



No boundaries for whales interacting with fishing activities targeting Patagonian toothfish (*Dissostichus eleginoides*)

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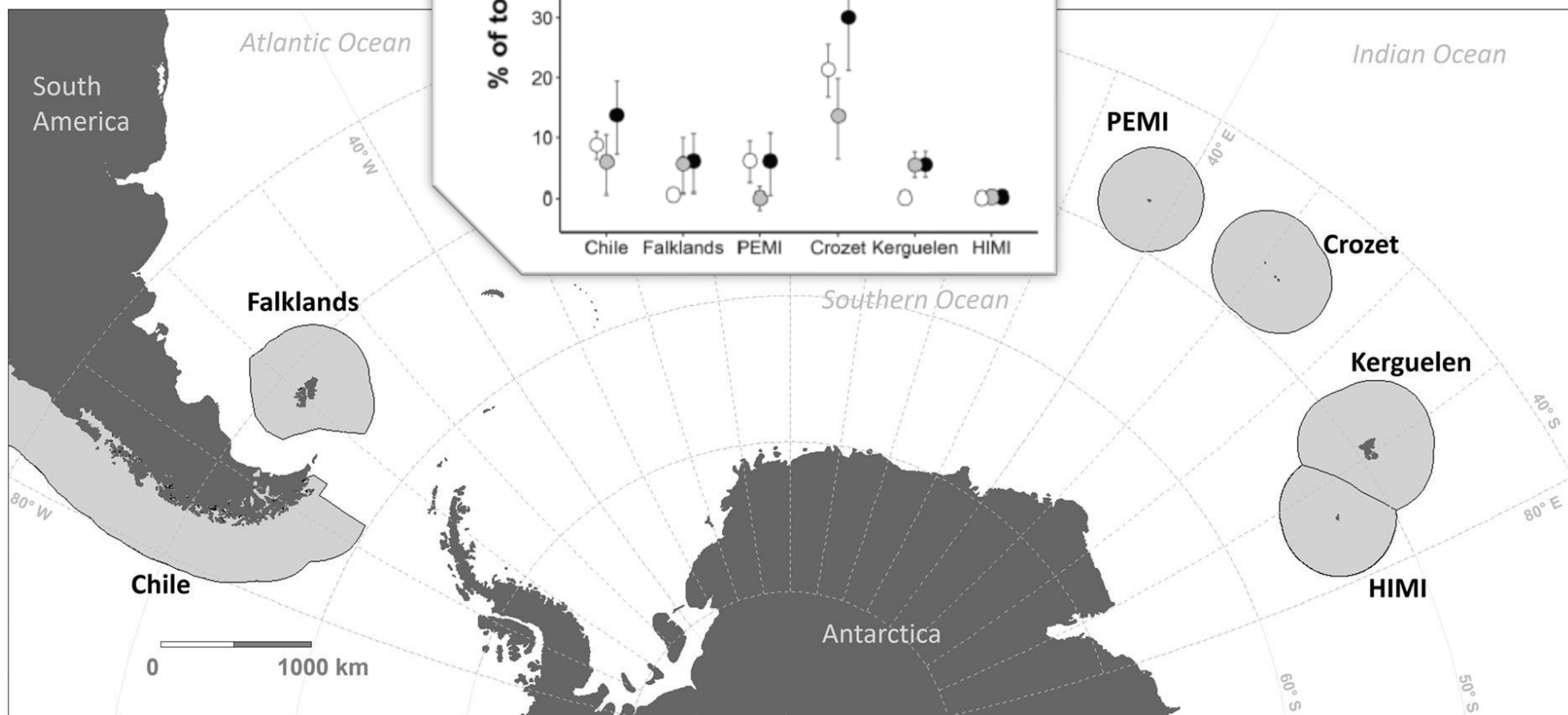
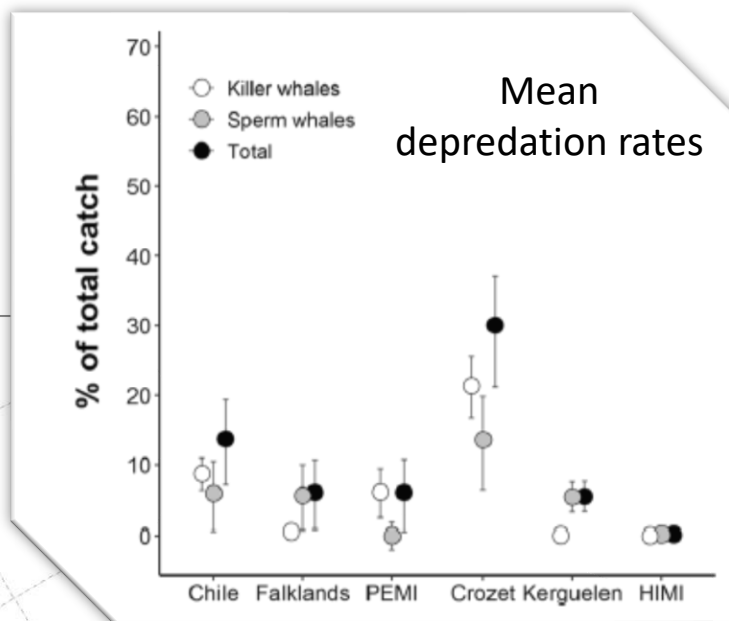
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5th Meeting of the Southern Indian Ocean Fisheries Agreement (SIOFA) Scientific Committee





