LOL 2023-X MMO Monitoring Program Report

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LOL 2023-X

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Participating/Contributing Scientific Staff

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Acknowledgements

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Previous related reports:

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Iriarte, V. (2022). LOL 2022-C MMO Monitoring Report. Fisheries Department, Directorate of Natural Resources, Falkland Islands Government, Stanley, Falkland Islands. 19 pp.

Iriarte, V. (2022). LOL 2021-X MMO Monitoring Report. Fisheries Department, Directorate of Natural Resources, Falkland Islands Government, Stanley, Falkland Islands. 19 pp.

Iriarte, V. (2021). LOL 2021-C MMO Monitoring Report. Fisheries Department, Directorate of Natural Resources, Falkland Islands Government, Stanley, Falkland Islands. 19pp.

Iriarte, V. (2020). LOL 2020-X MMO Monitoring Report. Fisheries Department, Directorate of Natural Resources, Falkland Islands Government, Stanley, Falkland Islands. 22 pp.

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Iriarte V., Arkhipkin A., Blake D. (2020). Implementation of exclusion devices to mitigate seal (*Arctocephalus australis*, *Otaria flavescens*) incidental mortalities during bottom-trawling in the Falkland Islands (Southwest Atlantic). Fish. Res. 227. https://doi.org/10.1016/j.fishres.2020.105537

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1. Introduction

This report presents the data regarding seabird and marine mammal interactions with the Patagonian longfin squid (*Doryteuthis gahi*, hereafter LOL) fishery, collected by the marine mammal observers (MMO) during the 2023-X season. For a description of the MMO Monitoring Program, MMO duties and sampling protocols, see report 2022-C.

The LOL 2023-X season started on 30 July 2023, with the 16 vessels with an MMO aboard and using a trawl fitted with a SED. The 16 MMOs were supplied by MRAG (UK) and as part of a general training provided by the Falkland Islands Fisheries Department (FIFD), were briefed on seabird and marine mammal data collection by Félix Morales (Senior MRAG Observer).

2. Results

2.1 *Manoeuvre monitoring*

A total of 1,246 trawls were reported, of which 1,237 shoots (99.2%) and 1,238 hauls (99%) were monitored. Of the total shoots, 823 (66%) were monitored from the gantry, 398 (32%) from the bridge/bridge wings, and 16 from the stern deck/other (1%), while 9 (1%) were not monitored (Fig.1). Regarding the hauls, 863 (69%) were monitored from the gantry, 357 (29%) from the bridge/bridge wings, and 18 (1%) from the stern deck/other, while 12 (1%) were not monitored (Fig.1).

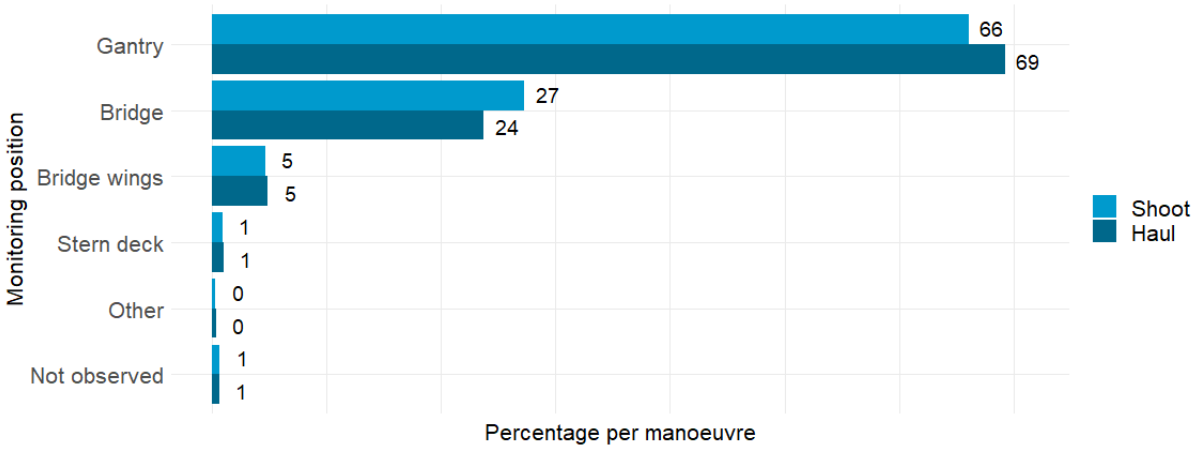

Fig.1. MMO observation effort.

