

LOL 2022-X MMO Monitoring Program Report



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LOL 2022-X

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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.

Iriarte, V. (2020). LOL 2020-C MMO Monitoring Report. Fisheries Department, Directorate of Natural Resources, Falkland Islands Government, Stanley, Falkland Islands. 20 pp.

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1. Introduction

The Marine Mammal Observer Program in the Patagonian longfin squid (*Doryteuthis gahi*) fishery is funded by the Falkland Islands Government (FIG), and it is managed by FIFD's Fishery Manager. In addition to vessel compliance monitoring, MMO record pinniped [i.e. South American sea lion (*Otaria flavescens*, hereafter OTB) and South American fur seal (*Arctocephalus australis*, hereafter ARA),] abundance, behaviour, net interactions, live deck releases, live SED escapes and incidental mortalities in at least three trawls per day. Regarding seabirds, MMO monitor bird scaring lines (BSL) efficiency, record seabird interactions with the fishing gear, mortalities, and carry out seabird carcass collection. In addition, MMO do observations of the discard management plan aboard and monitor its functioning.

The LOL 2022-X season started on 28 July 2022, with the 16 vessels with an MMO aboard and using a trawl fitted with a SED. The 16 MMOs were supplied by MRAG (U.K) and were briefed at the Falkland Islands Fisheries Department (FIFD) by the Fishery Manager and the Bycatch Mitigation officer.

2. Objectives

The objective of this report is to present all the data collected during the 2022-X season regarding marine mammal and seabird interactions with the LOL fleet. Information includes data collected by the MMO and collated by the Bycatch Mitigation Officer.

3. Methods

3.1 *Manoeuvre monitoring*

For a comprehensive description of MMO monitoring, see MMO report LOL 2022-C (Iriarte, 2022a).

3.2 *Bird scaring lines monitoring*

For a comprehensive description of MMO monitoring, see MMO report LOL 2022-C (Iriarte, 2022a).

3.3 *Seabird and marine mammal bycatch mitigation measures*

As overall compliance to good practices is a key factor to protected species bycatch mitigation efficiency, good practices (see Iriarte, 2022a) aboard are also monitored by the MMO and reported to FishOps.

3.4 *Mortalities & necropsies*

Pinniped mortalities are immediately reported to FishOps; carcasses should be marked (partially cut/complete removal of the left pectoral fin) before dumping them overboard.

In the case of seabirds, all carcasses recovered should be preserved frozen for posterior necropsy. Collected individuals are then aged following Prince and Rodwell (1994).

3.5 *Data reporting*

Data collected by the observers is received by FIFD's Data Manager and then managed by the Fisheries Data Analyst.

4. Results

4.1 *Manoeuvre monitoring*

A total of 2,789 trawls were reported, of which 2,780 (99.7%) were monitored in at least one manoeuvre (i.e. either a shoot or haul). Of a total of 2,773 shoots observed, 2,268 (81.7%) were monitored from the gantry, 358 (16.8%) from the bridge/bridge wings, and 41 from the stern/upper deck (1.47%) (Fig.1). Regarding the 2,786 hauls observed, 2,386 (85.6%) were monitored from the gantry, 358 (12.8%) from the bridge/bridge wings, and 42 (1.5%) from the stern/upper deck (Fig.1).

Fifty-seven percent of the fishing effort took place south of 52° S and 43% north (Fig.2). XVAK was the most visited grid square (412 shoots; 409 hauls), followed by XVAJ (417 shoots; 391 hauls), XVAL (280 shoots; 271 hauls), XPAP (189 shoots; 173 hauls), and XMAP (168 shoots; 155 hauls) (Fig.3).

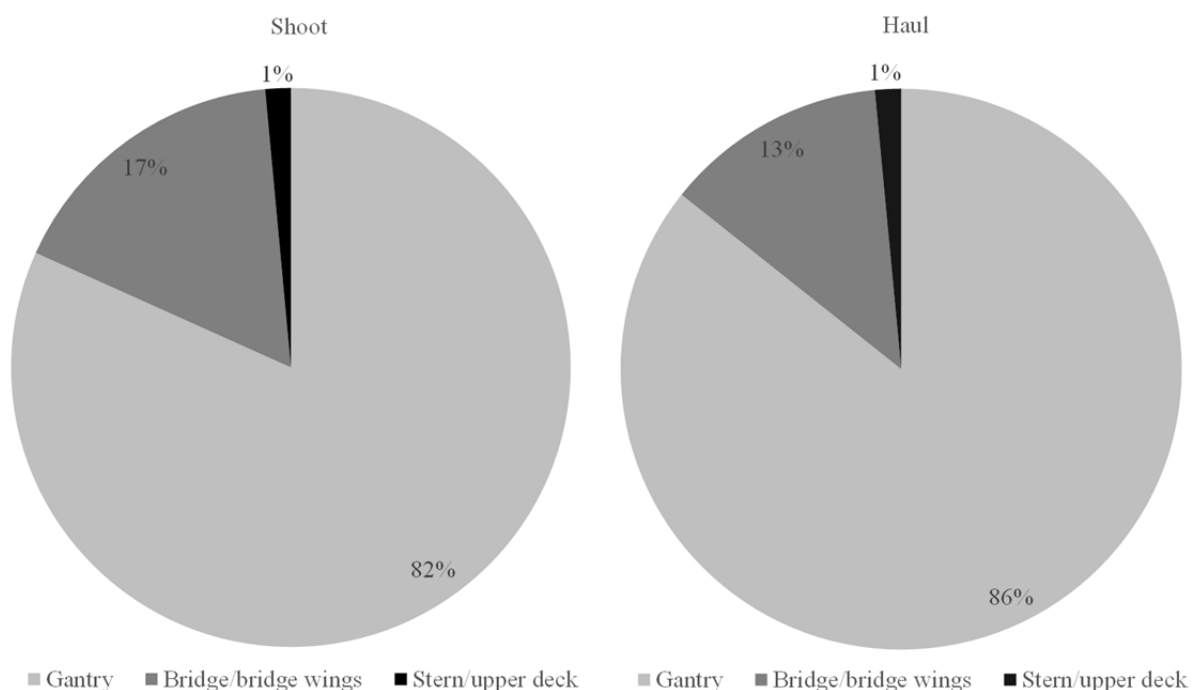


Fig.1. MMO position in manoeuvres.

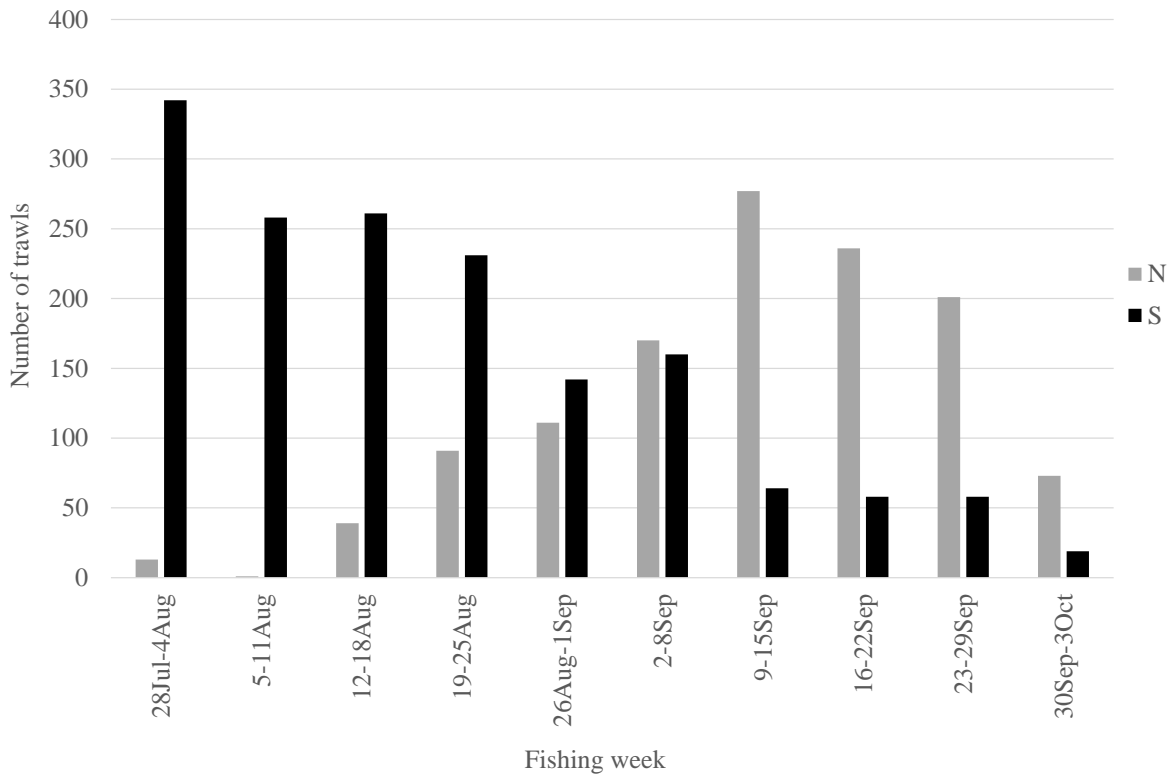


Fig.2. Fishing effort north and south of 52°S.