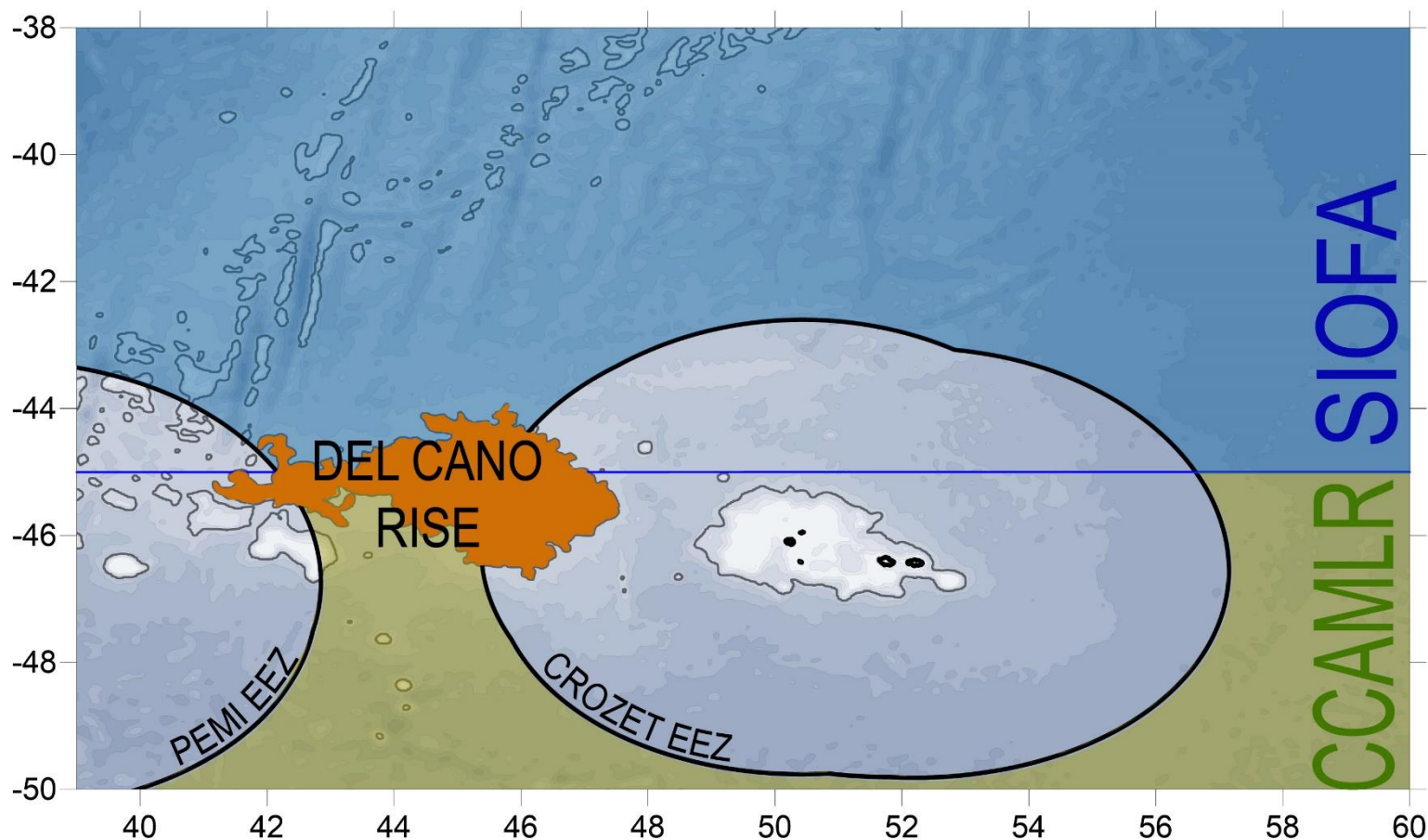
Context: Depredation rates in Patagonian toothfish fisheries



