Trialling the new Hookpod-mini, configured to open at 20 m depth, in pelagic longline fisheries off southern Brazil

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1. INTRODUCTION

Seabird bycatch in pelagic longline fisheries is a major threat for albatrosses and petrels. **(Phillips *et al*. 2016, Dias *et al*. 2019)**

Mitigation measures have been developed in recent decades

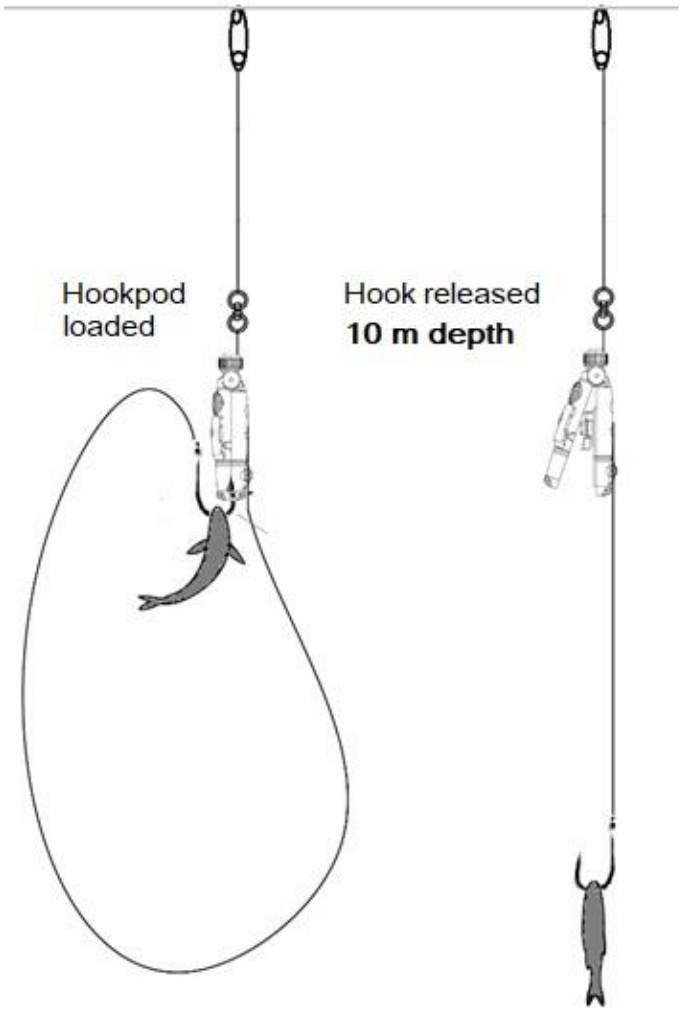
ACAP best-practice advise recommends these three mitigation measures should be used simultaneously to reduce seabird bycatch to negligible levels. **(ACAP 2021)**

Combinations of these three, among others, mitigation measures are required in major tuna RFMOs (ICCAT, WCPFC, IOTC, IATTC) and in regulations of several countries.

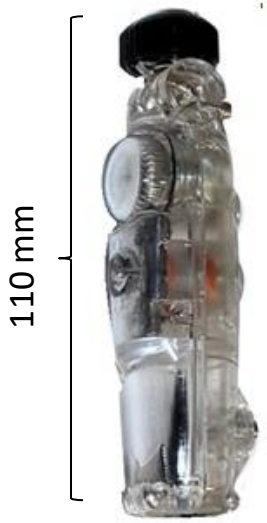
More recently, the ACAP also recommended hook-shielding devices, including the Hookpods, among the best practice measures for mitigating seabird bycatch. **(ACAP 2021)**

1. INTRODUCTION

Hookpods are an emerging seabird bycatch mitigation technology, which capsules the point and barb of hooks during line-setting.



Hookpod-LED
(65 g)



Hookpod-mini
(48 g)

At-sea trials with Hookpod-LED (Sullivan *et al*. 2017) and Hookpod-mini (Goad *et al*. 2019)

Both versions recommended by ACAP.