Seventy percent of the fishing effort took place south of 52° S and 30% north (Fig.2). XVAK was the most visited grid square (375 shoots; 385 hauls), followed by XVAL (245 shoots; 226 hauls), XUAL (132 shoots; 115 hauls), XPAP (85 shoots; 86 hauls) and XNAQ (75 shoots; 70 hauls) (Fig.3).

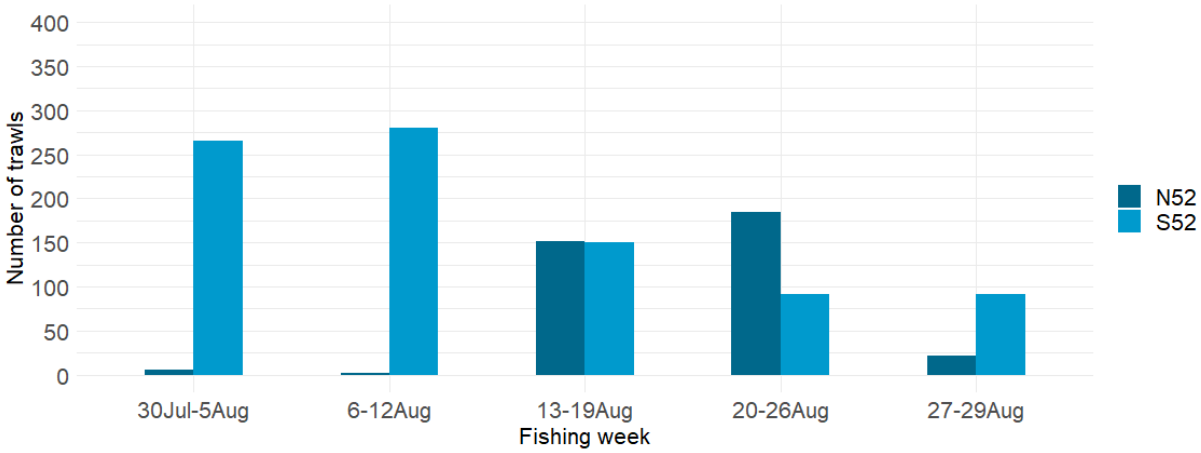

Fig.2. Fishing effort north and south of parallel 52º S.