Tixier et al. (2020) Assessing the impact of toothed whale depredation on socio-ecosystems and fishery management in wide-ranging subantarctic fisheries. *Reviews in Fish Biology and Fisheries*.



Map of the DEL CANO RISE area showing the EEZ boundaries





Rationales

Killer whales and sperm whales interact with all longline Patagonian toothfish fisheries.

We know from observers that killer whales and sperm whales interact with fishing activities on the Del Cano region both in the French EEZ and in the SIOFA area.

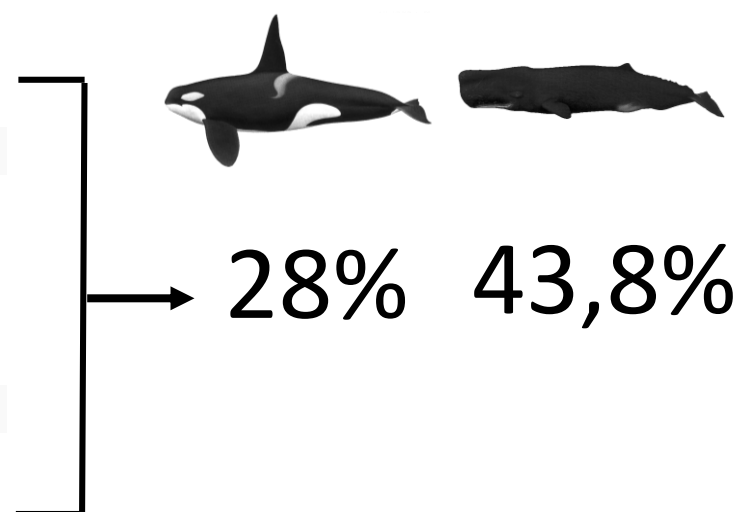
1. What are the interactions rates ?
2. What is the depredation rate?
3. Are those whales known to interact elsewhere?