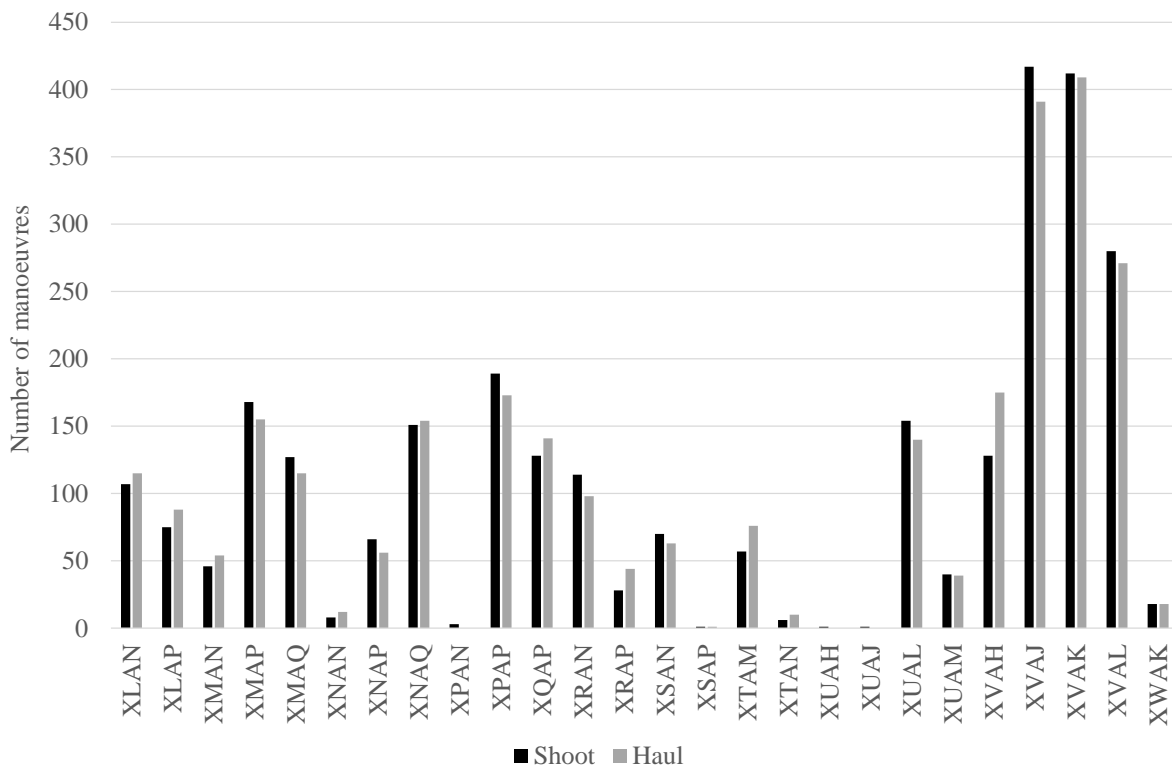


Fig.3. Fishing effort per grid square.

4.2 Pinniped sightings

A total of 10,136 seals [9280 ARA, 450 OTB, 406 unknown species (UN)] were seen attending vessels. Eighty-seven percent of the interactions were recorded south of 52°S (Table 1), particularly in grid squares XVAL (26.2%), XVAK (22.2%), XUAL (10.9%) and XVAJ (10.3%) (Fig.4), with ARA representing 94% of the sightings (Table 1).

Although pinniped attendance to vessels during the first fishing week (28 Jul-4 Aug) was high, during the second week (5-11 Aug) dropped as a result of a combination of bad weather and a reduced fishing effort (Fig 5). Seal attendance reached a peak on the fourth week (19-25 Aug), continuously reducing in the remaining weeks (Fig.5) while fishing effort concentrated north of 52°S (Fig.2).

Table 1. Pinniped interactions per region.

Region	Species	N° sighted	SED escapes	Deck releases	Mortalities	Total
North 52° S	OTB	273	1	0	0	274
	ARA	955	10	0	0	965
	UN	62	0	0	0	62
Sub-total north						1301
South 52° S	OTB	174	1	0	2	177
	ARA	8245	43	6	20	8314
	UN	343	1	0	0	344
Sub-total south						8835
TOTAL		10052	56	6	22	10136

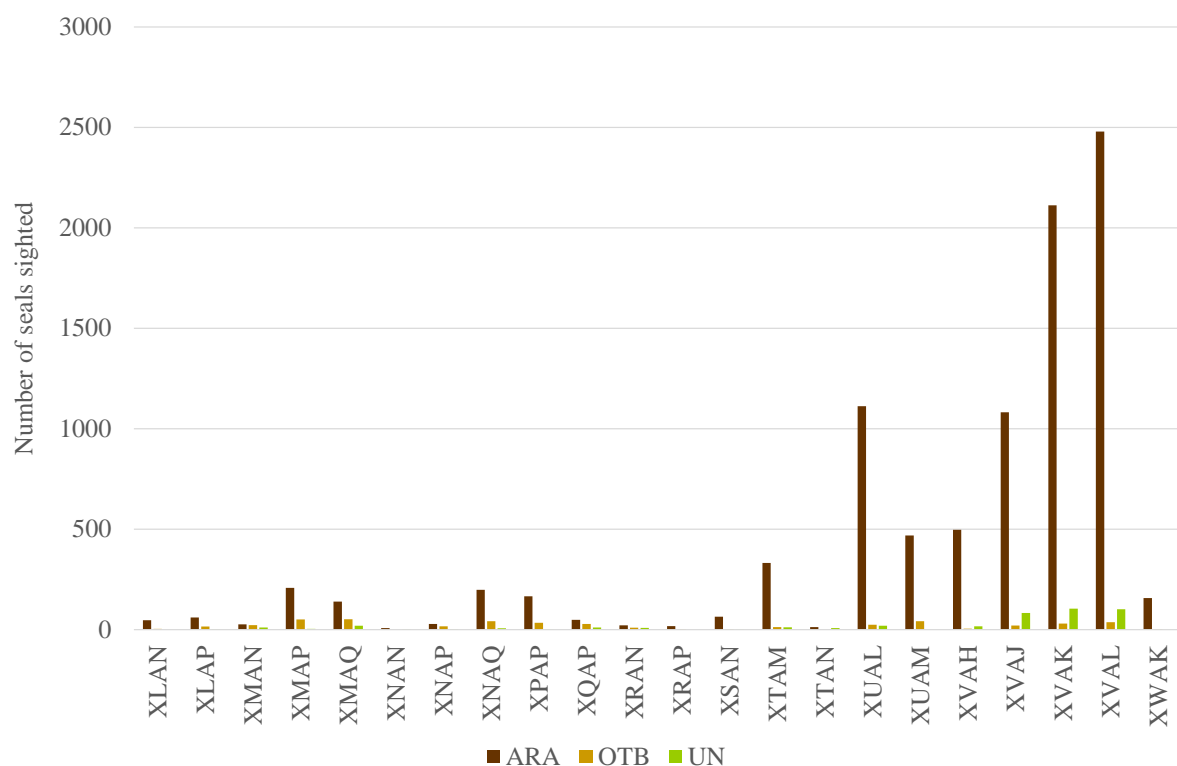


Fig.4. Pinniped sightings per grid square.