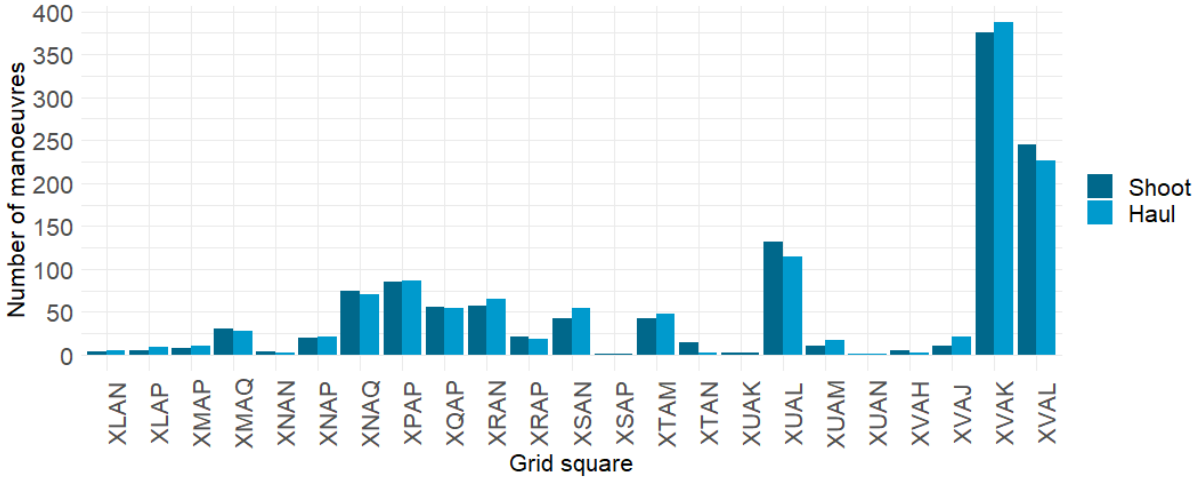

Fig.3. Fishing effort per grid square.

2.2 Pinniped sightings

A total of 3,156 seals [3,008 South American fur seals (*Arctocephalus australis*, hereafter ARA), 105 South American sea lions (*Otaria flavescens*, hereafter OTB), 43 unknown species (UN)] were seen attending vessels. Eighty-eight percent of the interactions were recorded south of 52º S (Table 1), particularly in grid squares XVAL (38%), XVAK (20%), XUAL (19%) (Fig.4), with ARA representing 95% of the sightings in the whole fishing area (Table 1).

Although the grid squares with the highest pinniped occurrence were similar to X seasons 2021 and 2022, in comparison to the latter pinniped abundance at the beginning of the season reduced by 57%, which is surprising as most of the fishing effort during the first week did occur south of 52º S (Fig.2). The overall pinniped attendance to vessels reached a peak during week 2 (6-12 Aug) and consequently reduced throughout the season (Fig.5).

Table 1. Pinniped interactions per region.

Region	Species	N° sighted	SED escapes	Deck releases	Mortalities
North 52° S	OTB	73	1	0	0
	ARA	296	2	0	0
	UN	14	0	0	0
Sub-total north		383	3	0	0
South 52° S	OTB	32	0	0	1*
	ARA	2712	15	4	7*
	UN	29	0	0	0
Sub-total south		2773	15	4	8
TOTAL		**3156**	**18**	**4**	**8***

**Includes carcass in advance stage of decomposition.*

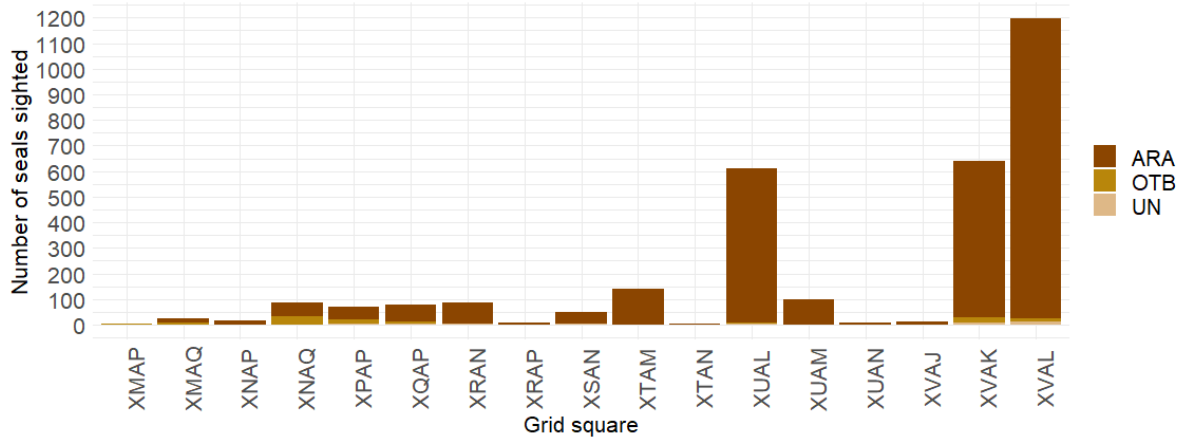

Fig.4. Pinniped sightings per grid square.

