



The impact of deep-water longline on epibenthic invertebrates

T. Morato and C. Pham



Impact of longline fishing on CWC

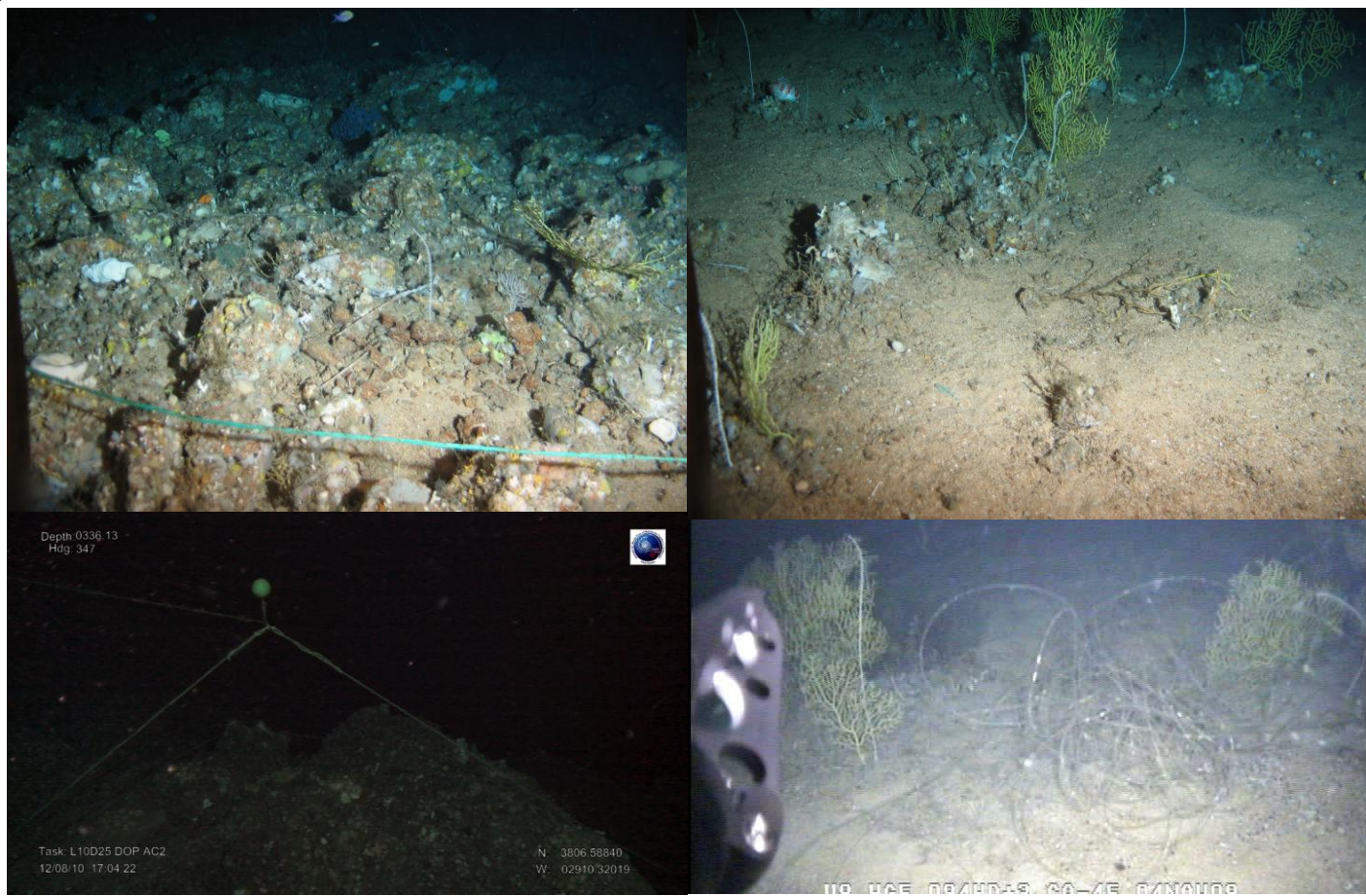
- Studies have shown bottom trawling to have significant impacts on epibenthic invertebrate communities (1-4)
- A study done on a trawled seamount in New Zealand showed that after ten years of trawling ban, the benthic communities showed no signs of recovery (6)
- Longline, although considered to have a low impact on the benthic environment, also catch epibenthic organisms such as CWC and sponges (7-9)
- Similarly to trawls (10) longlines can destroy organisms that will remain on the seafloor (11)