4.2.1 Pinniped attendance to vessels and behaviour

Of the 10,136 seals sighted, 7,097 (6,434 ARA, 368 OTB, 295 UN) were observed during hauling, comprising 70% of the individuals recorded. The remaining individuals (3,039) were seen during shooting (12.8%), trawling (9.6%), turning (5%) and steaming (2.4%). In 90% of the hauling attendance, seal behaviour was strictly related to foraging, with both ARA and OTB directly targeting lost catch around the fishing gear (57.3%) and eating from the net (32.4%)

(Fig.6). In the remaining vessel manoeuvres, the most common pinniped behaviour was to follow the vessel (62%), swim astern (12%), forage around the net (17%), and forage in the discard chute area (1%) (Fig.7).

4.3 Pinniped bycatch

Pinniped bycatch concentrated south of 52°S (89%), particularly around Beauchêne Island, in grid squares XVAK (37%), XVAL (25%), XVAJ (4%), and XUAL (15%) (Fig.8). A total of 81 seals were bycaught, of which 53 were seen escaping through the SED during hauling (50 ARA, 2 OTB, 1 UN), six ARA were safely released from deck, and 22 (20 ARA, 2 OTB) comprised incidental mortalities (Fig.8; Table 2).

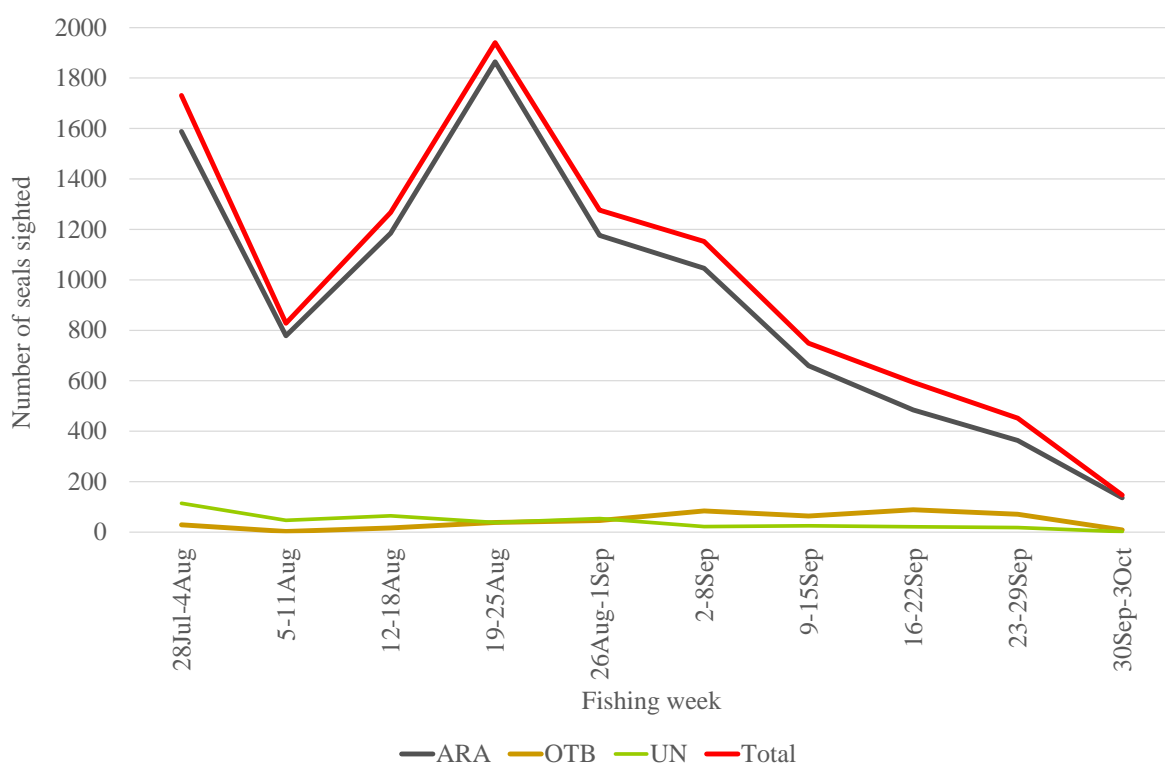


Fig.5. Cumulative pinniped sightings per fishing week.

4.3.1 Incidental mortalities

Fifty-five percent of the pinniped mortalities comprised drownings (10 ARA, 2 OTB), 36% were caused by propeller interactions, and 9% corresponded to carcasses in decomposition without unknown cause of mortality (Table 2, Fig.9). Drowning of seals in trawls fitted with a SED is usually correlated to the loss of tension of the net during manoeuvres, which results in the blockage of the escape path towards the SED. This can be exacerbated in manoeuvres carried out in rough weather conditions south of 52°S (Iriarte, 2022b).

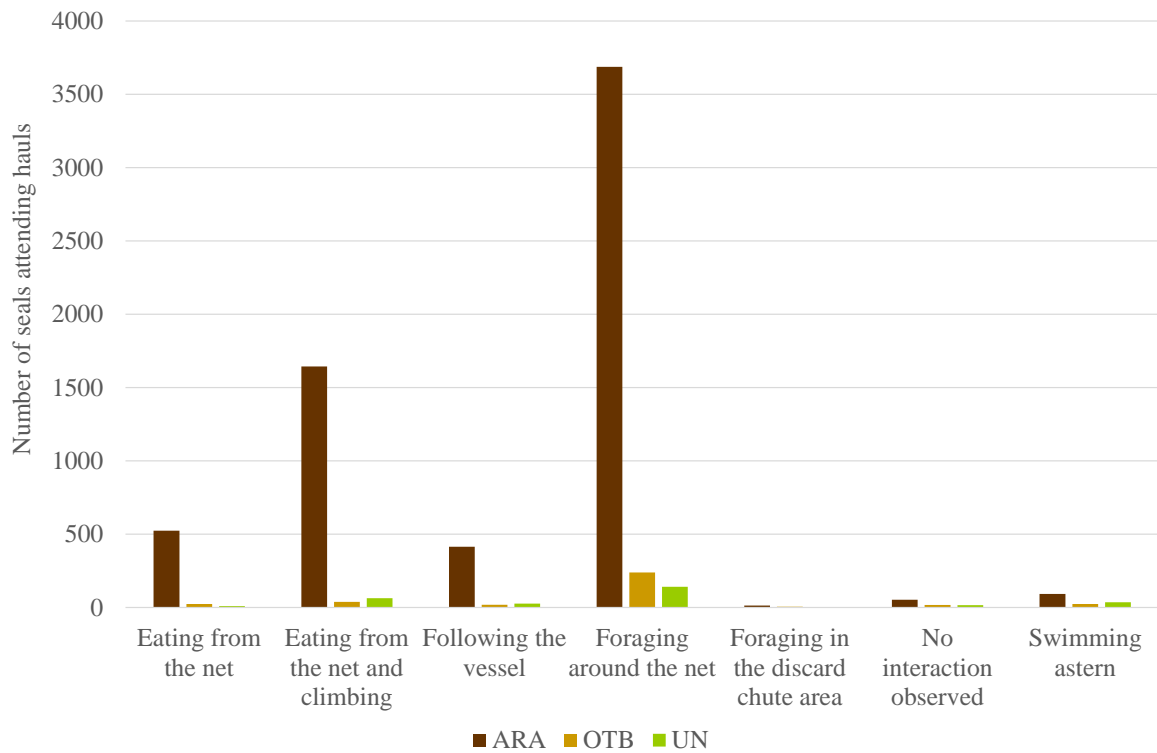


Fig.6. Pinniped behaviour exhibited during hauling.