1. What are the interaction rates ?

Higher interaction rate over the period 2009-2019

saisons	Longlines set:		interaction rates:	
	french	spanish	Killer whale	Spermwhale
2009_2010	14		0,0%	0,0%
2010_2011	107		28,0%	23,4%
2011_2012	88		9,1%	7,5%
2012_2013	105		0,0%	42,5%
2013_2014	244		13,6%	19,0%
2014_2015	137		10,2%	16,5%
2015_2016				
2016_2017	32		0,0%	43,8%
2017_2018		260	2,7%	14,7%
2018_2019	27	47	4,3%	14,9%
total	754	307		



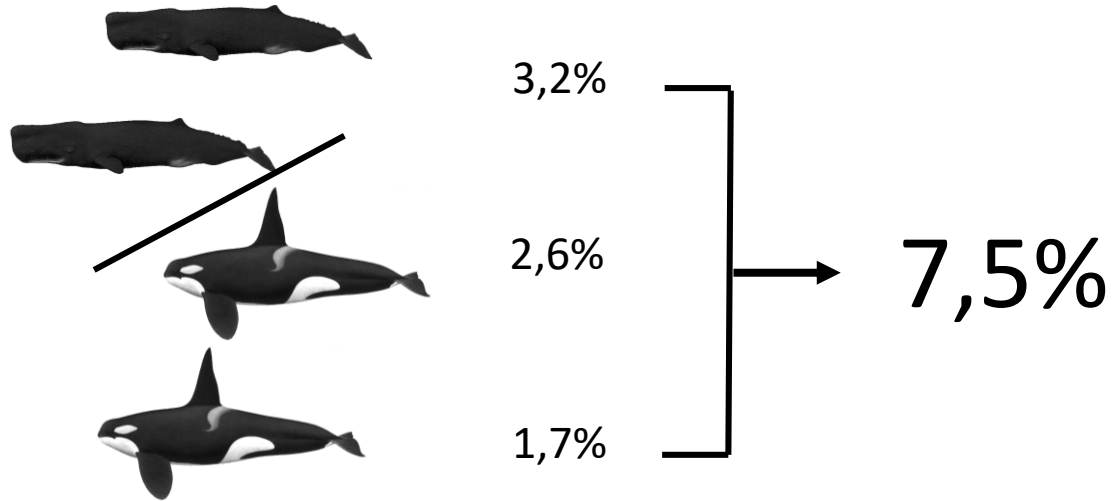
The interaction rates for an area :

Nb. longlines hauled in presence of whales (interacting with fishing operations)

Nb. longlines hauled (and observed for whales)