Impact of longline fishing on CWC

Objectives: Assess the impact of bottom longline fisheries on CWC

- Quantifying the **by-catch**
- ***in situ*** damages through video analysis





Impact of longline fishing on CWC

Study area: the Azores

Fishing takes place on seamounts with depth between 300 and 600 meters

Targets various demersal species particularly the black spot seabream (*Pagellus bogoraveo*), the wreckfish (*Polyprion americanus*), alfonsinos (*Beryx splendens* and *B. decadactylus*) and the forkbeard (*Phycis phycis*).



Impact of longline fishing on CWC

Observer data:

Bycatch data collected by observers onboard commercial vessels (389 longline sets and 550 handline sets)

Upon hauling, every organism captured was registered.

We also used data from 107 longline surveys done between 2007 and 2011

General Additive Models were used to standardize bycatch levels.



Impact of longline fishing on CWC

In situ video analysis:

Seafloor images from the seamount were obtained from ROV Luso and ROV SP

The number of all CWC present in the field of view was recorded for each video segment with the presence of a longline.

The physical state of each CWC was attributed to one of the following categories: intact, bent, minor damage, major structural damage, displaced or dead

Bycatch levels in the same area were compared to the densities estimated from video surveys done on Condor seamount



Impact of longline fishing on CWC

Assess level of by-catch of CWC in the bottom longline

Standardized mean by-catch (n / 1000 hooks)

Handline has **no impact** on sessile organisms

A typical **longline** set has very **low by-catch** of CWC; 3,000 hooks will catch 1 CWC

Adding in situ damage **bottom longline** will likely **serious impact 9-14 CWC**

Overall, **2.4%** of the impacted gorgonians were found in a **critical status**.

We estimate that for **1 tonne of fish** captured using bottom longline, **16 ± 2 benthic organisms** are caught as by-catch.

Minor damage	High	10	2.4 %
Major structural damage	Mid	73	20.1%
Displaced	Null	2	0.5 %
Dead	Null	7	1.9 %

Impact of longline fishing on CWC

Bottom trawling impact in CWC areas in Norway



Bottom longline impact in CWC areas in the Azores



- Analysis of bycatch levels on a seamount previously surveyed by ROV, showed that a longline impact **0.03% of the cold-water corals present**.
- Depending on trawl design and fishing depth, macrobenthos removal rate per tow ranges between **13.8% and 89%**, excluding the organisms damaged but not retained in the net (1-3)