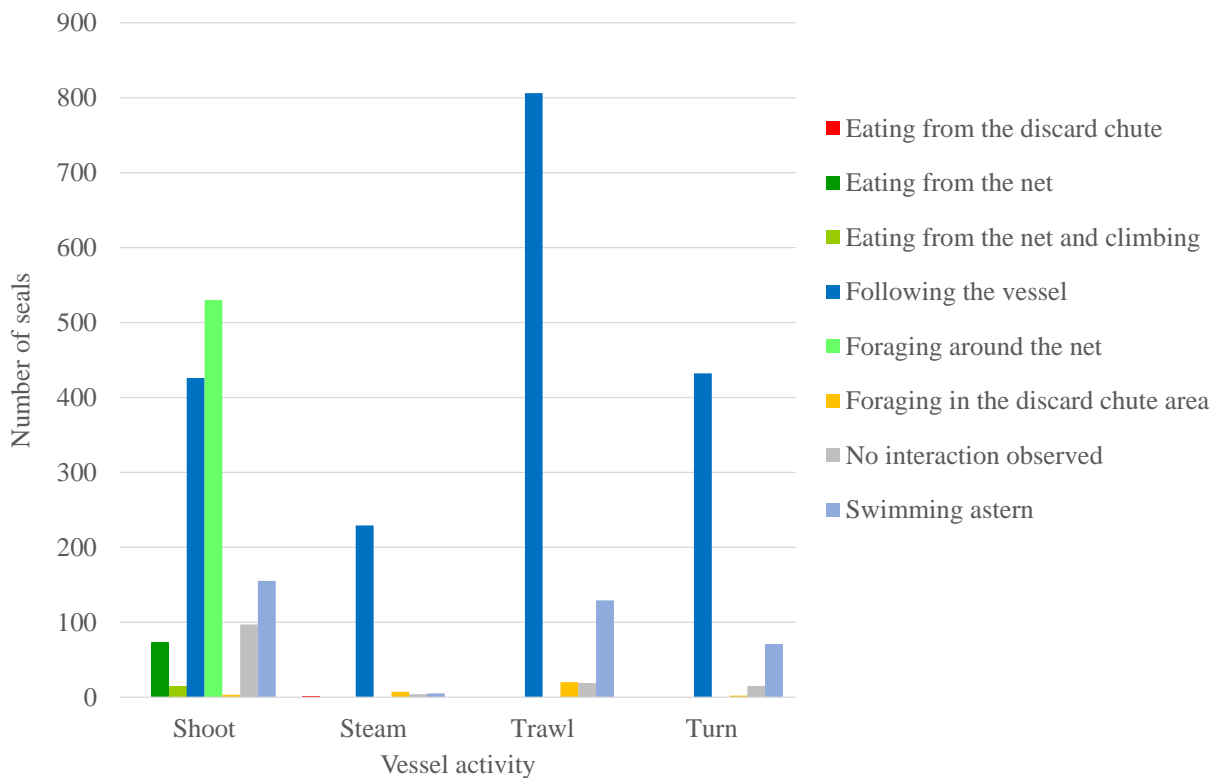


Fig.7. Pinniped behaviour exhibited during vessel manoeuvres.

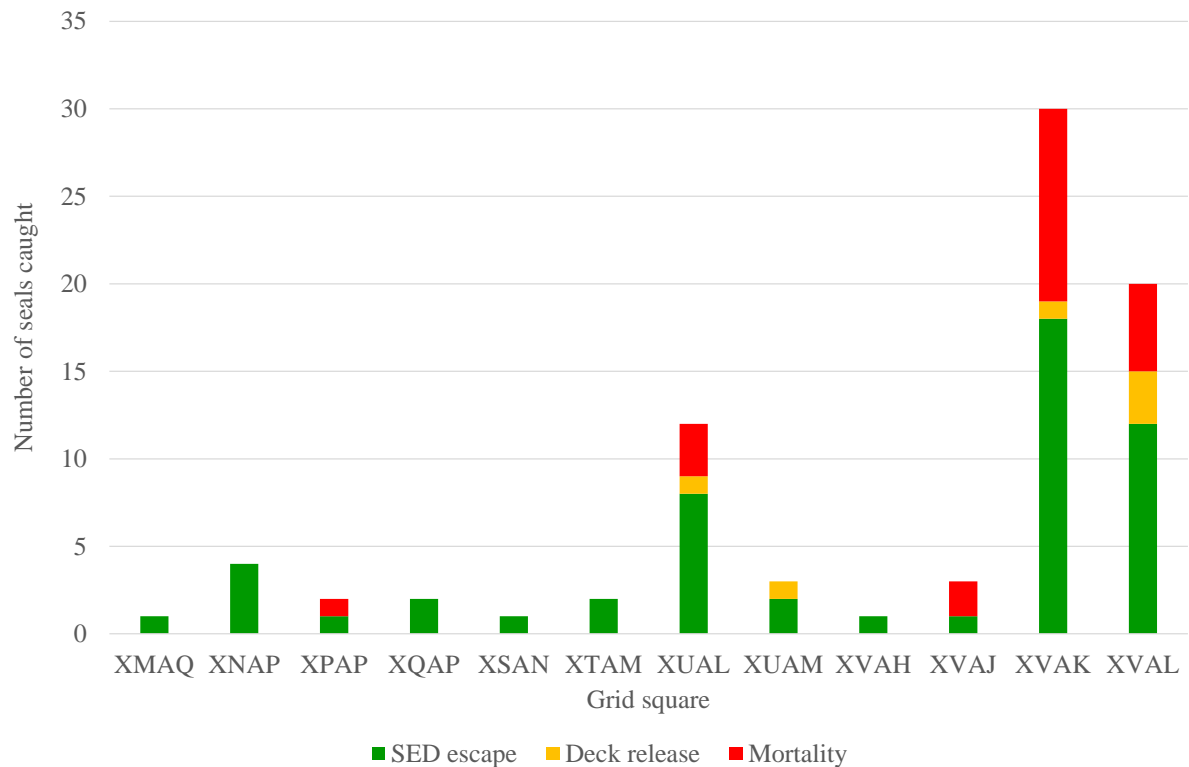


Fig.8. Pinniped bycatch per grid square.

Table 2. Pinniped incidental mortalities

Date	SED	Grid	Beauf.	Trawl (min)	#Turns	Spp.	#Mort.	Cause mort.	Comments
28/07/22	C	XVAL	5	385	2	ARA	1	UN	AM; CD
31/07/22	B	XUAL	7	290	0	ARA	2	D	AM; FC
31/07/22	B	XVAK	5	500	1	ARA	1	UN	AM; CD
10/08/22	B	XVAK	1	590	1	ARA	1	P	AM; CD
10/08/22	C	XVAK	2	210	1	ARA	1	P	AM; CD
15/08/22	B	XVAJ	4	360	2	ARA	1	P	AM; FC
15/08/22	B	XUAL	3	420	0	ARA	1	P	AM; CD
16/08/22	C	XVAL	4	525	2	ARA	1	P	AM; CD
23/08/22	B	XVAK	1	390	1	ARA	1	P	AM; CD
23/08/22	B	XVAK	3	565	1	ARA	1	P	AM; CD
24/08/22	B	XVAK	6	415	0	ARA	1	D	AM; FC
24/08/22	C	XVAK	4	520	0	ARA	1	D	AM; FC
25/08/22	B	XVAK	3	475	1	OTB	1	D	JM; FC
25/08/22	B	XVAL	6	775	3	ARA	1	D	AM; FC
25/08/22	B	XVAL	5	100	0	ARA	1	D	JM; FC
28/08/22	B	XVAK	8	465	1	ARA	1	D	AM; FC
28/08/22	B	XVAK	8	465	1	OTB	1	D	JM; FC
29/08/22	C	XVAL	3	215	0	ARA	1	D	AM; AL; PAonD
30/08/22	B	XVAK	3	435	1	ARA	1	P	AM; CD
30/08/22	C	XVAJ	2	335	0	ARA	1	D	JM; FC
20/09/22	B	XPAP	3	595	1	ARA	1	D	AM; FC

UN=unknown; AM=adult male; CD=carcass in decomposition; D=drowned; FC=fresh carcass; JM= juvenile male; AL=alive; PAonD=passed away on deck.