2. What is the depredation rate ?



Mean over the period 2009-2019

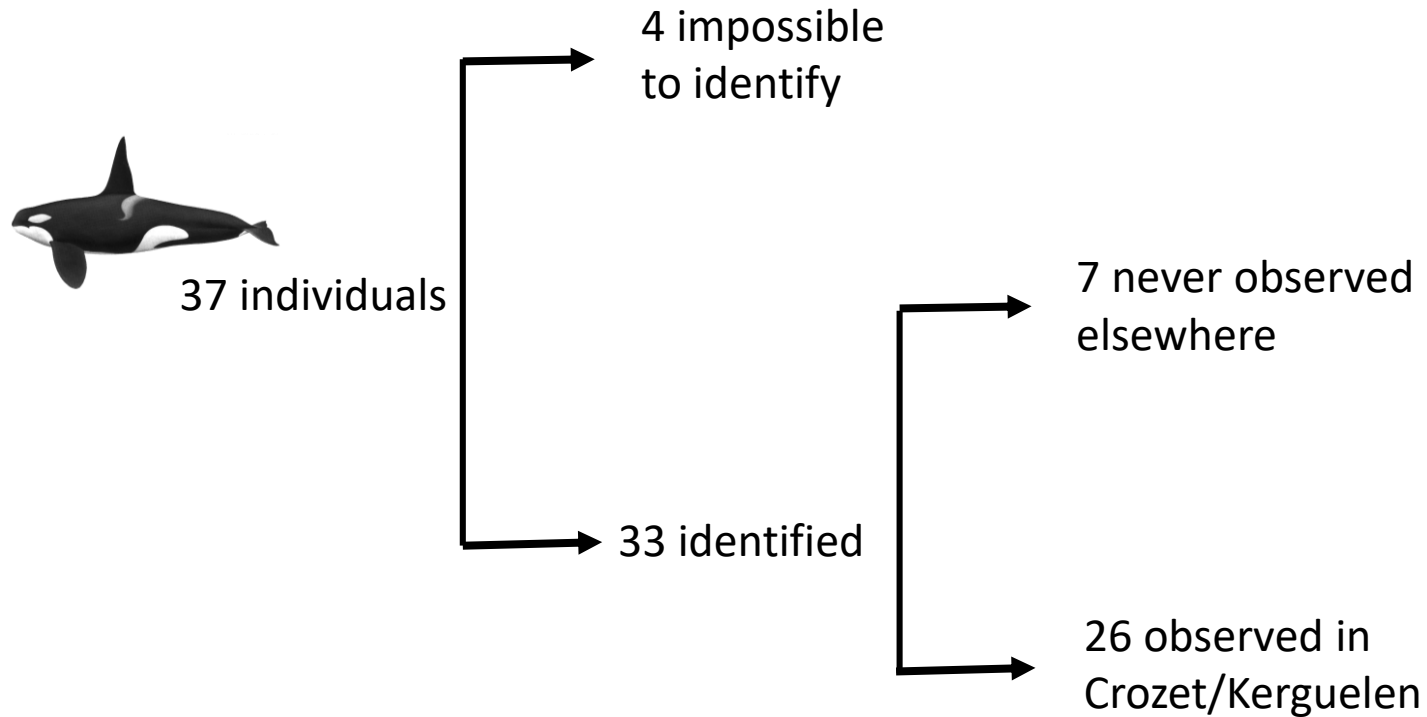
The depredation rates for an area :

Estimated weight of fish lost due to depredation

Total weight caught



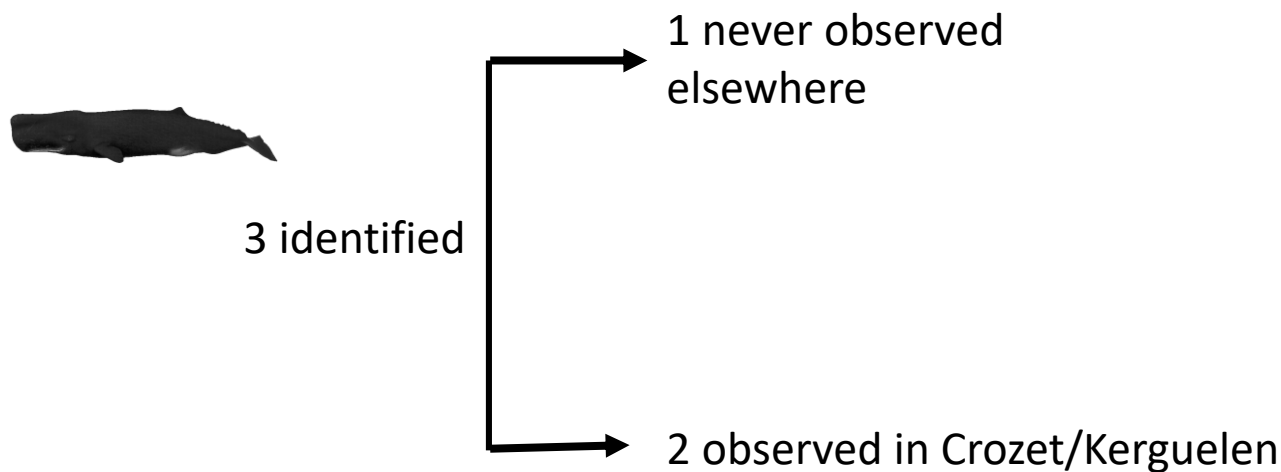
3. Are those whales known to interact elsewhere?



