



Centre d'études
biologiques de
Chizé



Marine Predator Group

Marine mammal depredation on demersal Patagonian toothfish fishery in the Crozet and Kerguelen Exclusive Economic Zone: Can fish traps solve that issue?

International Marine Mammals longline Bycatch Mitigation Issue

Woods Hole, Massachusetts

October 22-25, 2013



Christophe Guinet¹, Nicolas Gasco² Paul Tixier¹, Guy Duhamel²,

¹ Centre d'Etudes Biologiques de Chizé,
CNRS, UPR 1934, Villiers-en-Bois, 79360, France
(tixier@cebc.cnrs.fr; guinet@cebc.cnrs.fr)

² MNHN, Paris, 75005, France
(nicopec@hotmail.com ; duhamel@mnhn.fr)



Terres Australes et
Antarctiques Françaises



SARPC
Syndicat des Aménagements Régionaux de Palangiers Congélateurs



Introduction



Crozet & Kerguelen Islands
French territory, Southern Ocean

Long lived
demersal species
45 years
120 kg
2,2 m

Highly valuable
fish :12-14 €/kg

The french Patagonian toothfish Fishery

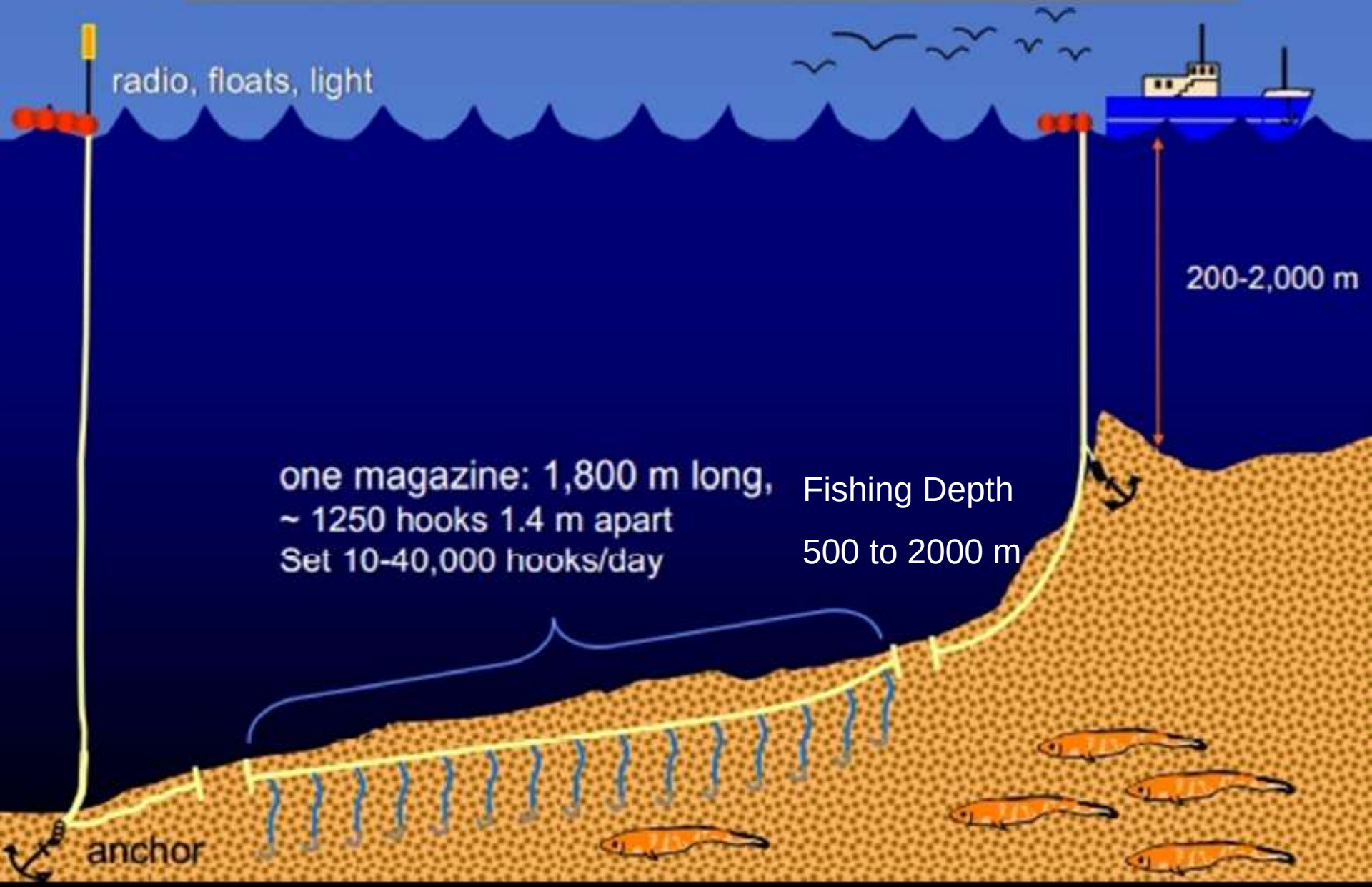


- 7 industrial longliners licensed to fish within the french EEZ (3 month trips)
- Year round
- MSC certified as sustainable and well managed
- Observers onboard
- Vessel Monitoring Sytem (1 loc/hour)



N. Gaso

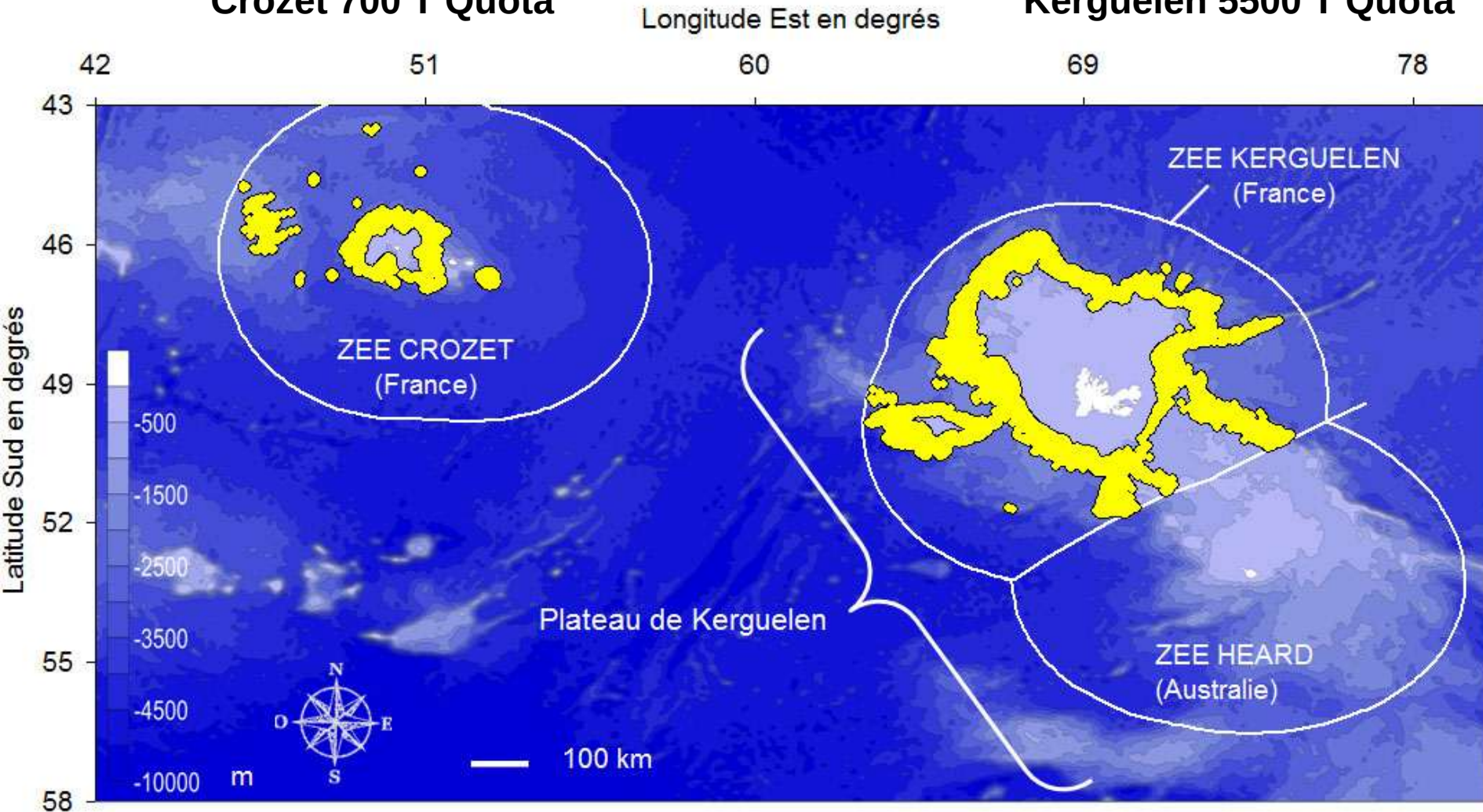
Norwegian system (autoline): ling, toothfish