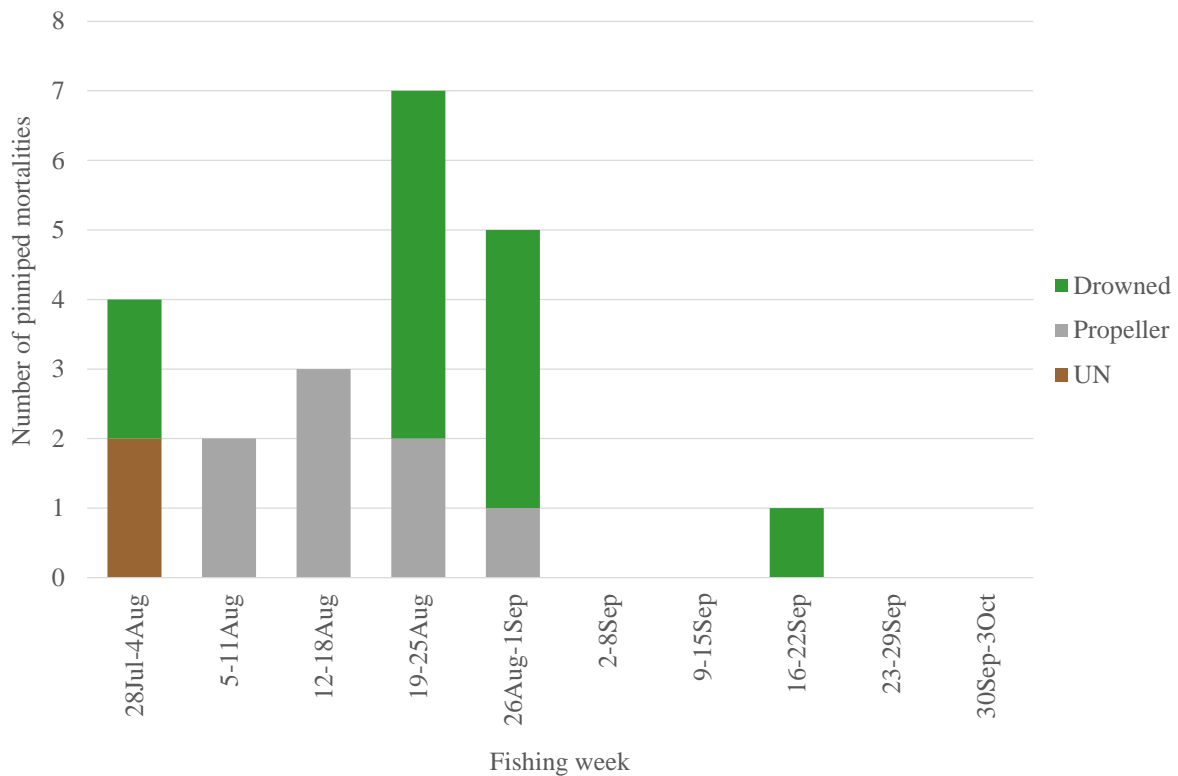


Fig.9. Type of pinniped mortality per fishing week.

4.3.2 SED escapes and live deck releases

During hauling 50 ARA, two OTB and one UN were seen escaping from the fishing gear through the SED hatch. The number of individuals that escaped when the SED was below the surface during both shooting and hauling remains unknown.

Regarding deck releases, 6 ARA were brought aboard inside the SED net extension and were safely released from the deck.

4.4 Seabird bycatch

A total of 47 seabird interactions were recorded throughout the season, of which 32 (68%) comprised net entanglements, 5 (11%) bird scaring line entanglements, 4 (9%) landings on deck, 3 (6%) SED entering through the top hatch, 2 (4%) vessel collisions and one (2%) warp cable/rawl door heavy hit & entanglement (Fig. 10). The outcome of these interactions was 22 (47%) live releases, 14 (30%) live escapes, and 11 (23%) mortalities (Fig. 11).

Of the 32 net entanglements observed, 25 comprised the black-browed albatross (*Thalassarche melanophris*, hereafter DIM), an ACAP species. Forty-one percent of the entanglements occurred in 400 mm mesh size located in either the mouth of the net (3%) or net wings (38%). These were followed by entanglements in 200 mm mesh (38%) located either in the mouth (34%) or body (3%) of the net (Fig.12).

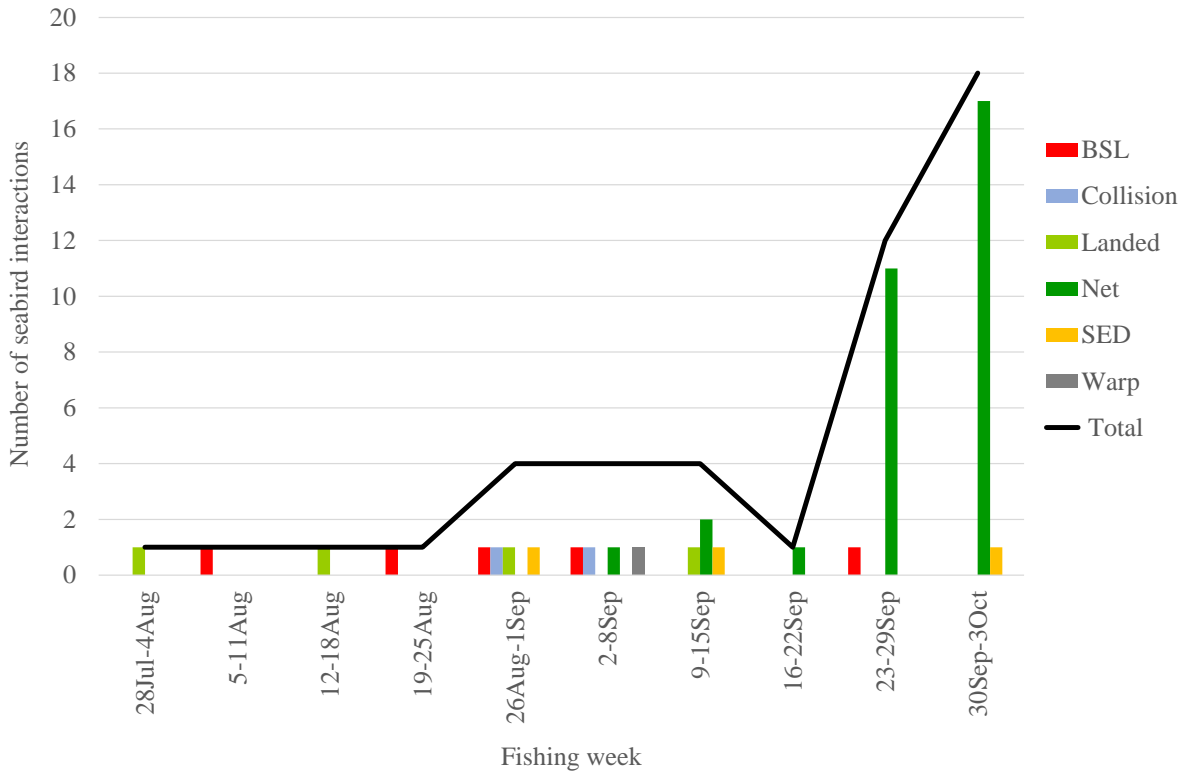


Fig.10. Number and type of seabird interactions recorded per fishing week.