Identification based on 432 pictures mainly collected by french observers as part of a routine photo-identification protocol in place.



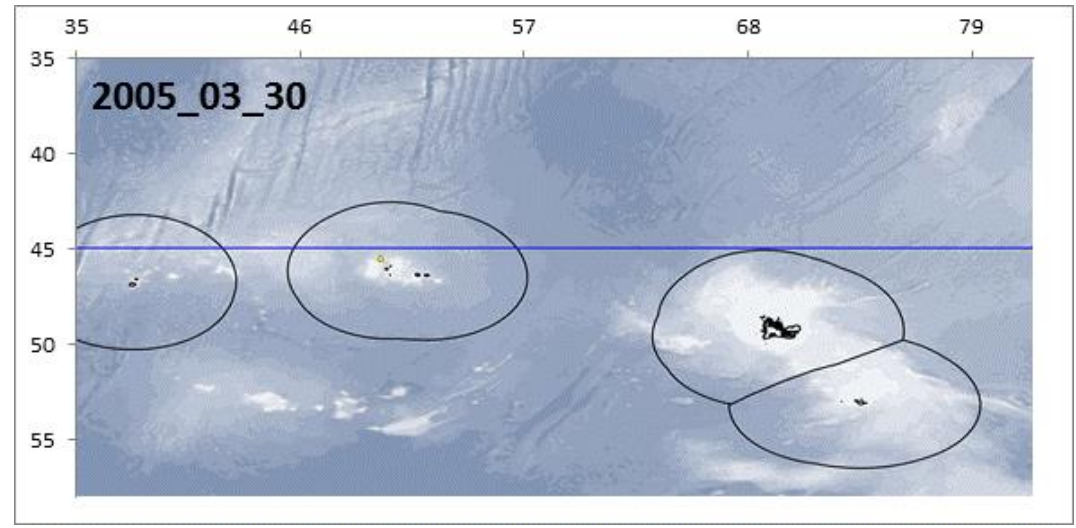
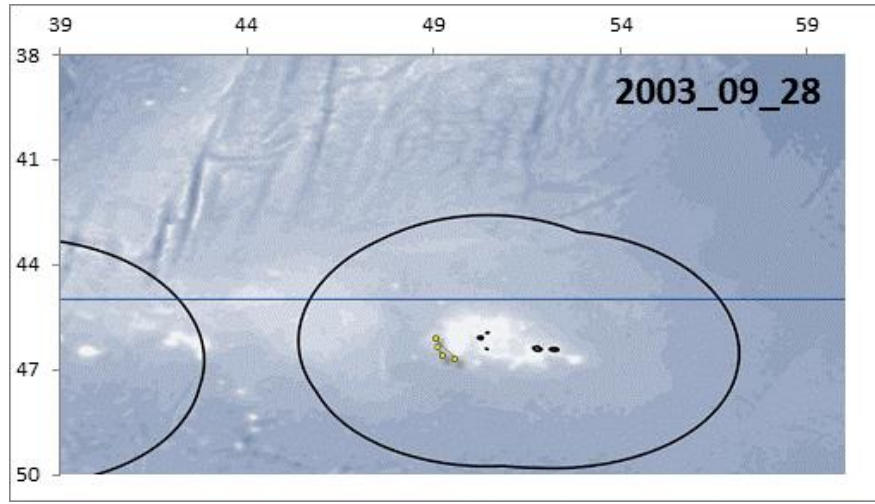
3. Are those whales known to interact elsewhere?



Pictures were mainly collected by french observers as part of a routine photo-identification protocol in place.



3. Are those whales known to interact elsewhere?





Conclusion

1. What are the interaction rates ?

- Interaction rates vary and could reach 28% for killer whales and more than 40% for sperm whales.

2. What is the depredation rate ?

- Depredation rate is estimated to be 7,5% based on the available data.