Catch < at 2% of the
estimated spawning biomass

Crozet 700 T Quota

Kerguelen 5500 T Quota











Saint Thomas production, B. Loyer ©



N. Gasco



A. Dervaux

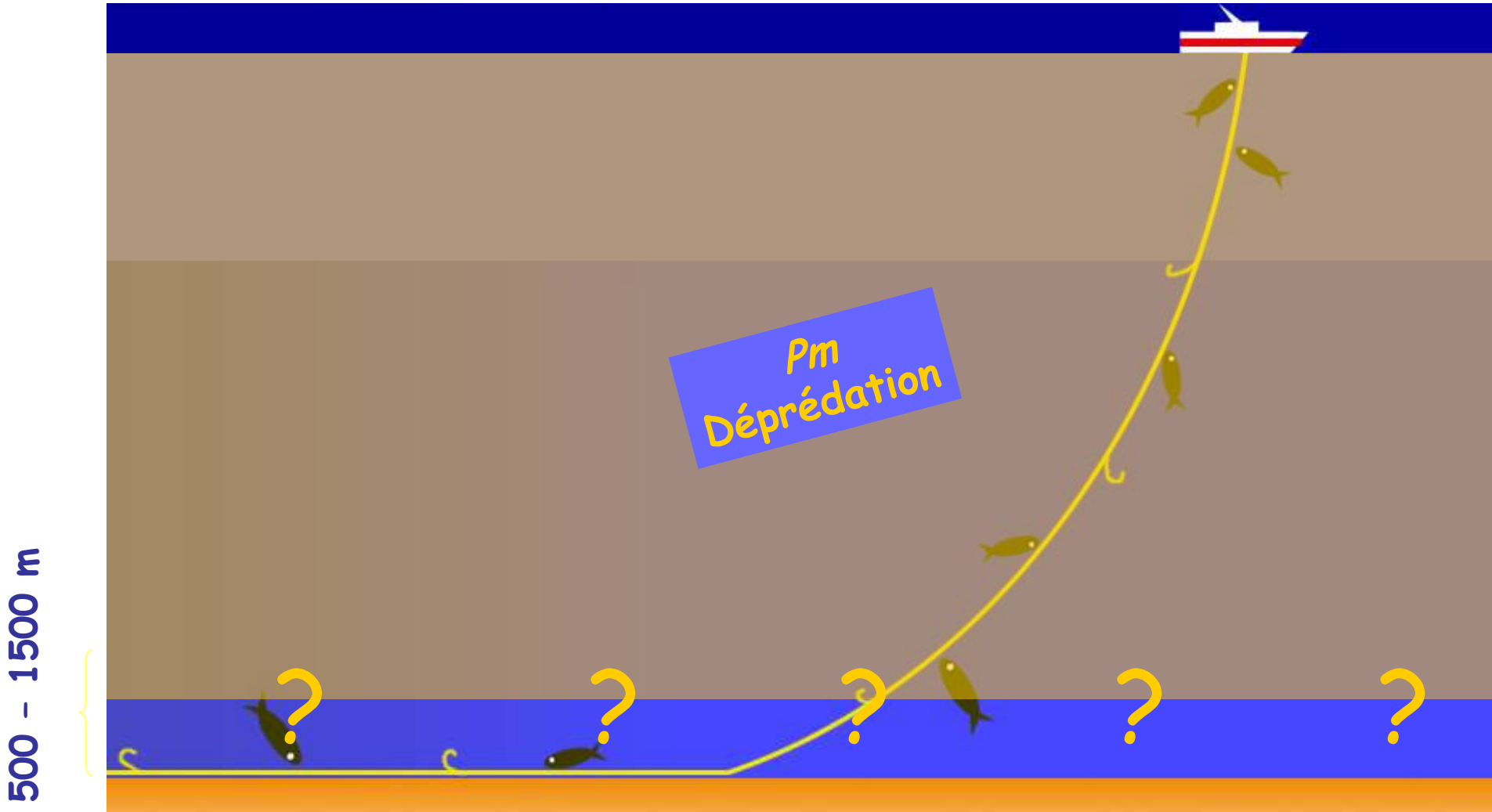




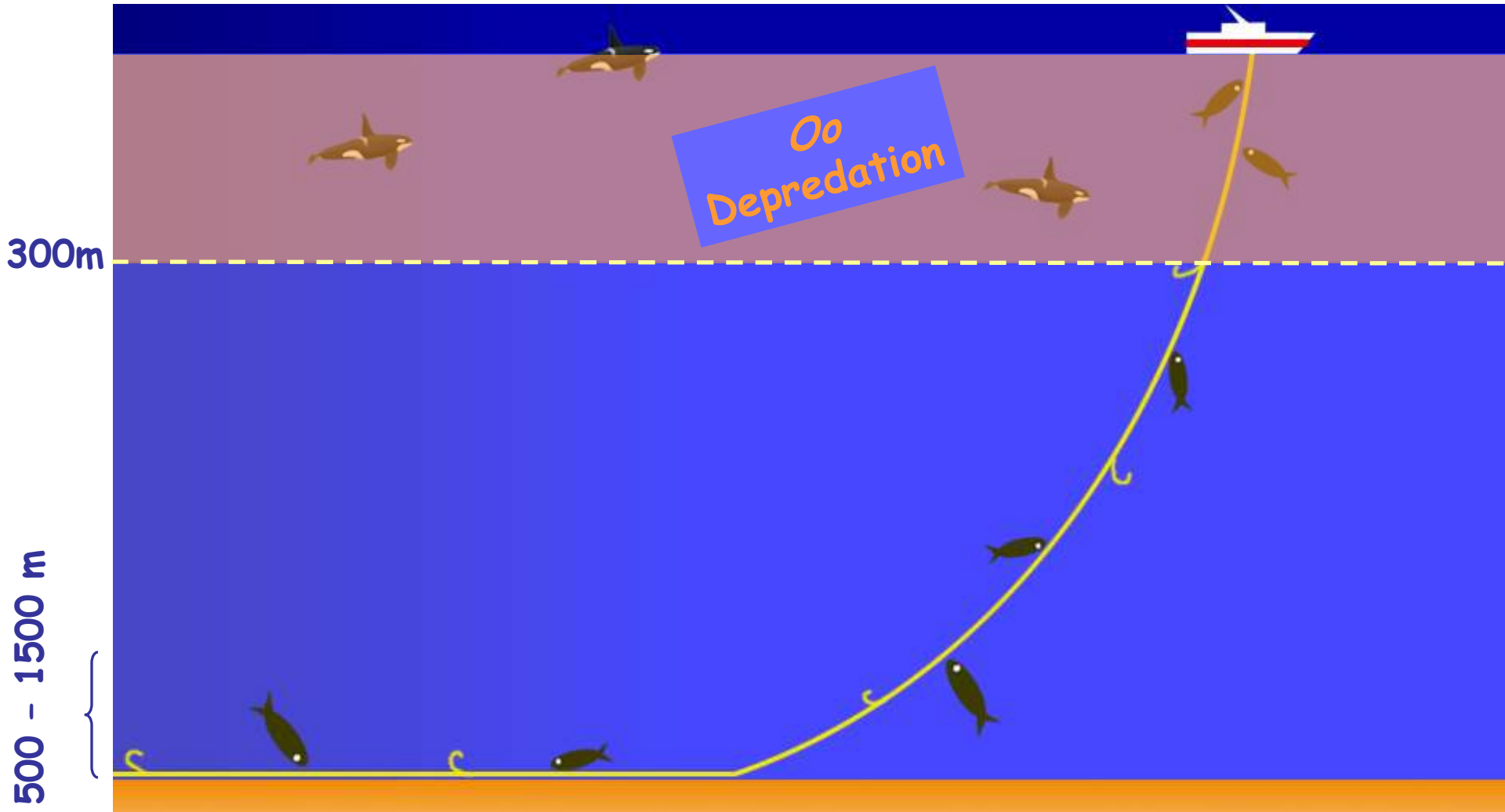


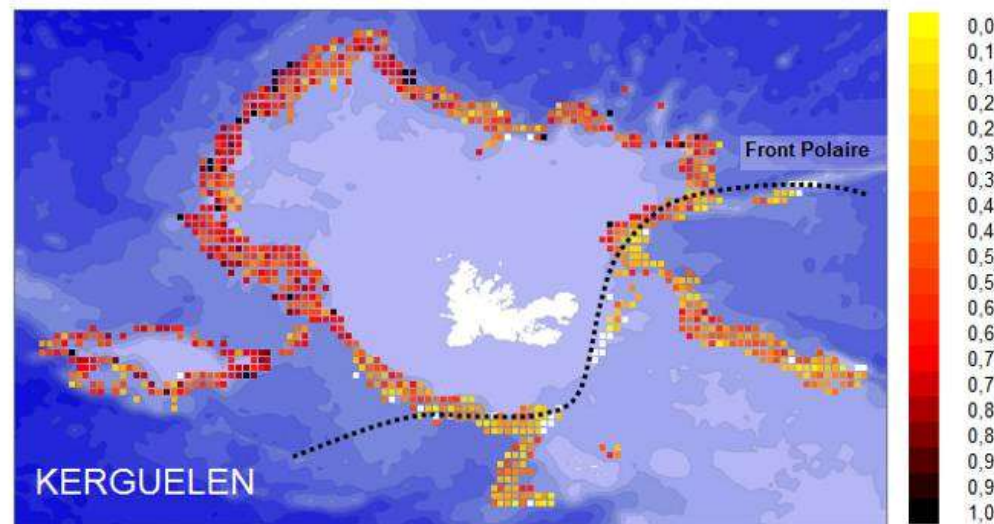