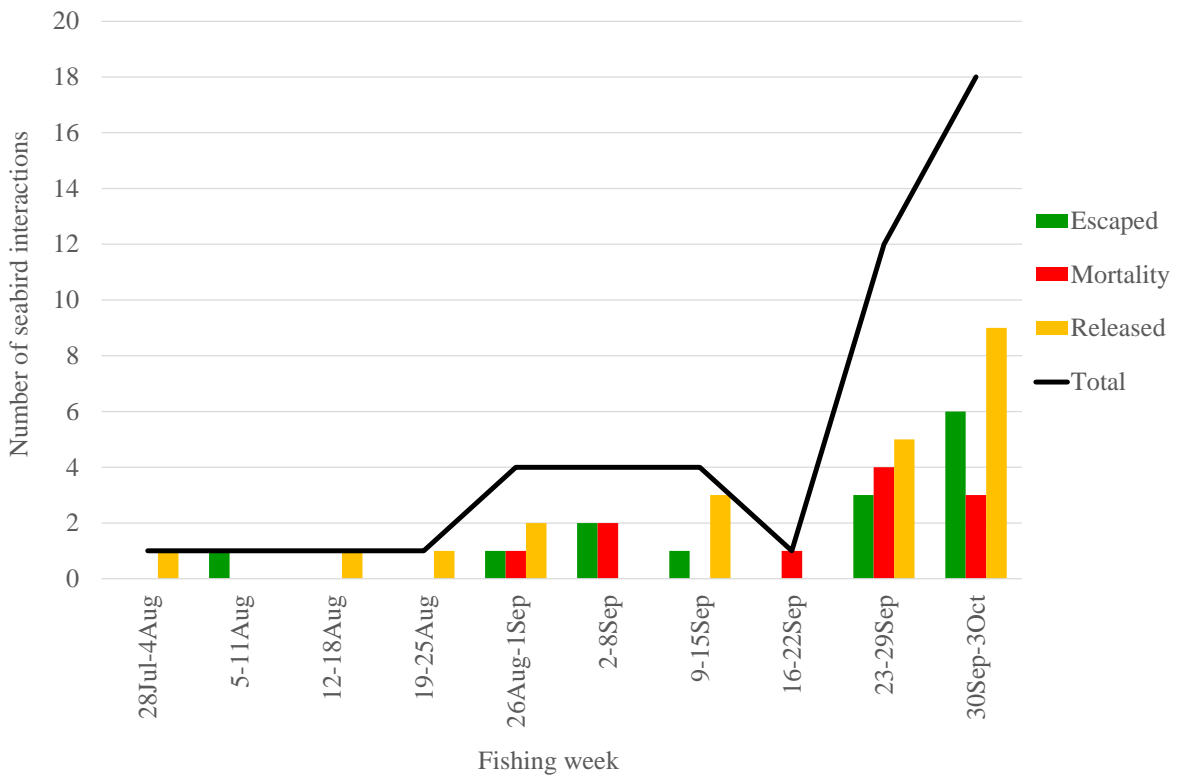


Fig.11. Outcome of the seabird interactions recorded per fishing week.

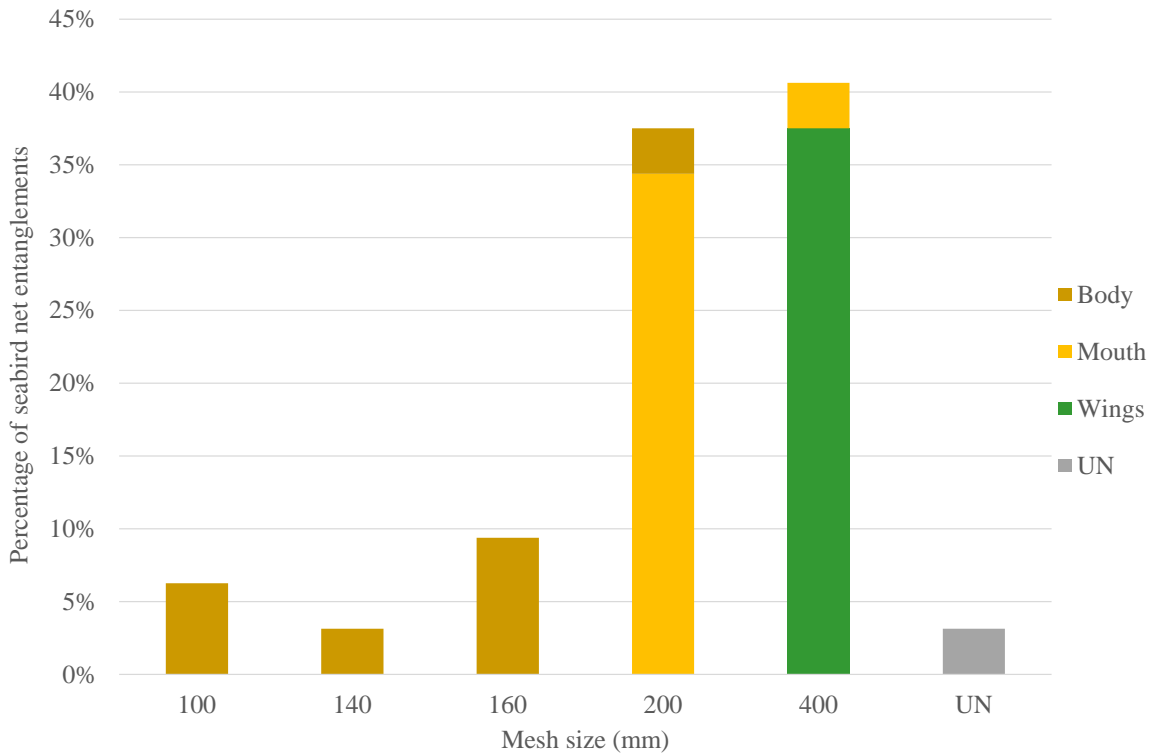


Fig.12. Percentage and trawl location of seabird net entanglements.

Seventy percent of the interactions were recorded south of 52°S, particularly in grid squares XVAK (34%), XVAJ (15%), XVAH (6%) (Fig.13).

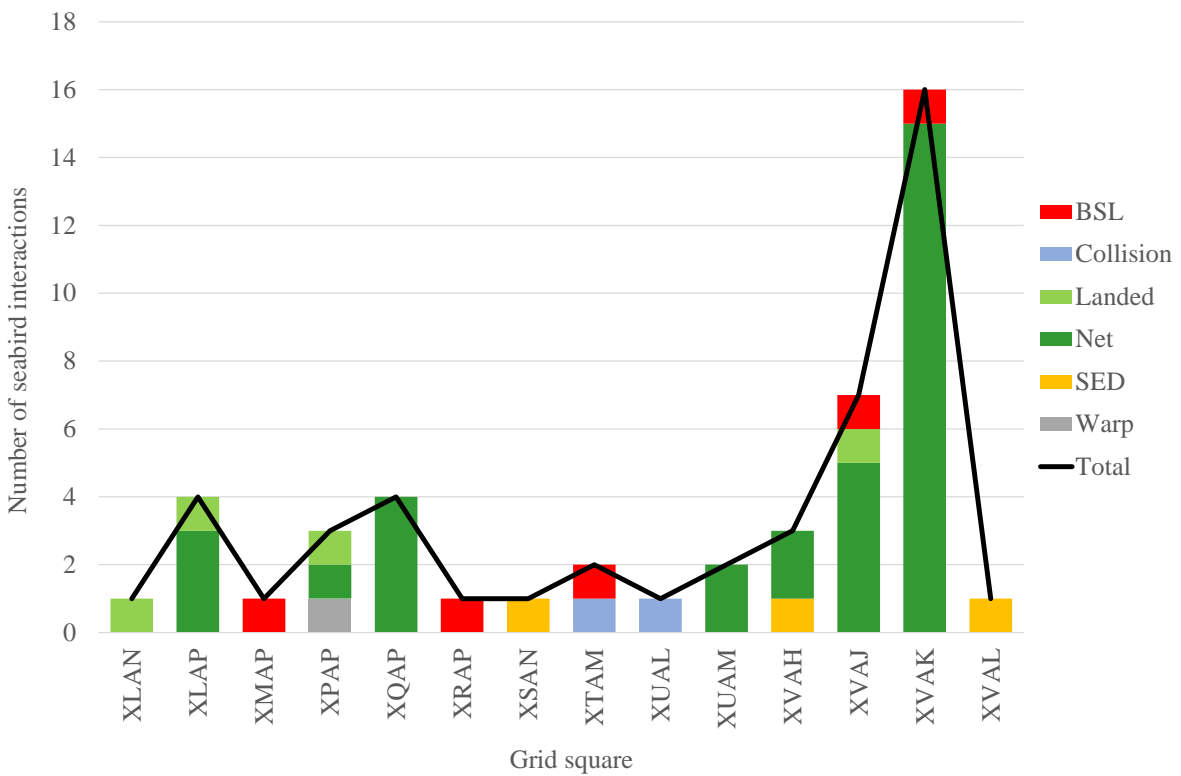


Fig.13. Number and type of seabird interactions recorded per grid square.