P.B. Mortensen



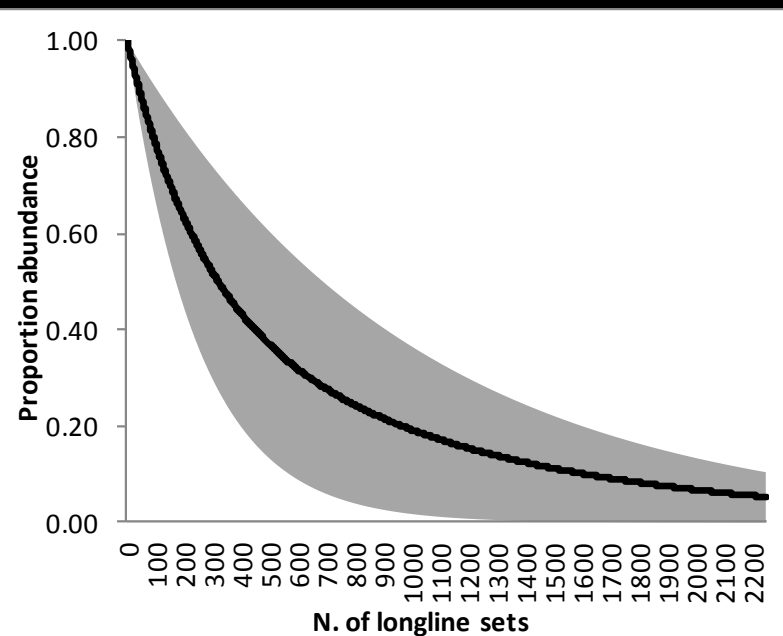
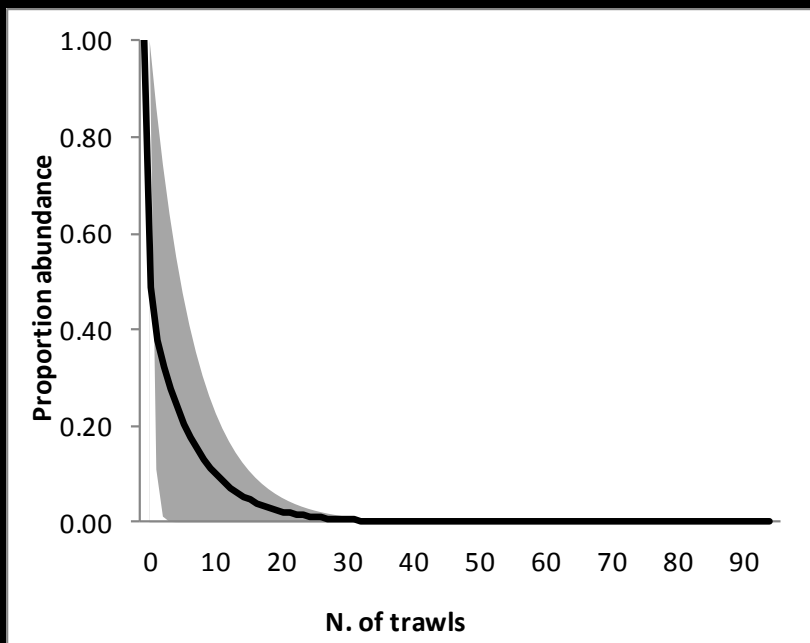
ROV U. Azores

Impact of longline fishing on CWC

Bottom trawling impact in CWC areas in Norway



Bottom longline impact in CWC areas in the Azores



P.B. Mortensen

ROV U. Azores

Impact of longline fishing on CWC

Bottom trawling impact in CWC areas in Norway



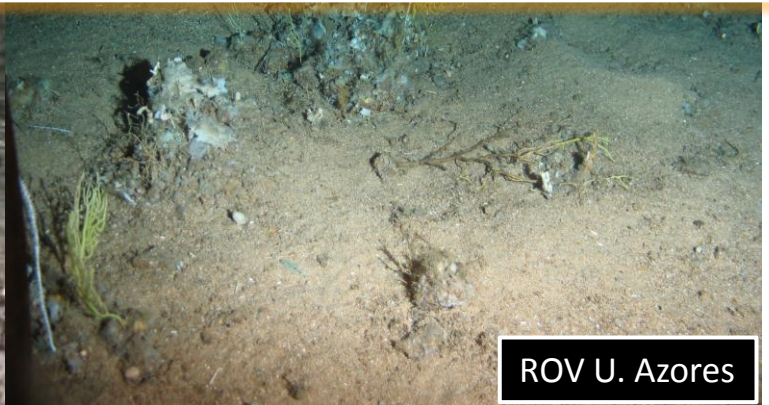
Bottom longline impact in CWC areas in the Azores



- This would imply **one trawl** towing over a site such as the Condor seamount to have a similar impact on the benthos than **346-2,226 longlines**.
- One **year of trawling** continuously in pristine habitats would have the same impact of about **535-833 years** of longlining



P.B. Mortensen



ROV U. Azores

Impact of longline fishing on CWC

Bottom trawling impact in CWC areas in

Bottom longline impact in CWC areas in

Examples from literature

One trawl towing over a distance equivalent to that of a longline can catch up to **59 kg** of cold-water corals on the Flemish cap (1).

Commercial fisheries in Norwegian waters regularly report coral bycatch of **100 kg** in one trawl (2).

Off the north-western shelf of Australia, bycatch of sponges after one hour of trawling exceeded **500kg** (3).

In the south Tasmanian Rise, a one hour tow over a pristine area caught an impressive **1,600 kg** of corals and sponges (4)

Coral mortality by trawling is bound to be higher considering these numbers fail to include epibenthic organisms destroyed but not retained in the net.

Impact of longline fishing on CWC

Leiopathes sp.