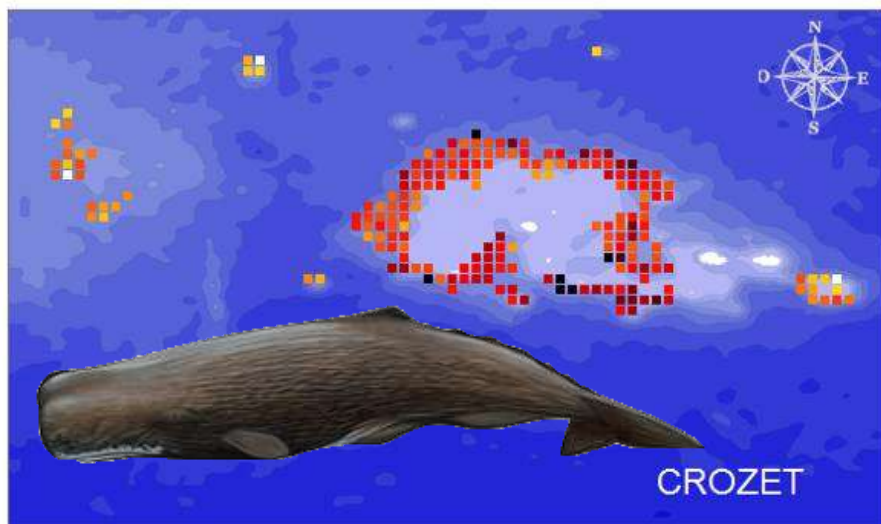
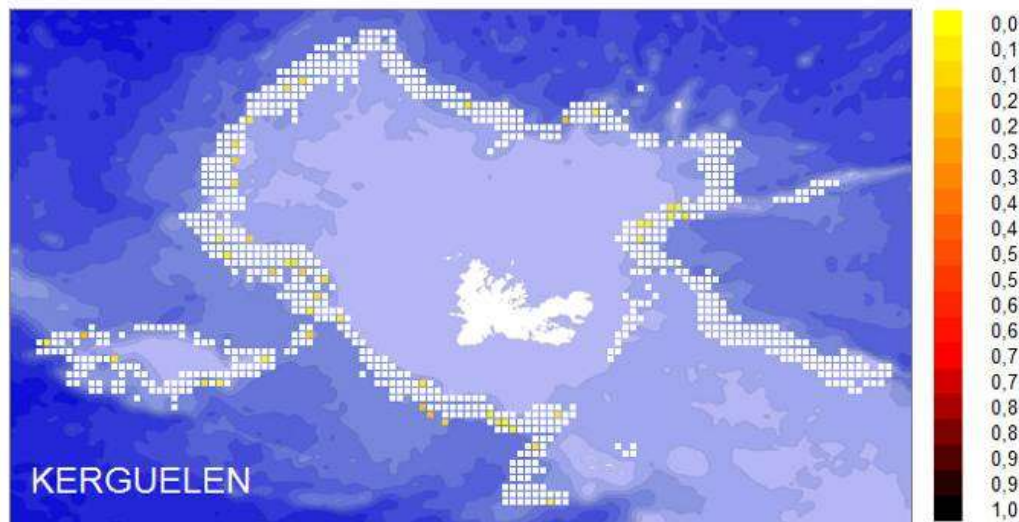
A. Dervaux

Interaction avec les cachalots



Interaction avec les orques



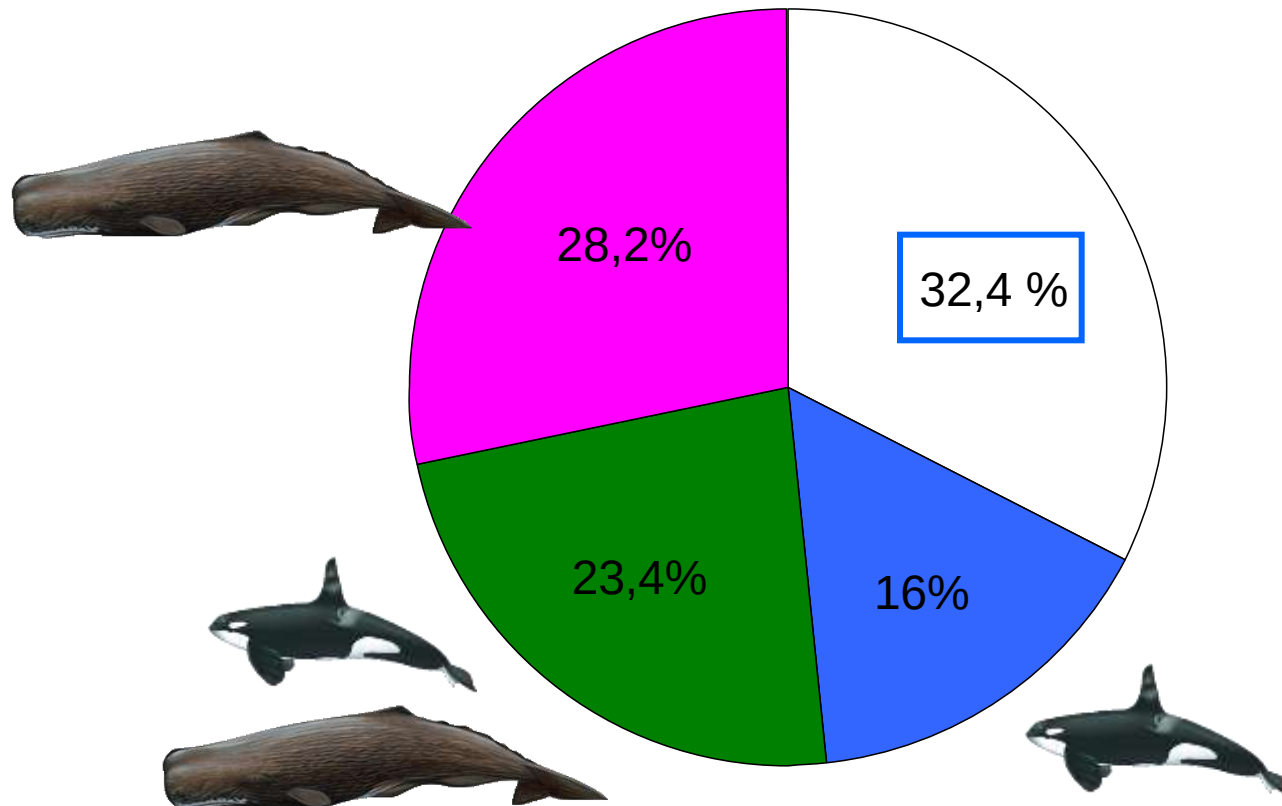


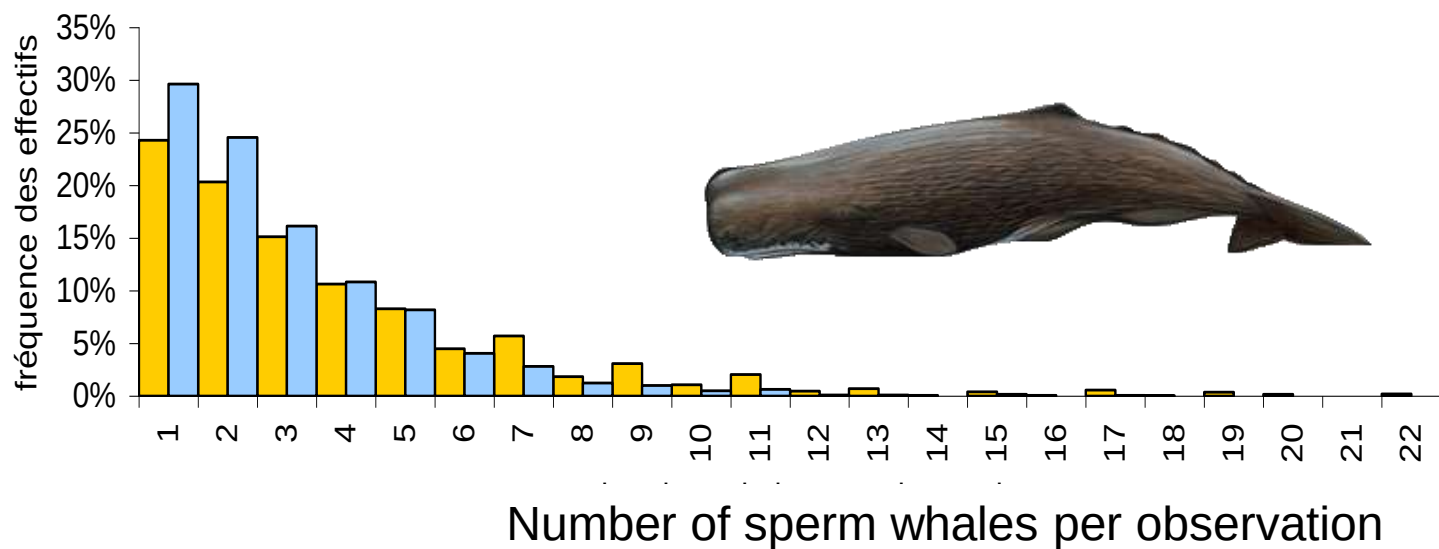
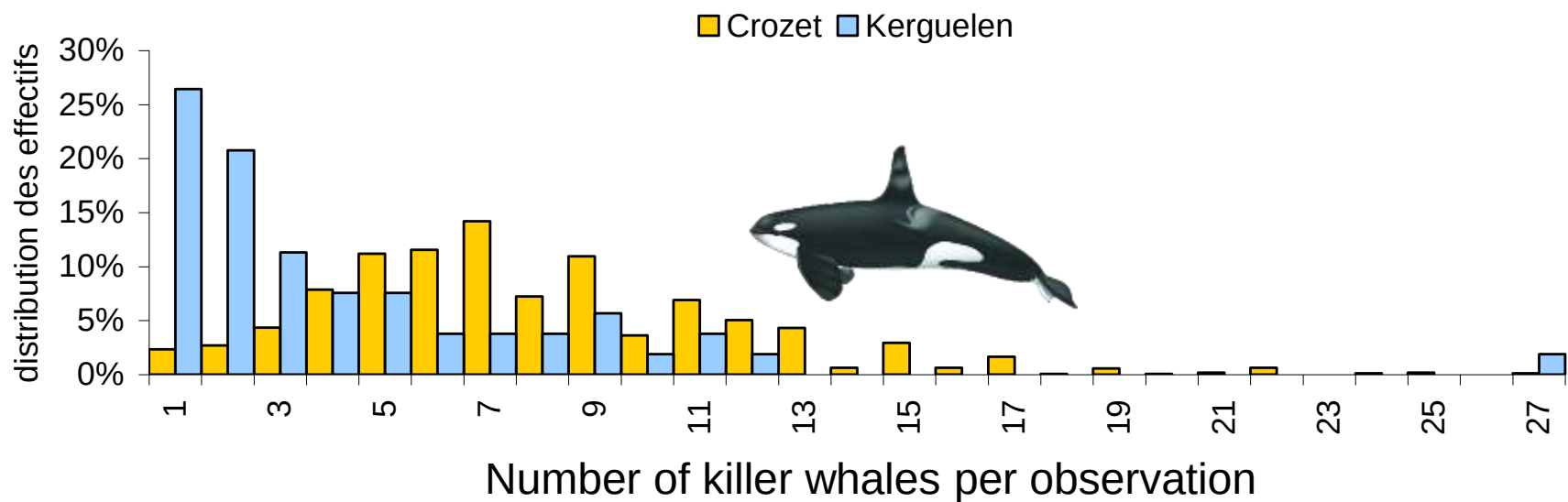
Interaction rate