2.2.1 Pinniped attendance to vessels and behaviour

Of the 3,156 seals sighted, 1,952 (1,843 ARA, 75 OTB, 34 UN) were observed during hauling, comprising 62% of the individuals recorded. The remaining individuals (1,204) were seen during shooting (15%), trawling (11 %), turning (8%) and steaming (3%). In 85% of the hauling attendance, seal behaviour was strictly related to foraging, with both ARA and OTB directly targeting lost catch around the fishing gear (51%), eating from the net (11%) and eating from the net and climbing on the net (22%) (Fig.6). In the remaining vessel manoeuvres, the most common pinniped behaviour was to follow the vessel (59%), swim astern (16%) and forage around the net (12%) (Fig.7).

2.3 *Pinniped bycatch*

A total of 30 seals were bycaught, of which 18 were seen escaping through the SED during hauling (17 ARA, 1 OTB), four ARA were safely released from deck, six individuals (5 ARA,

1 OTB) were incidentally killed, while two unmarked ARA carcasses in advance stage of decomposition were recorded in the first fishing week (Table 2, Fig.8). Eighty-seven percent of the pinnipeds were caught south of 52° S, being the two most important grid squares XVAK (40%) and XVAL (27%) (Fig.8).

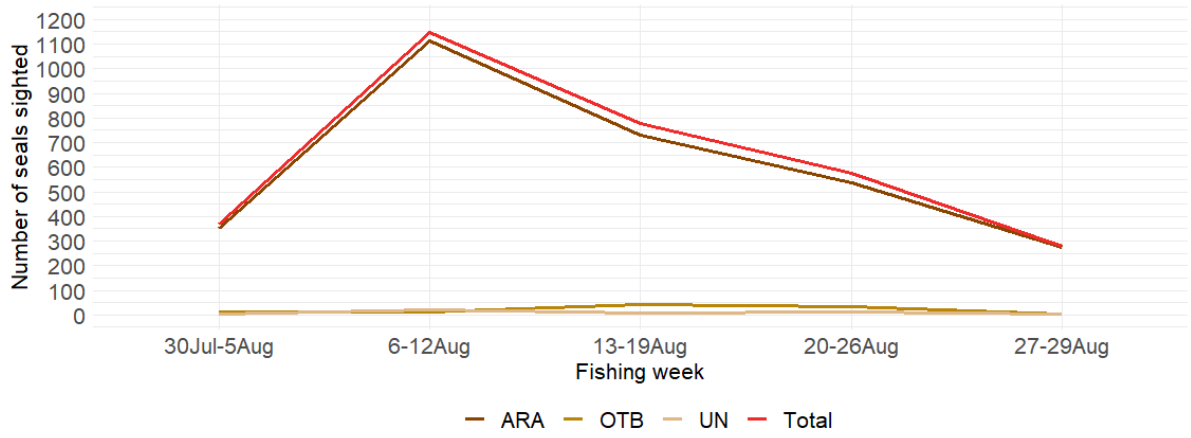

Fig.5. Cumulative pinniped sightings per fishing week.

2.3.1 *Incidental mortalities*

The cause of mortality of three of the ARA was drowning, while another individual was presumably killed by a propeller. The cause of mortality of the remaining seals is unknown, as data collected by the observers were scarce.