ACAP also recommended further research on the possibility of increasing depth protection

Objective

To evaluate, for the first time, the performance of the new Hookpod-mini, configured to release the hook at 20 m depth.

We conducted trials in vessels of the southern Brazil pelagic longline fleet.

To evaluate the effects of the Hookpod-mini, compared to conventional gear on:

- Seabird bycatch
- Turtle bycatch
- Target species catches

To evaluate Hookpods replacement rate due to losses, damage or malfunctioning.

2.1. At-sea monitoring

Seven trips (July 2018 - November 2019) of Brazilian pelagic longline vessels monitored by Projeto Albatroz and Albatross Task Force on-board observers.

72 sets and 81,989 hooks
- 45,289 (55%) Hookpod-mini
- 36,700 (45%) conventional gear (75 g swivel)

Hookpod-min or weighted swivels attached at 3.5 m from the hook

No bird-scaringlines used

Information obtained set by set by:

- Geographic position
- Date
- Setting start and end times,
- Sea surface temperature (SST),
- Bottom depth
- Fishing effort (number of hooks)
- Seabird bycatch
- Turtle bycatch
- Target species catches

Hookpod lost, damaged or malfunctioning

2.2. Data analysis

Data was grouped according to season (Spring/Summer or Autumn/Winter)

Captures expressed as nominal bycatch rates of seabirds (BPUE = birds/1000 hooks) and turtles (TPUE = turtles/1000 hooks), and catch rates of target species (CPUE = fish/1000 hooks).

Catches were split into four groups: Tunas (*Tunnus* spp.), Swordfish (*Xiphias gladius*), Sharks and 'Others' (miscellaneous fish).

Generalized linear models (GLM) were applied to check the effect of gear type (Hookpod vs conventional gear) on turtle bycatch and catches of target species.

- Negative binomial distributions,
- Response variable = number of fish or turtle caught.
- Explanatory variables = gear type, season, SST and bottom depth.
- Effort (number of hooks) as log link offset.