3. Are those whales known to interact elsewhere?

- At least 70% of the killer whales observed in Del Cano rise in SIOFA were seen in Crozet/Kerguelen.
- 3 sperm whales were identified in the Del Cano rise in SIOFA out of which 2 already interacted in Kerguelen and/or Crozet.



Recommandations

1. Evidences of depredation

- Acknowledges the existence of depredation in the Del Cano SIOFA area and the impact that depredation can have on toothfish catches.

2. Monitoring of depredation

- Adopts a mandatory protocol for documenting whales interactions with all fishing vessels operating in the Del Cano SIOFA area that is compatible with that of CCAMLR (Gasco et al. 2013).

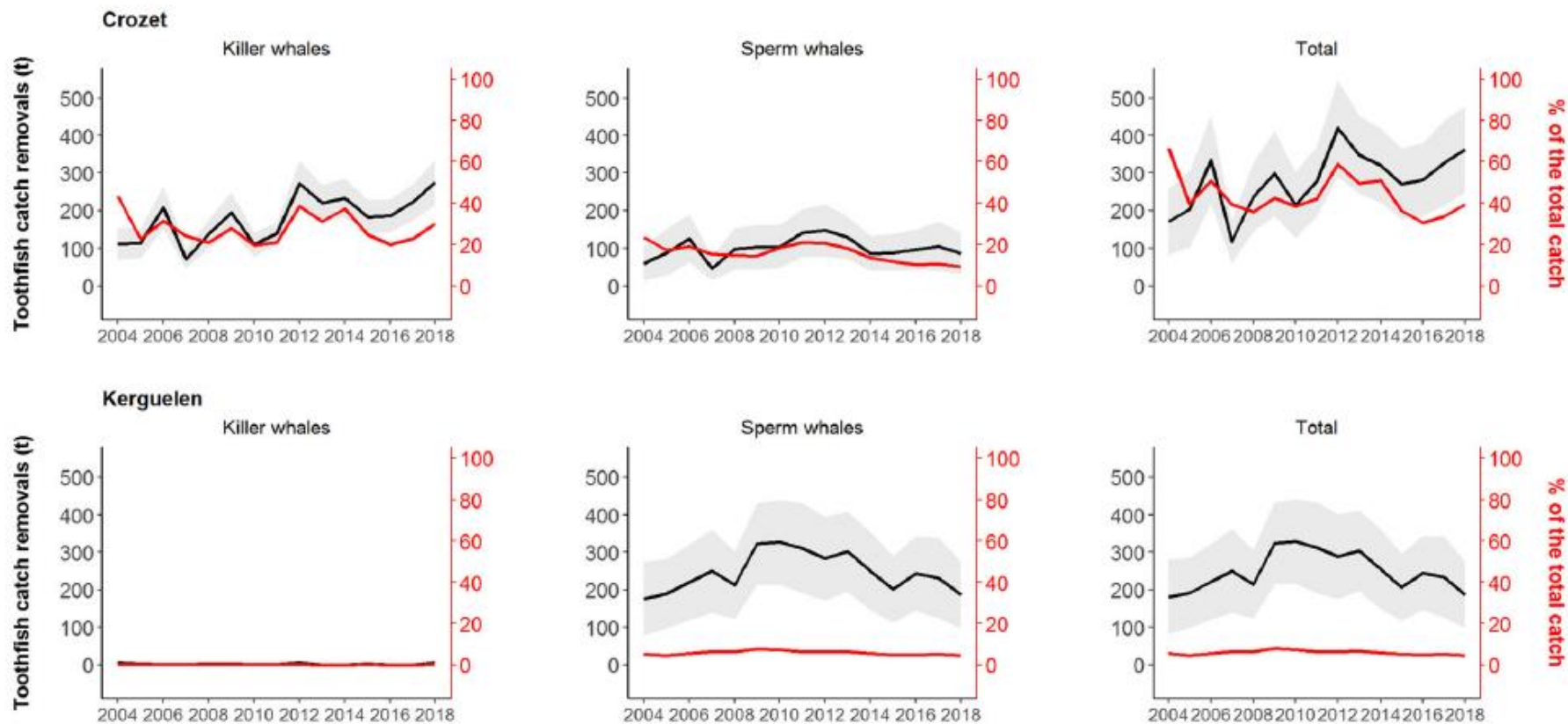