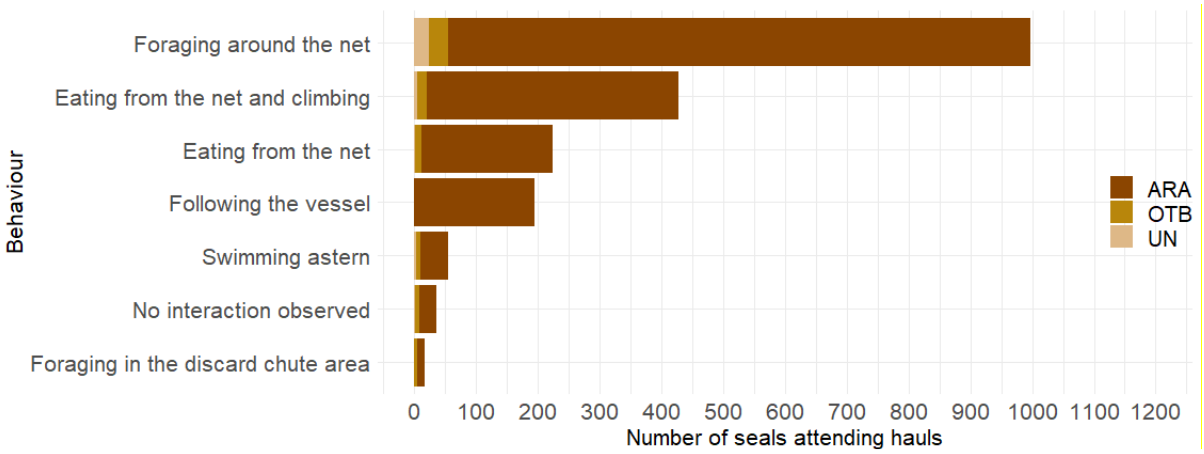

Fig.6. Pinniped abundance and behaviour exhibited during hauls.

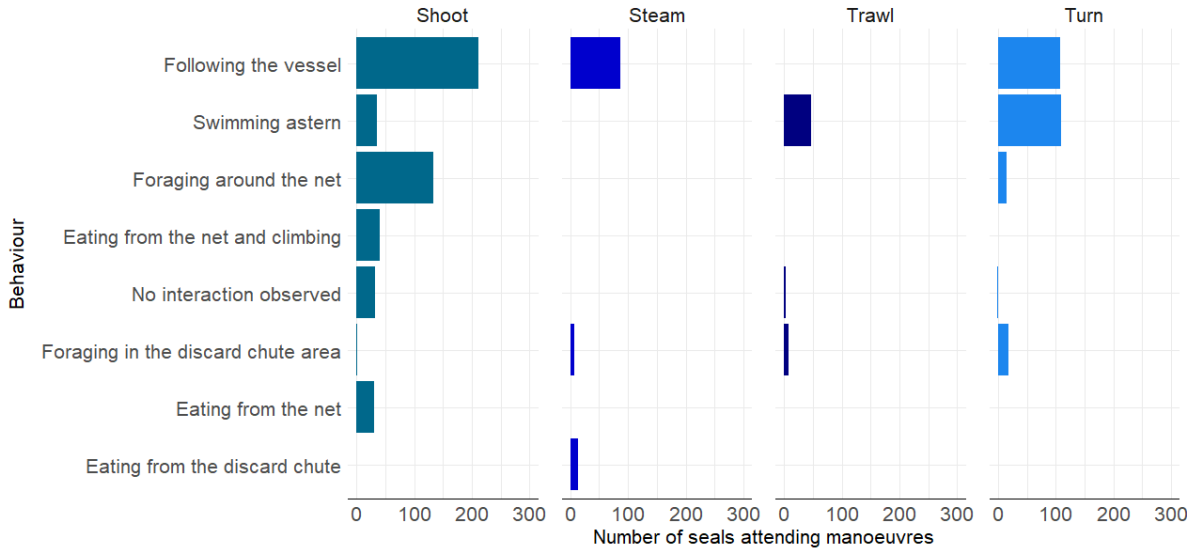

Fig.7. Pinniped abundance and behaviour exhibited during manoeuvres.