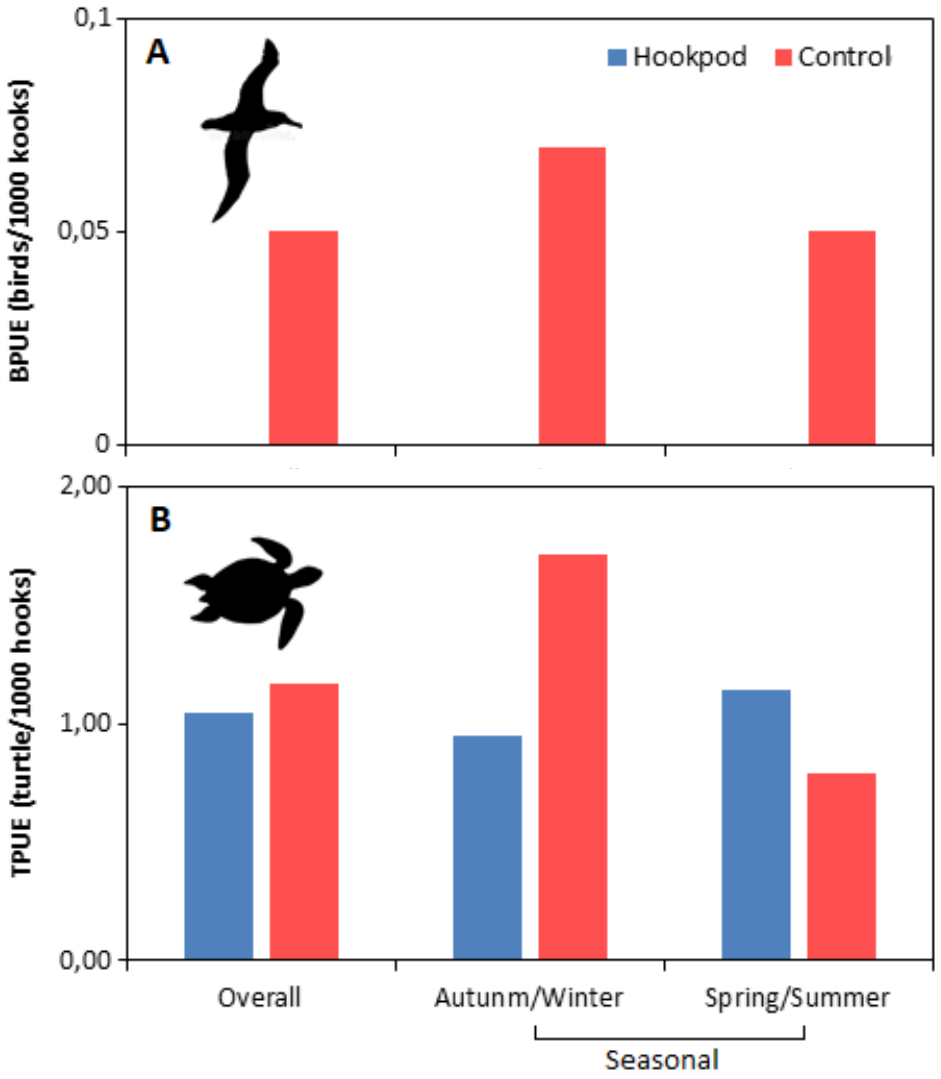
3.1. Seabird and turtle bycatch

Seabirds
Two birds (black-browed albatrosses) on the conventional gear (BPUE=0.05) and none on the Hookpod gear.

Turtles
Total of 90 turtles, 70 loggerhead (78%) and 20 leatherback (22%).

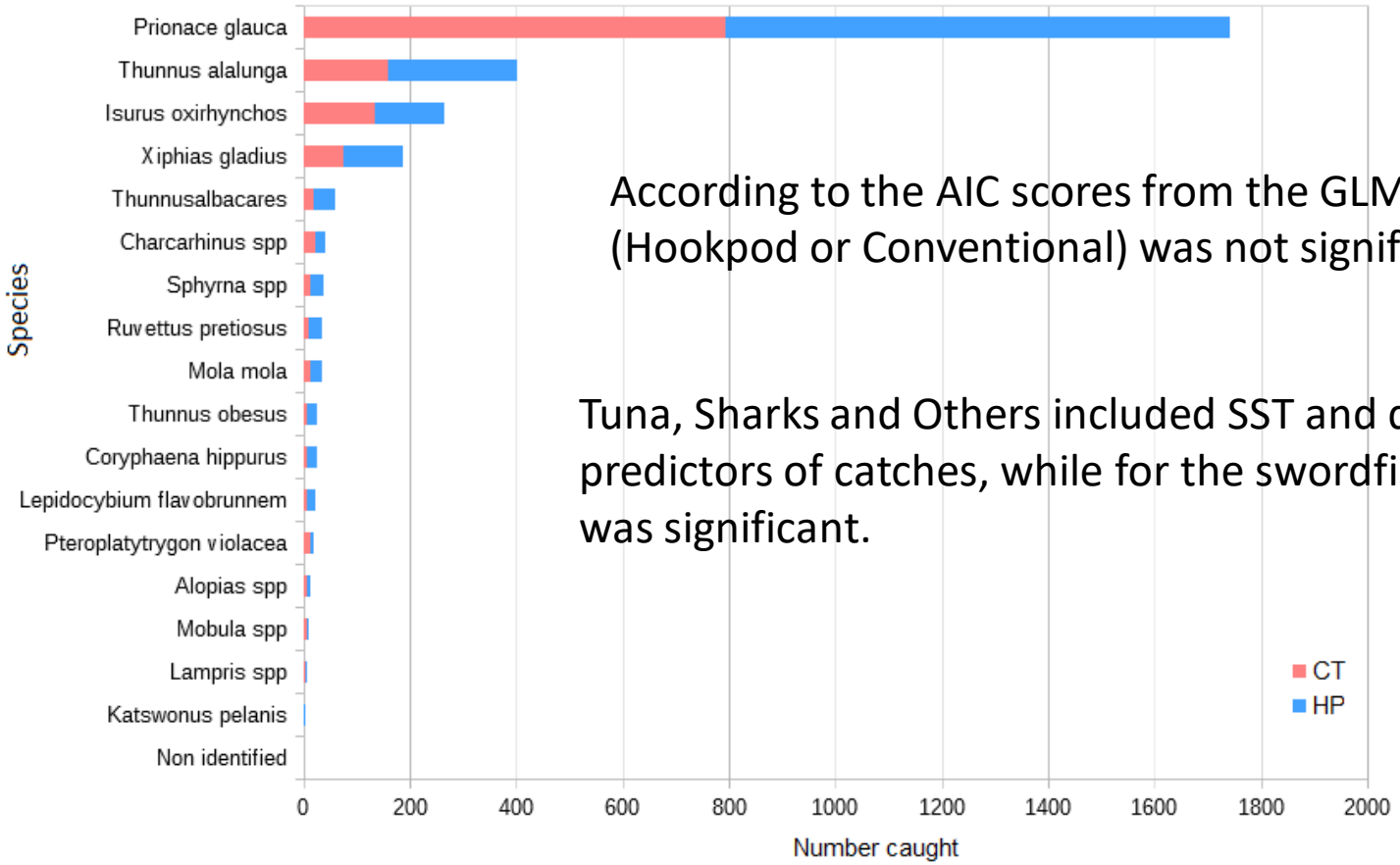
47 on Hookpod (TPUE = 1.04) and 43 on conventional gear (TPUE = 1.17),with contrasting effects between seasons.