Quantification of depredation levels

Interaction rates

Crozet Islands :
From 2003 à 2012







2003-2012 : bycatch

- 3 sperm whales**
- 4 elephant seals**



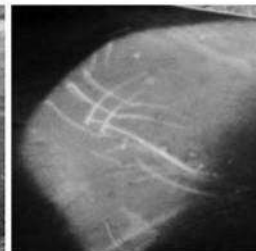
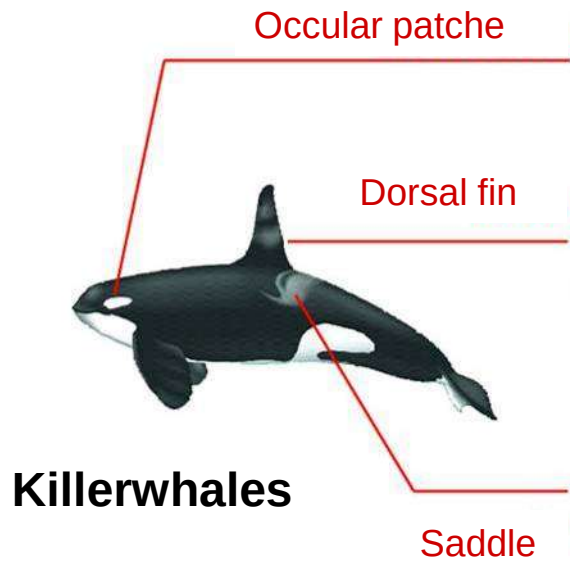
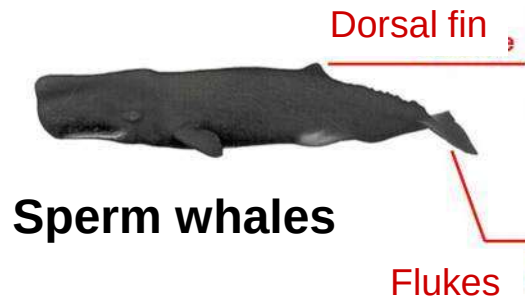
Seabird bycatch used to be an issue