- The **oldest** continuously **living organisms** on the planet
- Place of Birth: Azores
- Year of Birth: **-1392 c.e.** (common era)
- Year of Death: + 2008 c.e.
- Age: **3400 years**



Impact of longline fishing on CWC

Deep-water sharks catch issue

Location	Fishing gear	Target spp	Depth (m)	Prop DW Sharks	Source data	Reference
Azores	Bottom Longline	Blackspot seabream	300-750	2.56%	Obsevers, commercial fishing	Pham et al., 2013
Azores	Handline	Blackspot seabream	100-500	0.02%	Obsevers, commercial fishing	Pham et al., 2013
Azores	DW Trawl	Orange roughy	850-1300	2.90%	Obsevers, commercial fishing	Melo & Menezes, 2002



Impact of longline fishing on CWC

Deep-water sharks catch issue

Location	Fishing gear	Target spp	Depth (m)	Prop DW Sharks	Source data	Reference
Azores	Bottom Longline	Blackspot seabream	300-750	2.56%	Obsevers, commercial fishing	Pham et al., 2013
Azores	Handline	Blackspot seabream	100-500	0.02%	Obsevers, commercial fishing	Pham et al., 2013
Azores	DW Trawl	Orange roughy	850-1300	2.90%	Obsevers, commercial fishing	Melo & Menezes, 2002
Azores	Drifting longline	Black sccabardfish	650-1500	14.64%	Obsevers, commercial fishing	Machete et al., 2011
Canary Islands	Drifting longline	Black sccabardfish	200-3000	35.10%	Survey	Pajuelo et al., 2010
Continental Portugal	Drifting longline	Black sccabardfish	800-1450	8.20%	Commercial fishing	Bordalo-Machado et al., 2009



Impact of longline fishing on CWC

Deep-water sharks catch issue

Location	Fishing gear	Target spp	Depth (m)	Prop DW Sharks	Source data	Reference
Azores	Bottom Longline	Blackspot seabream	300-750	2.56%	Obsevers, commercial fishing	Pham et al., 2013
Azores	Handline	Blackspot seabream	100-500	0.02%	Obsevers, commercial fishing	Pham et al., 2013
Azores	DW Trawl	Orange roughy	850-1300	2.90%	Obsevers, commercial fishing	Melo & Menezes, 2002
Azores	Drifting longline	Black sccabardfish	650-1500	14.64%	Obsevers, commercial fishing	Machete et al., 2011
Canary Islands	Drifting longline	Black sccabardfish	200-3000	35.10%	Survey	Pajuelo et al., 2010
Continental Portugal	Drifting longline	Black sccabardfish	800-1450	8.20%	Commercial fishing	Bordalo-Machado et al., 2009
South Portugal	DW Trawl	Norway lobster	200-650	784 (57.9%)	Commercial fishing (in number)	Coelho & Erzini, 2008
South Portugal	DW Longline	Wreckfish and Conger	450-780	1354 (100%)	Commercial fishing (in number)	Coelho & Erzini, 2008



Impact of longline fishing on CWC

Deep-water sharks catch issue

Location	Fishing gear	Target spp	Depth (m)	Prop DW Sharks	Source data	Reference
Azores	Bottom Longline	Blackspot seabream	300-750	2.56%	Obsevers, commercial fishing	Pham et al., 2013
Azores	Handline	Blackspot seabream	100-500	0.02%	Obsevers, commercial fishing	Pham et al., 2013
Azores	DW Trawl	Orange roughy	850-1300	2.90%	Obsevers, commercial fishing	Melo & Menezes, 2002
Azores	Drifting longline	Black sccabardfish	650-1500	14.64%	Obsevers, commercial fishing	Machete et al., 2011
Canary Islands	Drifting longline	Black sccabardfish	200-3000	35.10%	Survey	Pajuelo et al., 2010
Continental Portugal	Drifting longline	Black sccabardfish	800-1450	8.20%	Commercial fishing	Bordalo-Machado et al., 2009
South Portugal	DW Trawl	Norway lobster	200-650	784 (57.9%)	Commercial fishing (in number)	Coelho & Erzini, 2008
South Portugal	DW Longline	Wreckfish and Conger	450-780	1354 (100%)	Commercial fishing (in number)	Coelho & Erzini, 2008
Hatton Bank	DW Longline	not known	750-1500	80.40%	Survey	Durán-Muñoz, 2011
Hatton Bank	DW Trawl	not known	not known	21.12%	Commercial fishing	Piñero et al., 2001
Bay of Biscay	DW Longline	deep water fish & sharks	not known	43.17%	Commercial fishing	Piñero et al., 2001
Faeroe	DW Longline	deep water sharks	750-1480	82.49%	Survey	Vinnichenko, 2008
Reykjanes Ridge	DW Longline	deep water fish	600-960	56.31%	Survey	Vinnichenko, 2008



