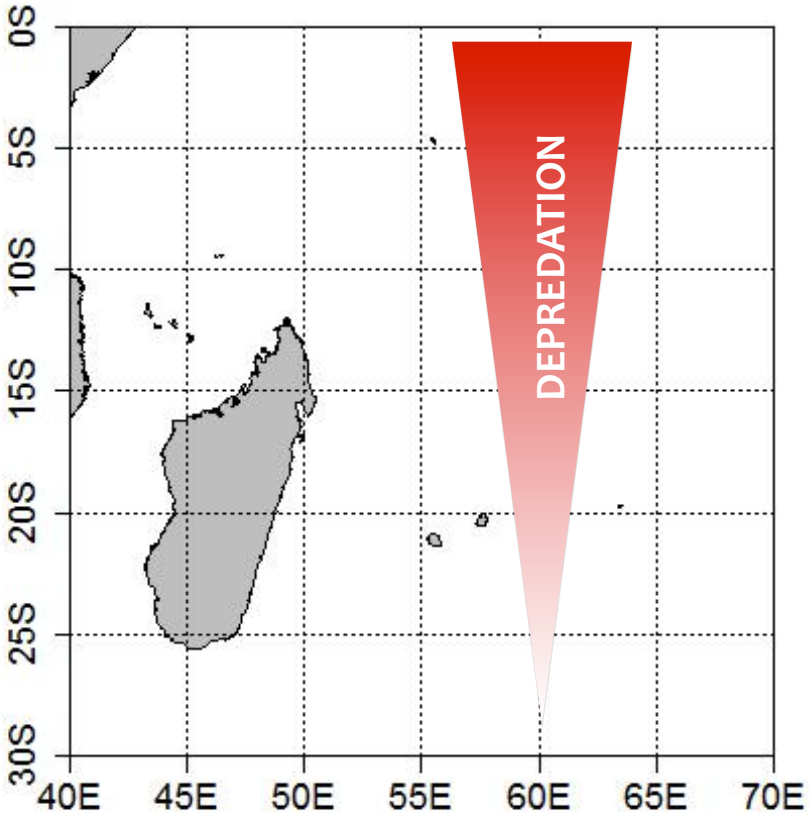
$$DR = \frac{\text{Number of fish depredated}}{\text{Number of fish caught}}$$





⇒ **Toothed whale depredation is more deleterious than shark depredation**

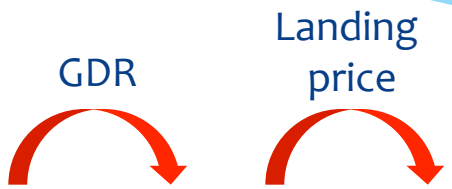
Overview of the toothed whale depredation in the SWIO



	IR (%)	DPUE	DR (%)
Seychelles	17	15.7	53
Reunion Island	9	2.7	14

⇒ **Decreasing toothed whale depredation gradient from North to South in the SWIO**

Economic losses due to depredation



	Landing (Mt)	Weight loss (Mt)	Economic loss (k€)
Seychelles (2004-2006)	581	130	312
Reunion (2007-2015)	14304	636	2861

Economic losses due to depredation

	Landing (Mt)	Weight loss (Mt)	Economic loss (k€)	Landing /hook (€/hook)	Loss/hook (€/hook)
Seychelles (2004-2006)	581	130	312	1.16	0.63
Reunion (2007-2015)	14304	636	2861	0.4	0.09

Landing price and
fleet fishing effort

Economic losses due to depredation

	Landing (Mt)	Weight loss (Mt)	Economic loss (k€)	Landing /hook (€/hook)	Loss/hook (€/hook)	Ratio of depredation (%)
Seychelles (2004-2006)	581	130	312	1.16	0.63	54
Reunion (2007-2015)	14304	636	2861	0.4	0.09	20

⇒ **SEYCHELLES: depredation accounted for 54% of the fish landed price per hook**

⇒ **REUNION ISLAND: depredation accounted for 20% of the fish landed price per hook**

Conclusion

❖ Shark depredation is more frequent, but toothed whale depredation is more deleterious

❖ Heavier impact of depredation in Seychelles

❖ Low overall profitability (increased running costs, low fish prices, decreased CPUE)
⇒ Even slight depredation losses are likely to induce economic disastrous effects

❖ Need of global and standard depredation indicators to:
- monitor depredation over time and space
- allow comparison between fisheries and fishing grounds
- assess depredation levels with standard methods

❖ Statistical reconstructions of catch series and CPUE (taking depredation indicators into account)


Depredation is also occurring in the Indian Sector of the Southern Ocean in the demersal longline fishery
Thank you for your attention
© B. Loyer