French patagonian toothfish fishery

2003 : 13 000 to 14 000 seabirds killed annually

2009 : 450



All Killer whales
individuals are
catalogued
according to their
social groups

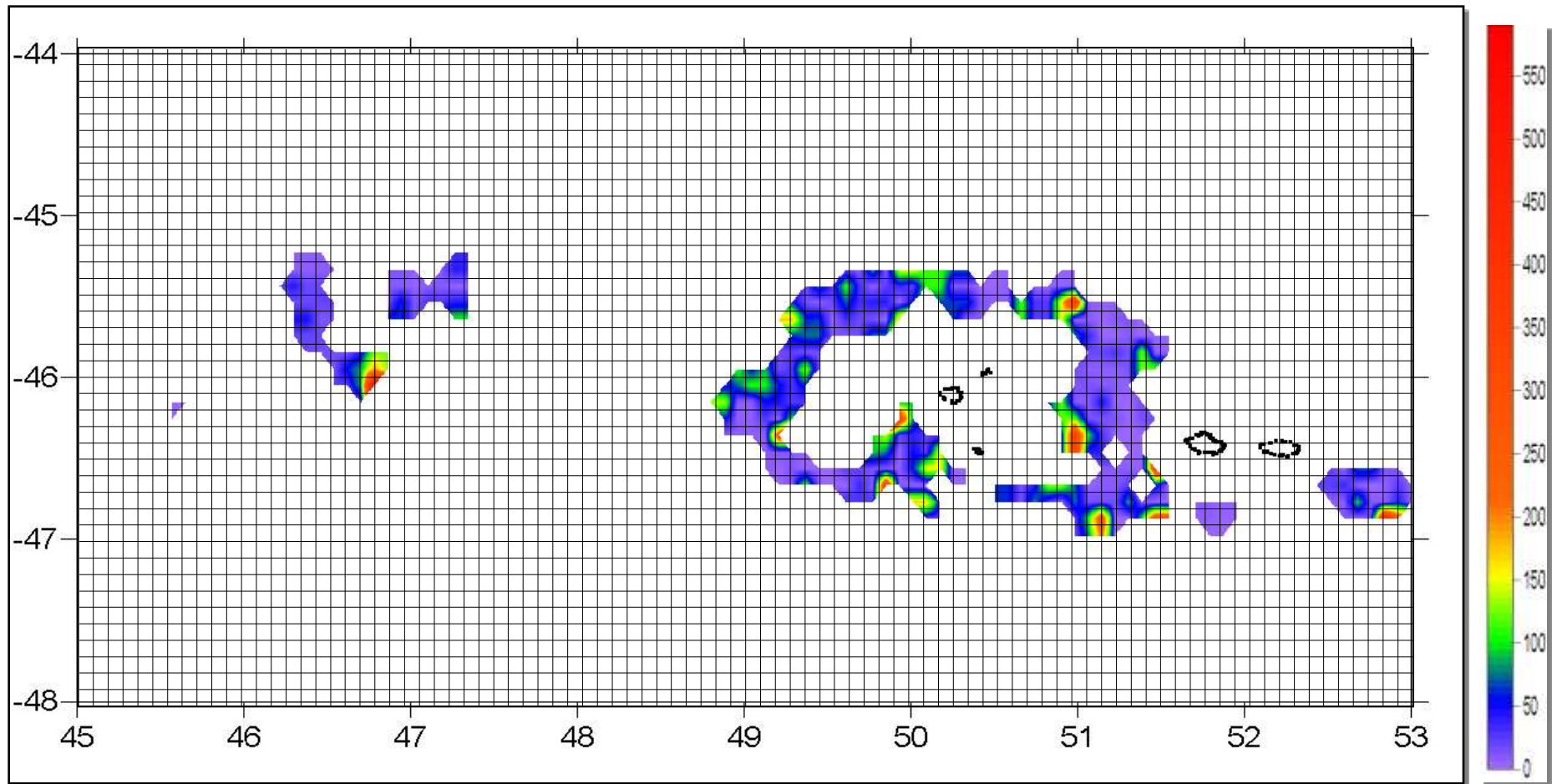


Part 1: Depredation

Estimation of losses

Comparison of CPUE in presence and absence of cetaceans

Absence of cetaceans



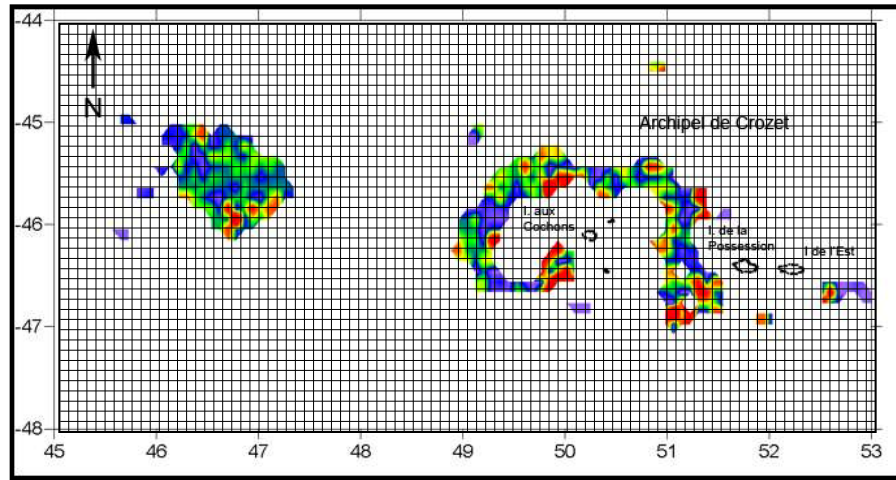
0.1° x 0.1° cells

Part 1: Depredation

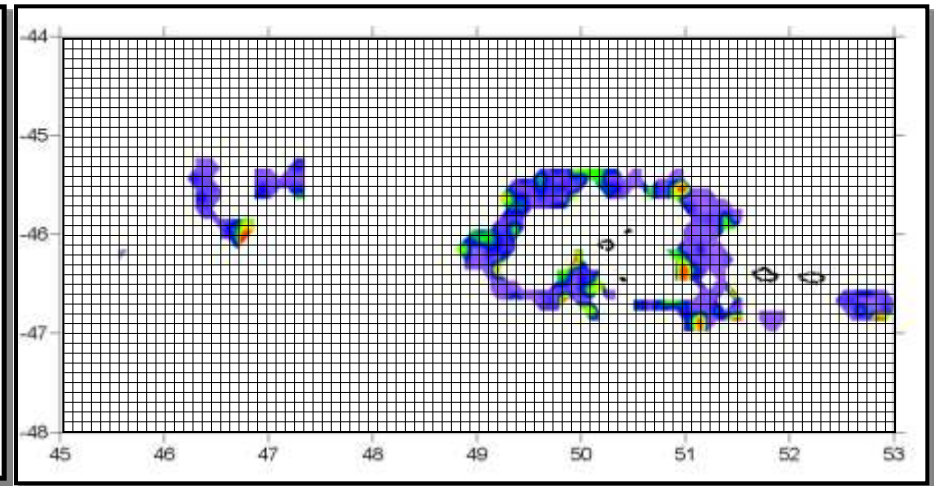
Estimation of losses

Comparison of CPUE in presence and absence of cetaceans

Absence of cetacean



Presence of cetaceans



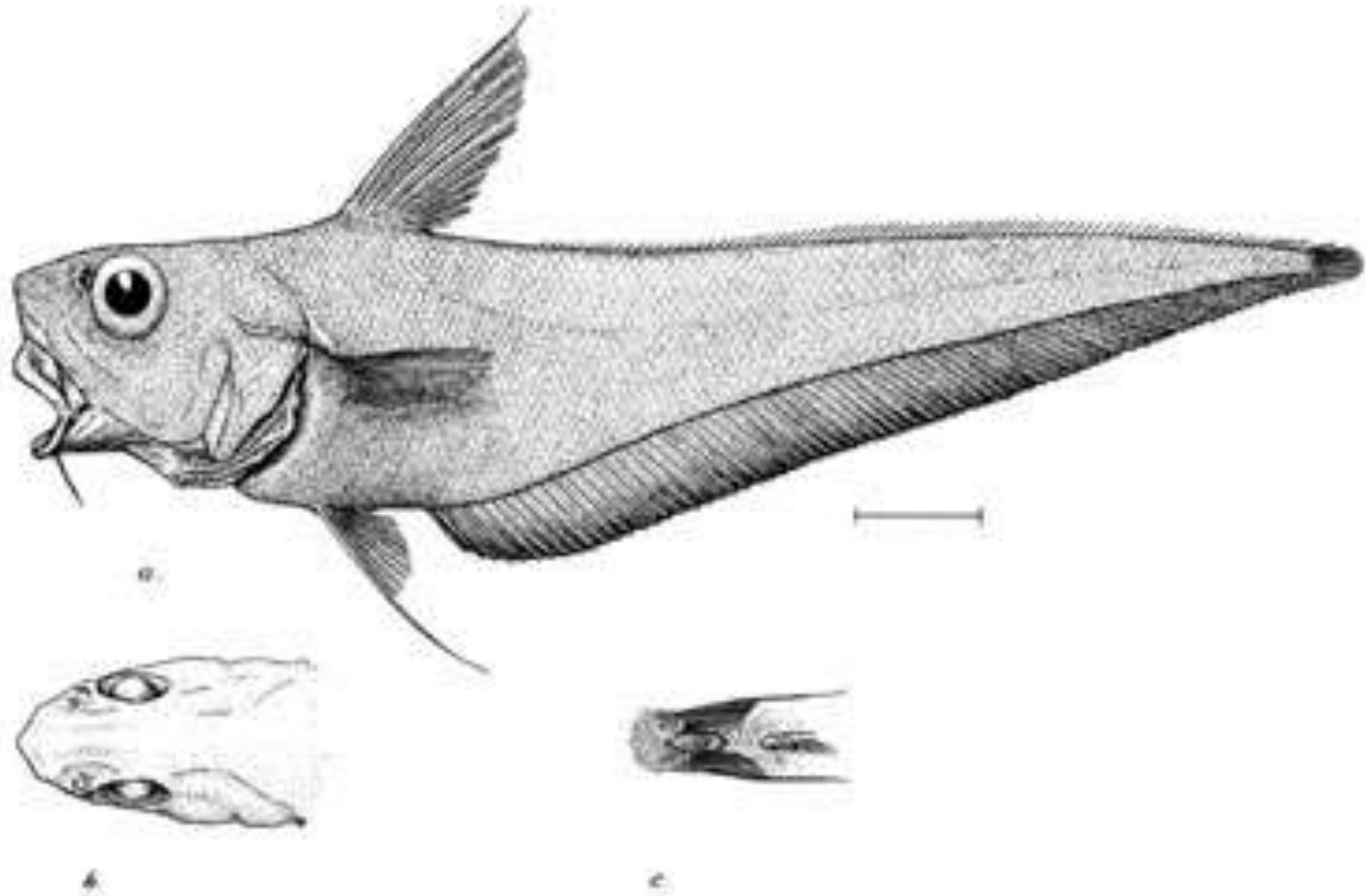
For each cell

$$\text{Fish loss} = \text{Effort} * \left(\text{CPUE}_{\text{without}} - \text{CPUE}_{\text{with}} \right)$$

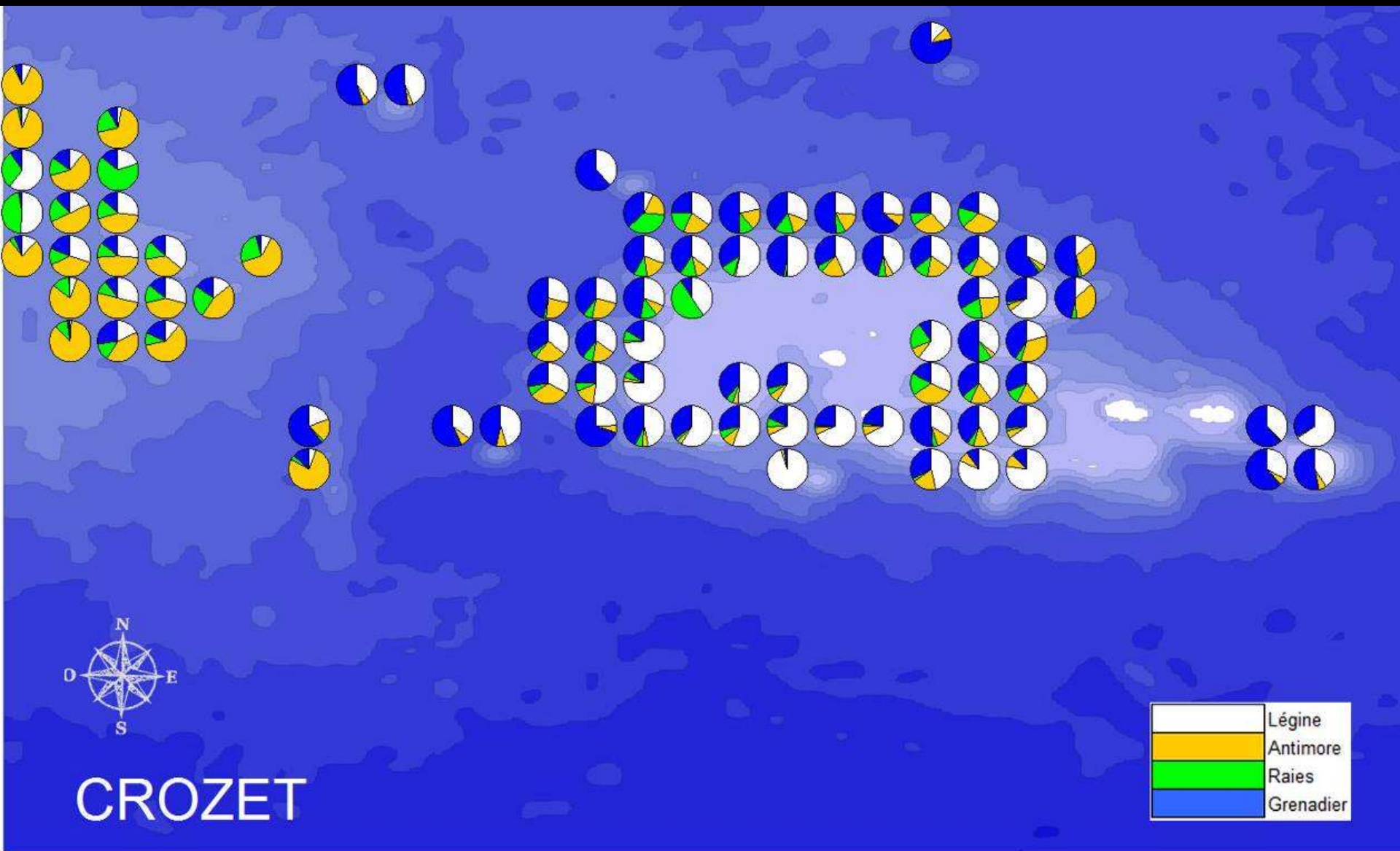


$$\text{Depredation rate} = \text{Fish loss} / \text{Fish hauled out}$$

Depredation Video



Rattail fish or grenadier (*Macrourus sp*)