Impact of longline fishing on CWC

Deep-water sharks catch issue

Location	Fishing gear	Target spp	Depth (m)	Prop DW Sharks	Source data	Reference
Azores	Bottom Longline	Blackspot seabream	300-750	2.56%	Obsevers, commercial fishing	Pham et al., 2013
Azores	Handline	Blackspot seabream	100-500	0.02%	Obsevers, commercial fishing	Pham et al., 2013
Azores	DW Trawl	Orange roughy	850-1300	2.90%	Obsevers, commercial fishing	Melo & Menezes, 2002
Azores	Drifting longline	Black scabbardfish	650-1500	14.64%	Obsevers, commercial fishing	Machete et al., 2011
Canary Islands	Drifting longline	Black scabbardfish	200-3000	35.10%	Survey	Pajuelo et al., 2010
Continental Portugal	Drifting longline	Black scabbardfish	800-1450	8.20%	Commercial fishing	Bordalo-Machado et al., 2009
South Portugal	DW Trawl	Norway lobster	200-650	784 (57.9%)	Commercial fishing (in number)	Coelho & Erzini, 2008
South Portugal	DW Longline	Wreckfish and Conger	450-780	1354 (100%)	Commercial fishing (in number)	Coelho & Erzini, 2008
Hatton Bank	DW Longline	not known	750-1500	80.40%	Survey	Durán-Muñoz, 2011
Hatton Bank	DW Trawl	not known	not known	21.12%	Commercial fishing	Piñero et al., 2001
Bay of Biscay	DW Longline	deep water fish & sharks	not known	43.17%	Commercial fishing	Piñero et al., 2001
Faeroe	DW Longline	deep water sharks	750-1480	82.49%	Survey	Vinnichenko, 2008
Reykjanes Ridge	DW Longline	deep water fish	600-960	56.31%	Survey	Vinnichenko, 2008
Faraday Seamounts	DW Trawl	not known	500-1200	6.90%	Survey	Hareide and Garnes, 2001
Reykjanes Ridge (A)	DW Longline	not known	500-2000	10.10%	Survey	Hareide and Garnes, 2001
Reykjanes Ridge (B)	DW Longline	not known	500-1700	37.20%	Survey	Hareide and Garnes, 2001
Hecate Seamount	DW Longline	not known	500-1800	22.15%	Survey	Hareide and Garnes, 2001
North of the Azores	DW Longline	not known	500-1300	63.23%	Survey	Hareide and Garnes, 2001
Rockall Trough	DW Longline	not known	600-1400	58.76%	Survey	Clarke et al., 2002
Rockall Trough	DW Trawl	not known	600-1200	22.45%	Survey	Clarke et al., 2002



Impact of longline fishing on CWC

Conclusion:

Handline has no impact on benthic organisms

A typical longline set in the Azores has an expected in situ impact of 9.6-14.5 CWC

Longline impacts mostly 3-dimensional and branched colonies

Recovery potential from longer lived CWC species is small

One trawl over Condor seamount may have a similar impact on the benthos than
346-2,226 longlines

Deep-water sharks by-catch is higher in longlining when compared to trawl

But can probably be minimize

Thanks

AZORES TEAM

Alexandra Rosa, Andreia B. Henriques, António Godinho, Arquipélago Crew, Bogdan Glogovac, Christopher Pham, Diana Catarina, Eva Giacomello, Fernando Tempera, Filipe Porteiro, Frederic Vandeperre, Gui Menezes, Hugo Diogo, Hugo Parra, Íris Sampaio, João Gil Pereira, João Monteiro, João Santos, José Nuno Pereira, Marina Carreiro Silva, Paulo Martins, Pedro Ribeiro, Renato Bettencourt, Ricardo Medeiros, Ricardo Serrão Santos, Rogério Ferraz, Telmo Morato, Tiago Bento, Valentina Matos, Victor Rosa, Victor Slof