According to the AIC scores from the GLM models, the Hookpod effect on turtle bycatch was not significant



3.2. Target species catches

- 2,935 individuals of target and non-target teleost and elasmobranch
- Blue shark (59%), albacore (14%), mako shark (9%) and swordfish (6%): 89% of total



According to the AIC scores from the GLMs, gear type (Hookpod or Conventional) was not significantly influential.

Tuna, Sharks and Others included SST and depth as predictors of catches, while for the swordfish only depth was significant.

Figure 2. Total catches (number of individuals, X axis) for each teleost and elasmobranch species (Y axis) caught on Hookpod (HP) or control (CT) gear.

3.3. Replacement rate

Hookpod replacement rate due to damaged, malfunctioning, missing from branchlines or losses with entire sections of the longline was **1.34% of the total 45,289 deployments**.

Fate	Number	% of total Hookpods used (n=1,580 pods)	% of total total deployments (n=45,289 hooks)
Broken	37	2.34	0.08
Don't oppening	137	8.67	0.30
Don't closing	29	1.84	0.06
Missing from gear	22	1.39	0.05
Lost with gear	380	24.05	0.84
Total	605	38.29	1.34
Total without lost gear	225	14.24	0.50

Without considering the Hookpods lost with the fishing gear, the replacement rate was 0.50%.

4. DISCUSSION

- Zero seabird bycatch supports previous studies on the Hookpod effectiveness **(Sullivan et al. 2017, Goat et al. 2019)**
- Relatively low bycatch in conventional gear due to night setting and line weithing.
- No significant effect of Hookpod on turtle bycatch or target species catches. **(Sullivan et al. 2017, Goat et al. 2019)**
- Replacement rate similar to previous evaluations **(Sullivan et al. 2017, Goat et al. 2019)**
- Both Hookpod versions were reviewed against ACAP best-practice criteria and are currently recommended by ACAP, WCFPC and NZL regulations.

5. RECOMMENDATIONS

- That the Working Group on Bycatch considers adding the Hookpod, both Hookpod-LED and Hookpod-mini, to the seabird bycatch mitigation measures recommended in Resolution C-11-02.

- That the Working Group on Bycatch encourages further research on the performance and feasibility of Hookpods by CPCs, which shall submit to the IATTC any information derived from such efforts.

5. ACKNOWLEDGEMENTS