toothfish

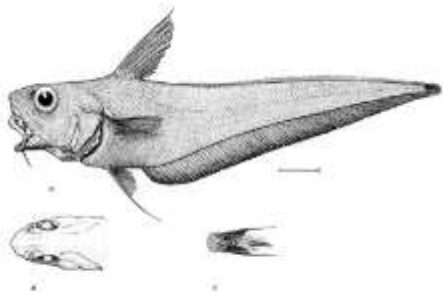
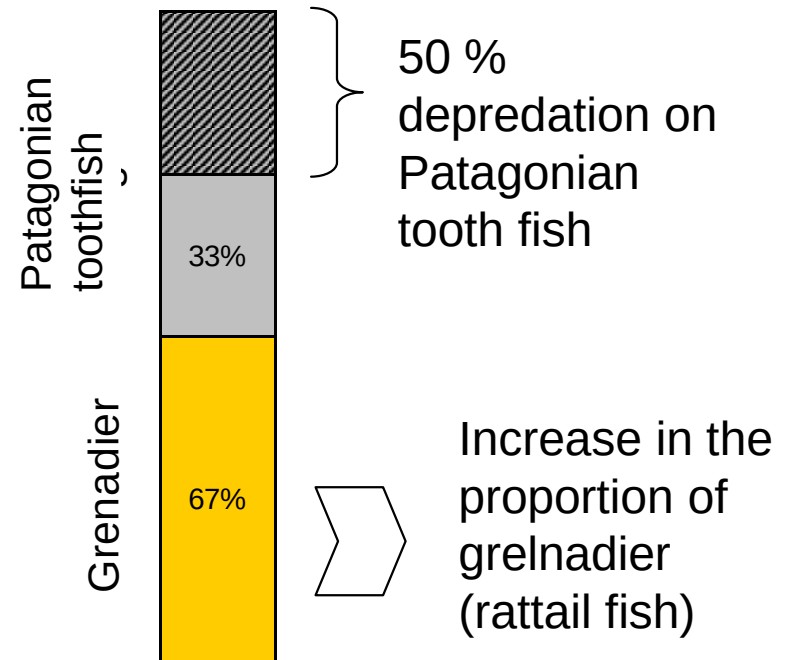