4.4.1 Live interactions

Live interactions included 30 DIM, four diving petrels (*Pelecanoides urinatrix*, hereafter PEL), and three sooty shearwaters (*Ardenna grisea*, hereafter PFG). These interactions were mostly recorded during hauling (81%), trawling (3%), and shooting/steaming (8% each) (Fig.14).

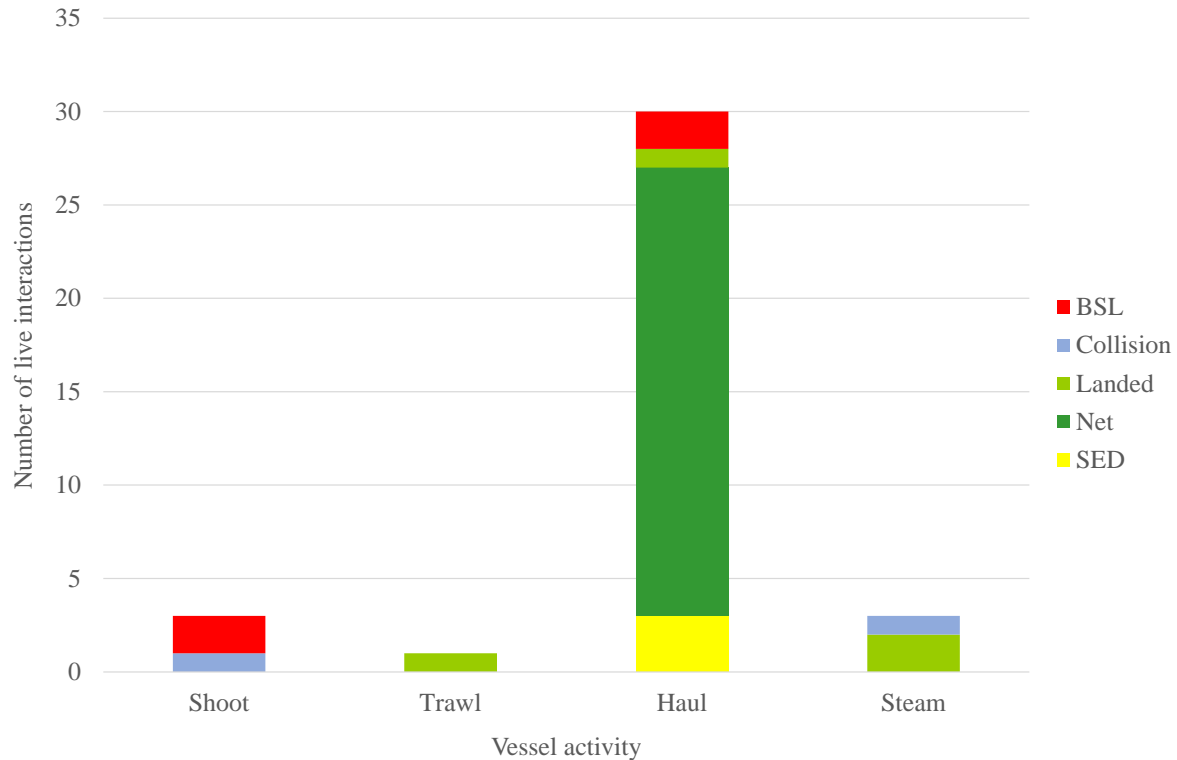


Fig.14. Number and type of seabird live interactions.

Of the 30 interactions observed during hauling, 24 (80%) comprised net entanglements (21 DIM, 3 PFG) of which 7 escaped by themselves (6 DIM, 1 PFG), whilst 17 were released alive (15 DIM, 2 PFG). The rest of the live interactions observed during hauling comprised 3 (10%) SED entrances, 2 (7%) BSL entanglements, and 1 (3%) deck landing. Of these, 23 individuals (17 net, 5 deck, 1 BSL) were rescued by crew and safely released, whilst the remaining individuals managed to escape by themselves.

4.4.2 Incidental mortalities

A total of 11 seabird mortalities were recorded, of which 7 comprised ACAP vulnerable species [6 DIM, 1 giant petrel (*Macronectes spp*, hereafter MAX)]; the remaining included 4 PFG (Table 3). Seventy-one percent of ACAP species mortalities occurred south of 52°S, in grid squares XVAK (60%), XVAJ (20%), XUAM (20%) (Fig.15).

Overall seabird cause of mortality were net entanglements (82%), warp cable entanglements (9%), and entanglements in FAA streamers (9%) (Table 3, Fig.16).

Table 3. Seabird incidental mortalities.

Date	M	Grid	Spp.	#Indiv.	Int.	Ns	Ms	S
29/08/22	H	XVAK	MAX	1	BSL	NA	NA	N
04/09/22	Sh	XUAM	DIM	1	Net	Mo	400	N
05/09/22	T	XPAP	DIM	1	Warp	NA	NA	Y
25/09/22	Sh	XPAP	DIM	1	Net	Bo	100	N
25/09/22	H	XLAP	PFG	1	Net	Bo	160	Y
25/09/22	H	XQAP	PFG	1	Net	Mo	200	N
25/09/22	Sh	XQAP	PFG	2	Net	Mo	200	Y
30/09/22	H	XVAK	DIM	1	Net	UN	UN	N
01/10/22	H	XVAK	DIM	1	Net	UN	UN	N
01/10/22	H	XVAJ	DIM	1	Net	UN	UN	N

M=manoeuvre; Int=interaction; Ns=net sector; Ms=mesh size (mm); S=sampled.
 H=haul; Sh=shoot; T=trawl; NA=not applicable; UN=unknown; Ch=chafer;
 Mo=mouth; Wi=wing; Bo=body; Col=collision.

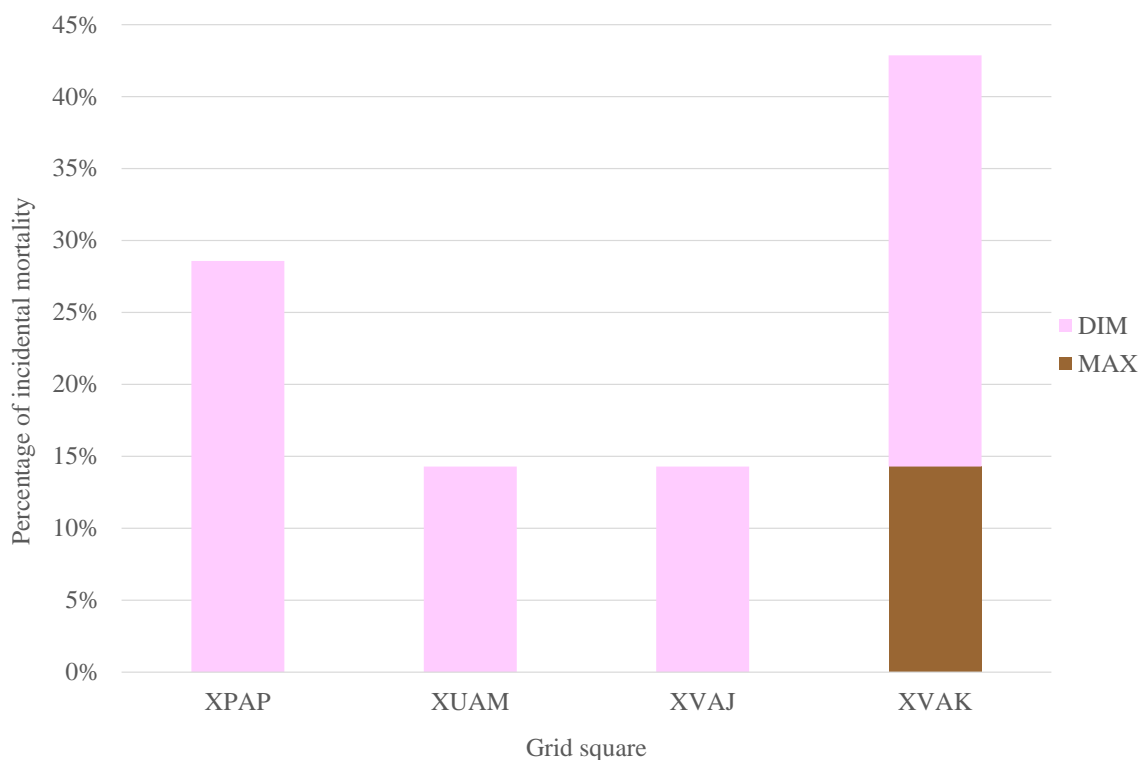


Fig.15. Percentage of ACAP species incidental mortality per grid square.