Table 2. Pinniped incidental mortalities

Date	SED	Grid	Beauf.	Trawl (min)	#Turns	Spp.	#Mort.	Cause mort.	Comments
02/08/23	B	XVAK	5	650	1	ARA	1	UN	ASD; AM
05/08/23	B	XVAK	7	345	1	ARA	1	UN	ASD; AM
08/08/21	B	XVAL	2	483	2	OTB	1	UN	UC; AM
10/08/23	B	XVAL	2	585	2	ARA	1	D	FC; AM
15/08/23	B	XUAN	3	335	0	ARA	1	D	FC; AF
15/08/23	B	XUAN	3	335	0	ARA	1	P	UC; AM
16/08/23	B	XVAK	8	415	0	ARA	1	D	FC; JM
21/08/23	B	XVAL	3	385	1	ARA	1	UN	UC; AM

AF=adult female; AM=adult male; ASD=advanced stage of decomposition; D=drowned; FC=fresh carcass; JM=juvenile male; P=propeller; UC=unmarked carcass; SED model as described in Iriarte et al (2020).

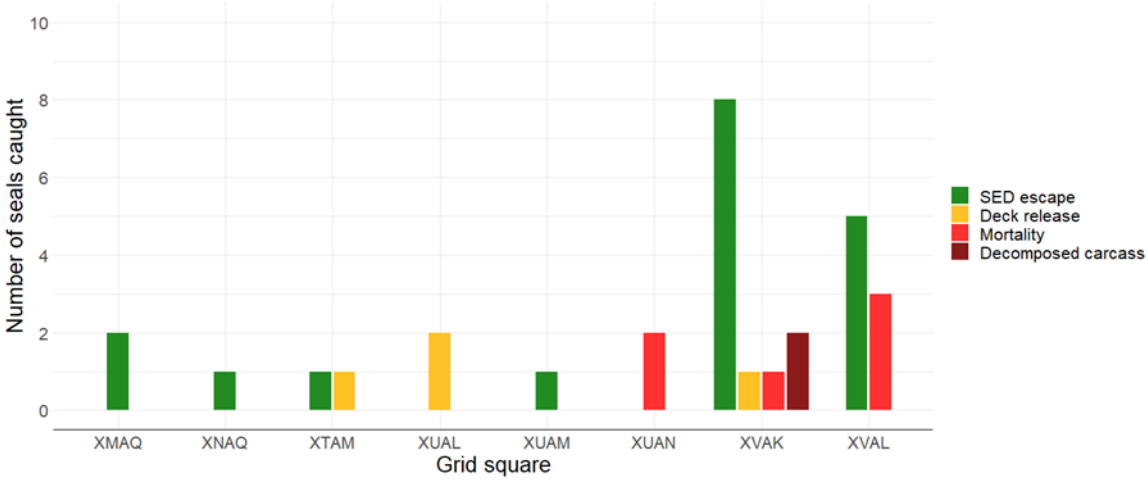

Fig.8. Pinniped bycatch per grid square.

2.3.2 *SED escapes and live deck releases*

During hauling 17 ARA and one OTB were seen escaping from the trawl through the SED hatch (cover photo). The number of individuals that escaped when the SED was below the surface during both shooting and hauling remains unknown.

Regarding deck releases, 3 ARA were brought aboard inside the SED net extension, while one came on top of the net. Two individuals were safely released from the deck after cutting the net, while in the other event it is unknown how the individual was released.

2.4 *Seabird bycatch*

Seabird interactions involved two ACAP species: the black-browed albatross (*Thalassarche melanophris*, hereafter DIM) and the giant petrel (*Macronectes spp*., hereafter MAX).

A total of six seabird interactions were recorded throughout the season, of which five (80%) comprised DIM net entanglements and one (20%) MAX deck landing (Fig. 9. Table 3). The outcome of these interactions was two (33%) live releases, one (17%) live escape, and three (50%) mortalities (Fig. 9, Table 3). It is interesting to notice that upon arrival onto deck the MAX looked dizzy, but recovered after vomiting a plastic bag and squid.