Rattail fish

Absence of Killer
whales and sperm
whales

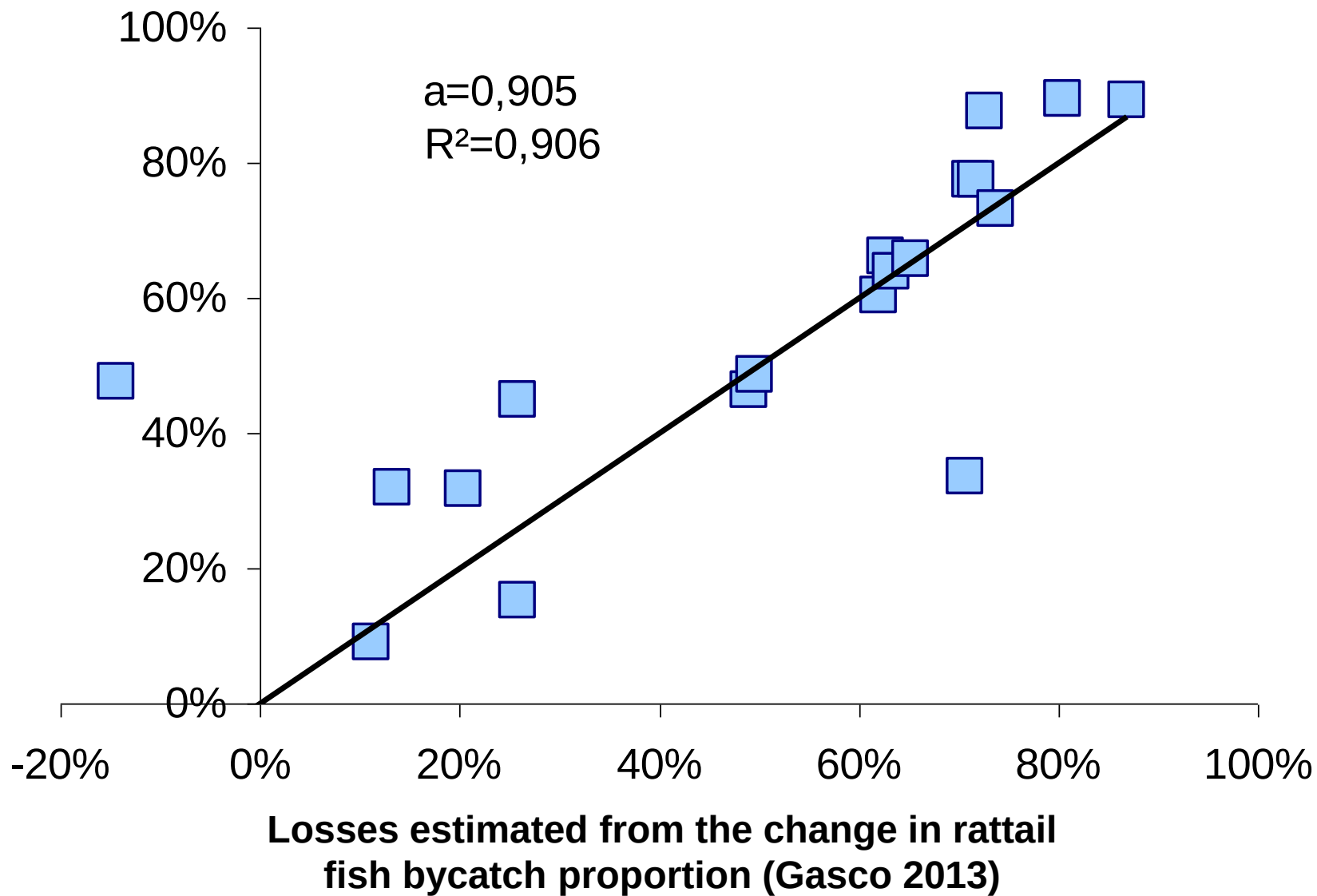


Presence of Killer
whales and sperm
whales

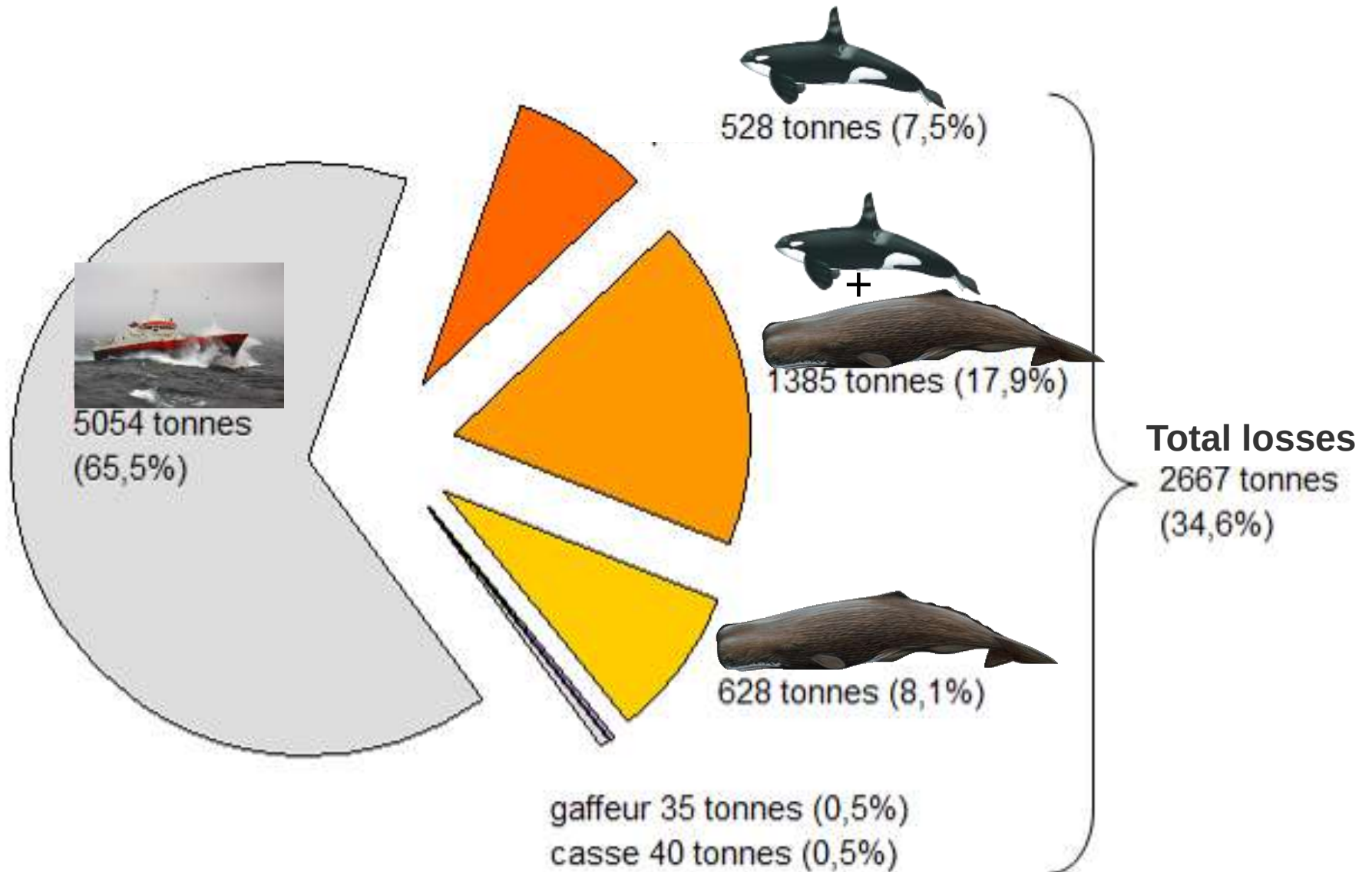


100% 100% 100% 100% 100% 100% 100% 100% 100% 100%

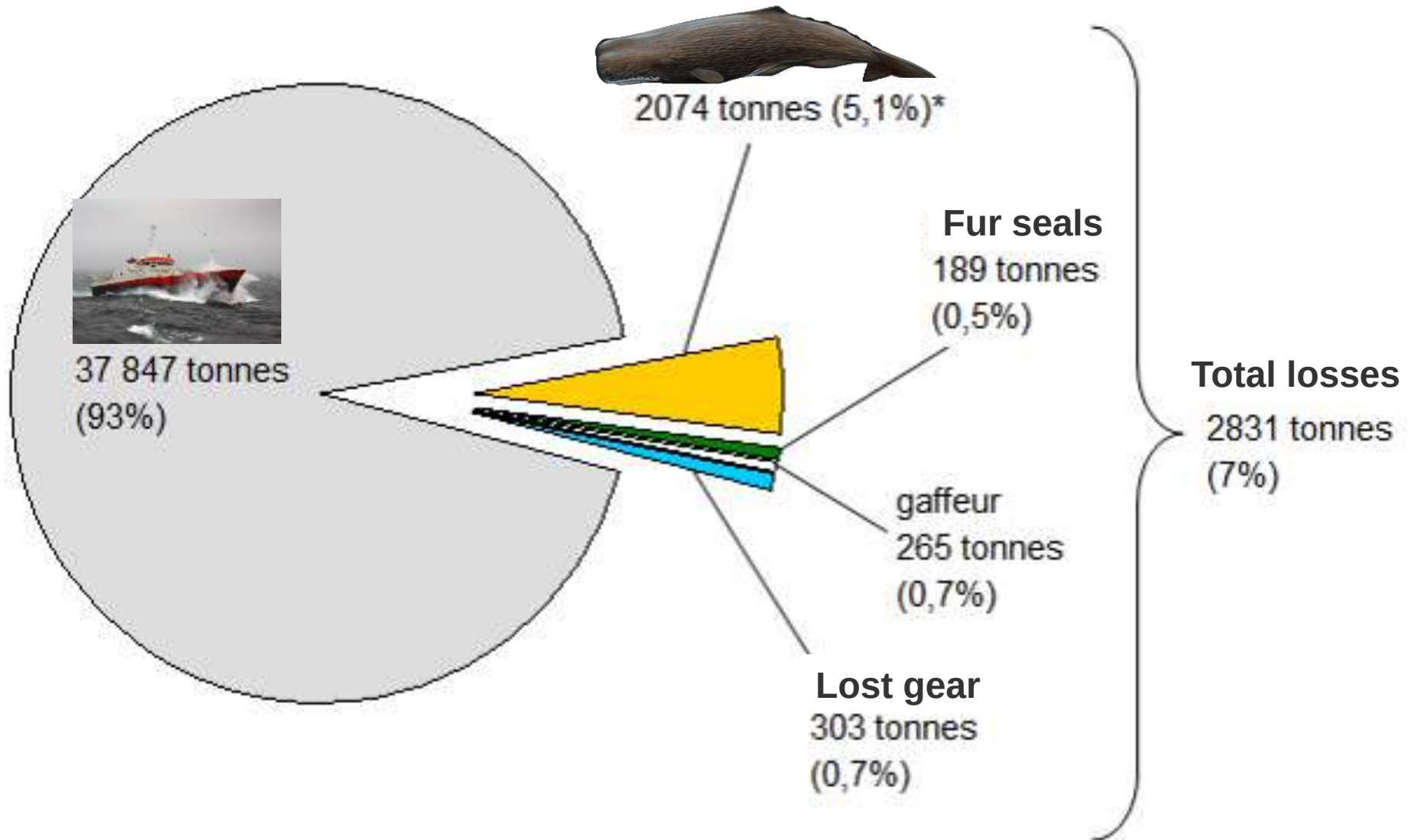
Losses estimated from the Tixier et al. (2010)
method (yield difference)



Crozet : 2003-2012



Kerguelen : 2003-2012



Depredation has large economic consequences

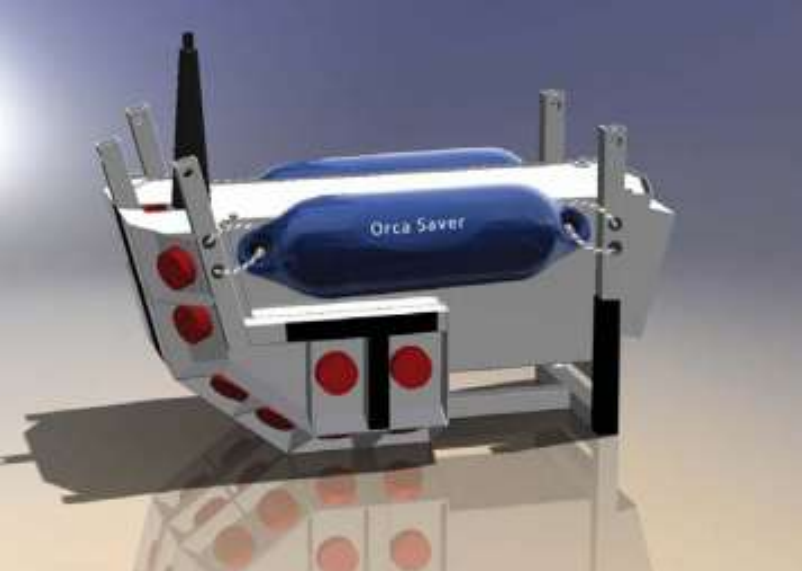
- 2003-2012: 4800 tonnes of fish lost to depredation within the french fishery
- 57.6 Millions € (5.76 M€/yr)

And possibly large ecological consequences
(Unbalancing the population of super-predators)

Tested solutions



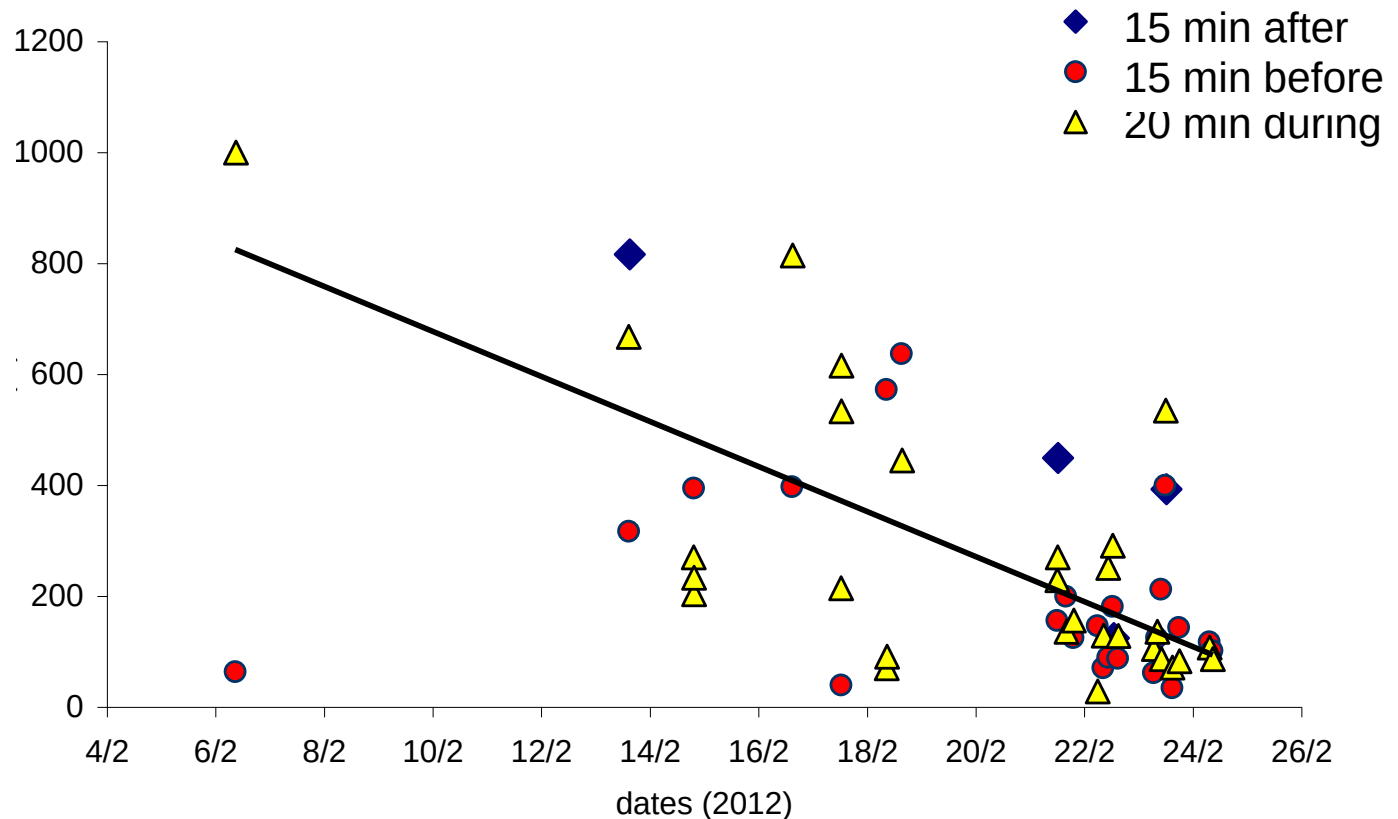
N. Gasco



ORCASAVER : 45 k€

- Acoustic power 197 db
- Frequencies 7 Hz -25 khz ?
- Random transmission of acoustic signals...