Net mortality included 9 individuals (5 DIM, 4 PFG) and mostly took place during hauling (64%). Forty-four percent of the mortalities occurred in in the mouth of the trawl in 200/400 mm meshes (Fig.17). Although one of the observers on three occasions neither collected the mesh size nor location of DIM entanglements, these mortalities may have also been related to either 200/400 mm meshes located in the mouth of the trawl/net wings.

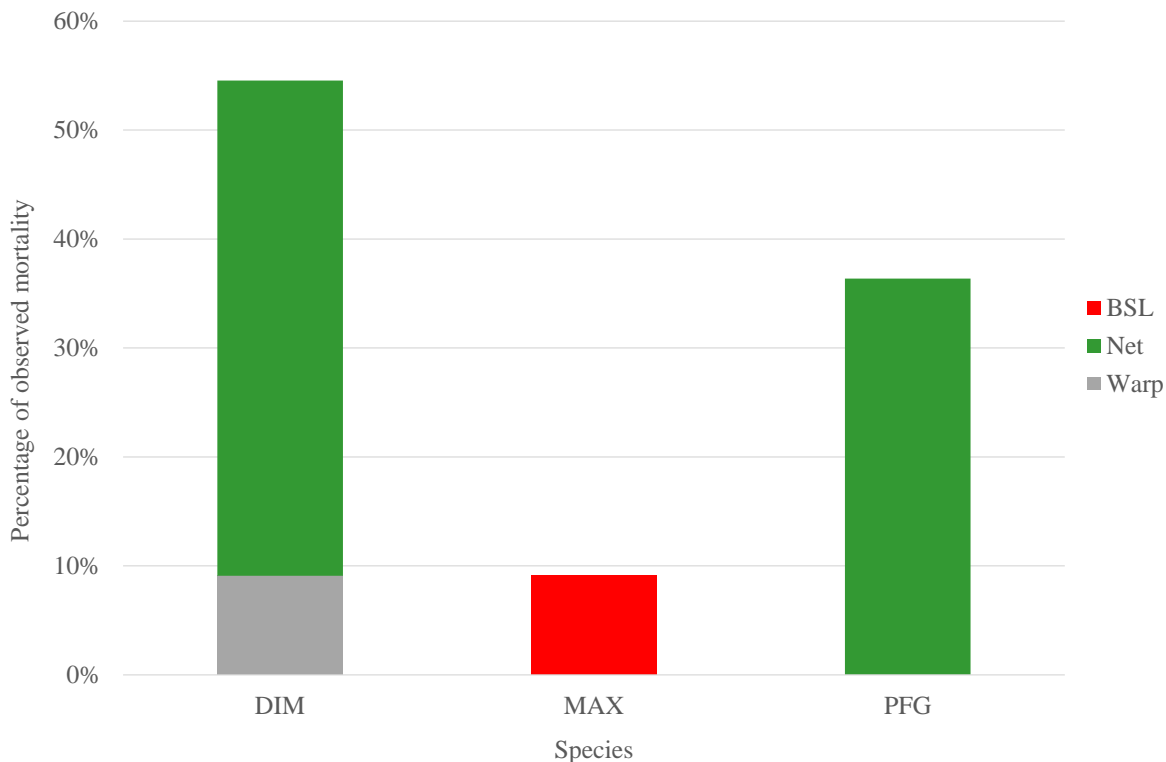


Fig.16. Cause of mortality per seabird species.

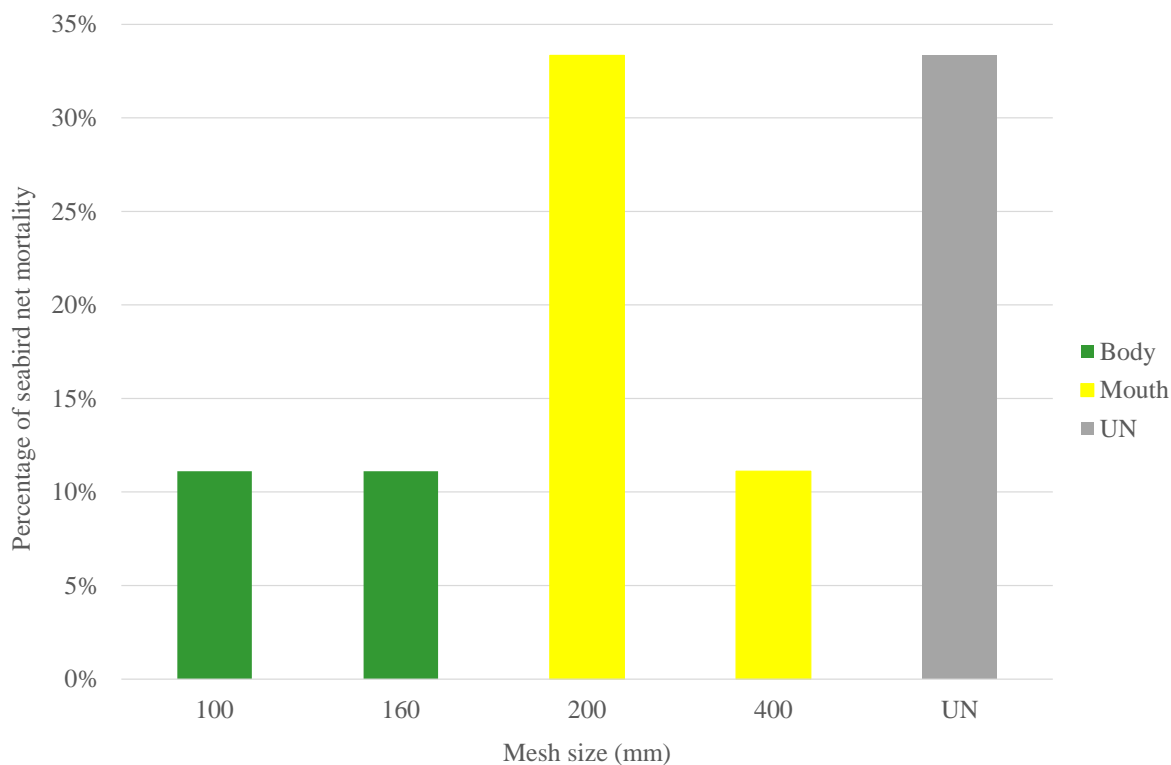


Fig.17. Percentage and location of seabird net mortality.

Similar to previous years, seventy-three percent of the seabird mortality was recorded in three days within the last two weeks of the fishery (Table 3, Fig.11; Iriarte, 2022b). Seabird mortality was observed during both shooting (64%) and hauling (36%) (Table 3).

5. Conclusions

5.1. Following the trend of previous X seasons, interactions of pinnipeds with the fishery slowly decreased during the fishing period, while interactions of seabirds showed an abrupt increase in the last two weeks of the fishery, the time at which DIM usually arrive to the Falklands to breed.

5.2. In comparison to season 2021-X, seal attendance to vessels remained similar, however the number of bycaught seals reduced by 43%. Consequently, incidental mortality decreased by 50% and observed SED escapes by 42%.

5.3. In comparison to 2021-X, seabird interactions diminished by 74%, with mortalities reducing by 87% and live releases by 50%. This could be related to a reduced overlap of the fishing effort south of 52°S with breeding albatross arrival.

5.4. Similar to previous seasons, most of the megafauna bycatch took place south of 52°S, particularly around Beauchêne Island (grid squares XVAK, XVAJ, XVAL), where megafauna occurrence is more prevalent and also where fishing effort is usually higher.

5.5. Net entanglements in 200-400 mm meshes around the mouth of the trawl continue to be the predominant cause of seabird mortality.

6. References

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Prince P.A., Rodwell S.P. (1994). Ageing immature black-browed and grey-headed albatrosses using moult, bill and plumage characteristics. *Emu*. (94): 246-254.