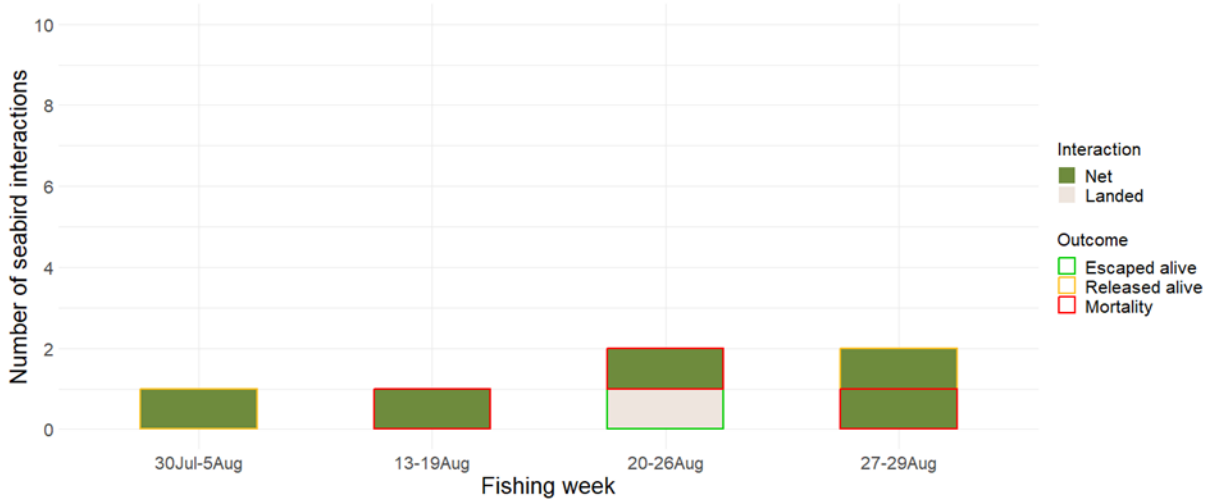

Fig.9. Number, type, and outcome of seabird interactions recorded per fishing week.

Sixty-seven percent of the entanglements occurred in the net wings/mouth of the trawl south of 52º S (Table 3). Neither net plans with details on the commercial name of the twine nor exact location of the entanglement were provided by the observers.

Table 3. Seabird interactions

Date	Grid	Manoeuvre	Spp	Interaction	Location	Mesh (mm)	Material	Outcome
31/07/23	XVAK	Haul	DIM	Net	Codend	120	UN	Released alive
13/08/23	XVAL	Shoot	DIM	Net	Wings	400	UN	Mortality
20/08/23	XQAP	Trawl	MAX	Landed	Deck	NA	NA	Escaped alive
25/08/23	XMAQ	Shoot	DIM	Net	Mouth	160	Golden	Mortality
28/08/23	XVAL	Haul	DIM	Net	Wings	UN	UN	Released alive
29/08/23	XVAK	Shoot	DIM	Net	Wings	400	UN	Mortality

3. Conclusions

3.1 In comparison to season 2022-X, attendance of pinnipeds to the vessels at the beginning of the season reduced by 57%, increased and reached a peak during the second fishing week, and after that continuously fell until the end of the season.

3.2 In comparison to season 2022-X, seabird interactions diminished by 87%; the early closure of the fishery prevented its overlap with the arrival of breeding albatrosses to Beauchêne Island in mid-September/early October.

3.3 Similar to previous seasons, most of the pinniped and seabird interactions took place south of 52° S, specifically around Beauchêne Island (grid squares XVAK, XVAL), where megafauna concentrations are prevalent and also where fishing effort is usually higher.

3.4 It is crucial to make sure the observers follow the instructions from the FIFD's Manual and provide details on every bycatch event, including photographs and/or video footage. In addition, for every seabird net entanglement it must be ensured observers provide a schematic trawl diagram, location of the seabird entanglement in the trawl, mesh size, commercial name of the material, and diameter of the thread.