Mean
distance (m)
of killer
whales from
fishing vessel
after Orca
Saver
activation



Fish Pots



New fishing method:

pots lines → management ↗ :

- ~~depredation~~
- ~~incidental seabirds bycatch~~

- finer management:

- maximum size / trap size

- minimum size / mesh size



Joost©



MSC Eco-label

ORCASAV a dedicated research campaign to assess the use of fish traps to catch patagonian toothfish to solve the depredation issue and seabird bycatch





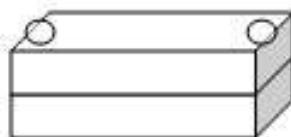
CAMPAGNE ORCASAV 2010

IMAGE N.G.

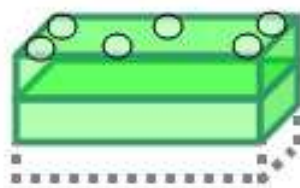
petite leader



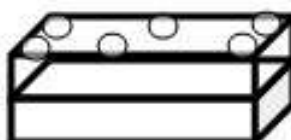
légère



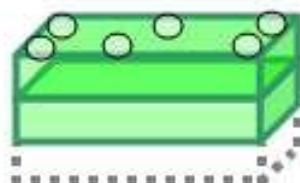
vis-à-vis



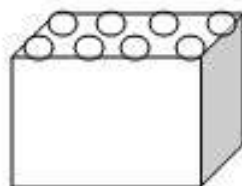
mono-goulotte



assymétrique



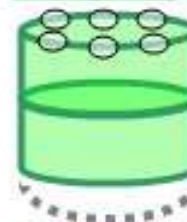
king crab



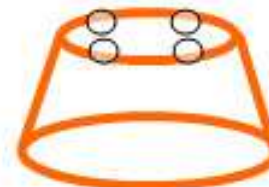
verveux



verticale



orange



grande leader



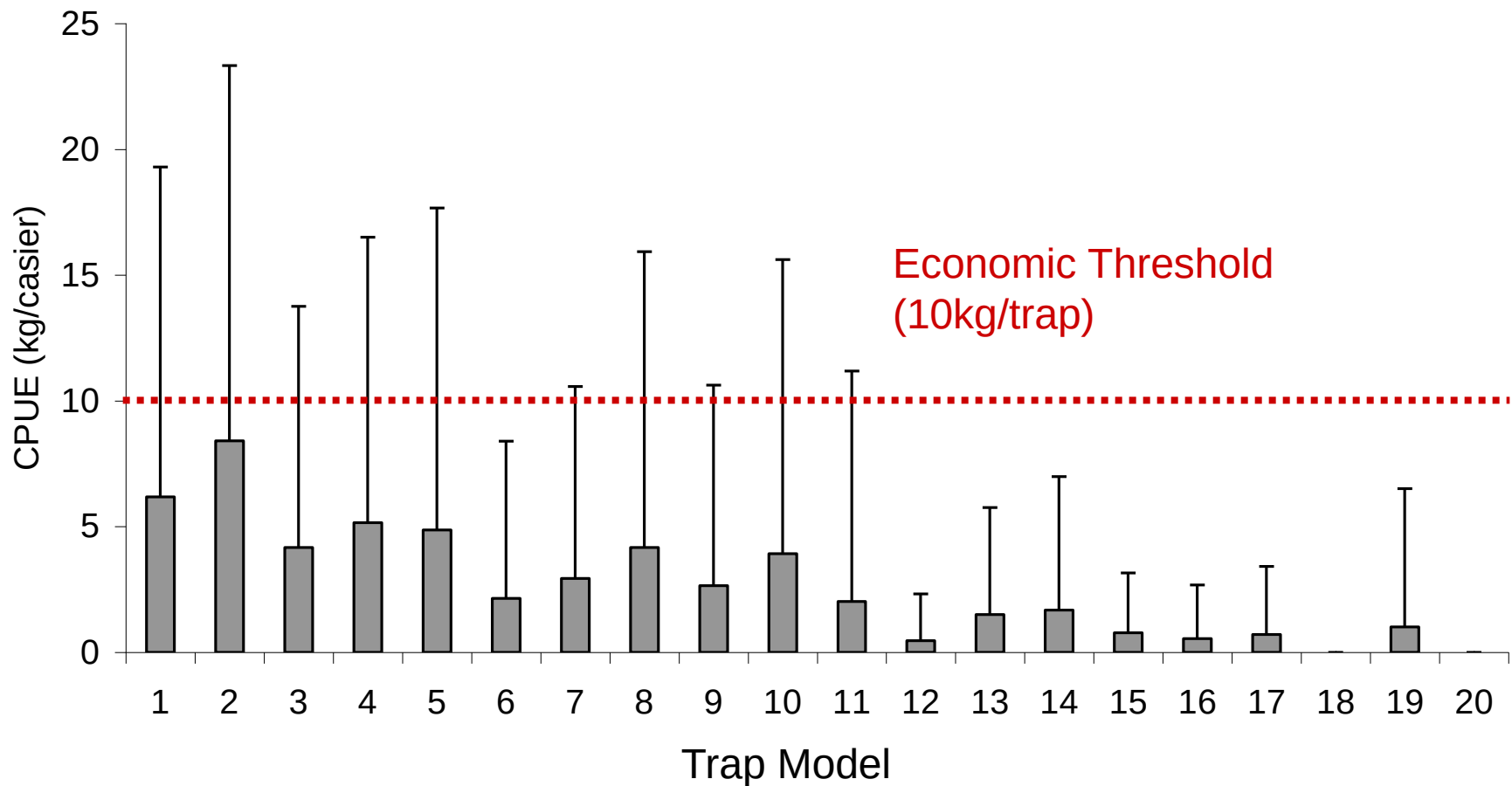
perroquet



○ : flotteur

..... : réhausseur





Demersal long line yield 153,4 kg/km versus traps 82,0 kg/km but with the possibility of much longer demersal long lines (up to 20 km) compared to pots line (max 5 km).

Bavouzet G., Morandeau F., Mouchel M., Méhault S., Duhamel G., Guinet C., Roullot J., Kinoo JP., Gasco N., Aubert JL.. (2011). Rapport de la campagne casier Orcasav : Une campagne innovante de pêche aux casiers dans la ZEE de Crozet pour lutter contre la déprédation des orques et la mortalité aviaire.



Very large crab bycatch

**Catch biased toward
large fish (i.e. females)**



Problem of available space on decks to store and handle the pots.



Working conditions and safety issues handling pots in high seas compared to the demersal longlines



Perspectives

- Protecting the fish on the line:

- At the line level

- At the hook level



SAGO (Fiskevegn)





Aknowledgements

Muséum National d'Histoire Naturelle;

TAAF;

IPEV;

Fishing companies of Reunion Is.;

Fishery observers onboard longliners

Workers of Possession I.



All photographers

AUBERT Jean Luc; BARRETT-LENNARD Lance; BEILLOEIL; BELBEYC'H Bruno; BERTHET Philippe; BERTRAND Geoffrey; BLANCHARD Pierrick; BOITEAU Christophe; BONNET Joël; BOST Charles-André; BURLE Marie-Hélène; CARCAILLET Christopher; CARDOT Gilles; CHEVRIER Claude; DE STEPHANIS Renaud; DESMARET Rolland; DESPIN Bernard; DONDELINGER Caroline; DOREMUS Ghislain; DUFRENE Rémy; FERNANDEZ Eric; FOURNIER Jean-Charles; GASCO Nicolas; GAUTHIER-CLERC Michel; GOUEDARD Yvon; GUINET Christophe; HANDRICH Yves; HANUISE Nicolas; HOARAU Eric; LANGUENOU Roger; LE CORRE Yann; LEGRAND Jérôme; LEMARCHAN Christian; LEQUETTE Benoît; LERIDON Jean; LEROUX Eric; LESCAROUX Jean-Michel; MAISON Jérôme; MANGIN Stéphane; MANILEVE Patrick; MARECHAL Pierre; MELLE Jean-Luc; MOURIES Jacques; NOORKHAN Alain; NOYAN Patrick; PAULIN Rémy; PAWLOWSKI Frédéric; PERROT Yohann; PETER Jean; RIDOUX Vincent; RINGOT Frédéric; SCHWEBEL Luc; SORIN Dominique; STENBERGER Ludovic; VERLAND Henri; VERMANDE Hugues; VILLEMIN Catherine; WEIMERSKIRCH Henri



Effort : millions of hooks