3. Mitigating measures | move-on rule

- Adopts actions to reduce the risk of spreading depredation behavior :
 - A) stop hauling and buoy off the line when killer whales are sighted,
 - B) steam away at least 30 nautical miles,
 - C) not haul any line within a radius of 30 nautical miles around the initial observation point, and
 - D) restart hauling of the buoyed-off line once killer whales are absent.



Depredation removals in Crozet and Kerguelen Patagonian toothfish fisheries

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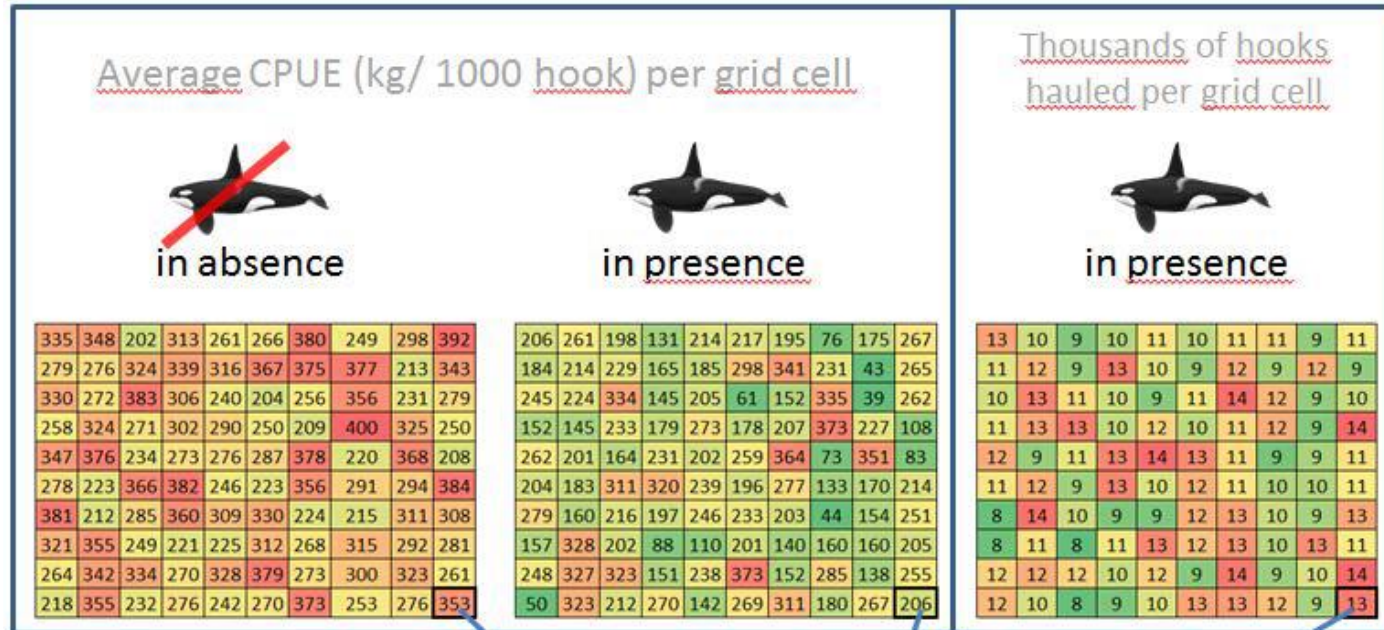


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CPUE methods

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Lost fish in this cell = $(353 - 206) * 13 = 1984$ kg