Table A.1: Mitigation measures and outcomes.

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| **Period** | **Pre-season** | | **2nd Commercial season 2017** | | | | | | |
| **Dates (2017)** | **13-28 Jul** | | **29Jul-2Aug** | **3-5 Aug** | **6-9 Aug** | **10-20 Aug** | **21-28 Aug** | **29 Aug-11 Sep** | **12 Sep-4 Oct** |
| **Mitigation** | Shoot on the turn; haul with net mouth closed; high speed steaming 1-2 nm before shoot | | EZ (Fig.1) | Mandatory grid/grill on the top of fish bin; 4 vessels with observers fishing in EZ; mortalities both within and outside EZ | No fishing allowed in EZ; 3 vessels with observers + rest of the fleet WEZ; first SED trial WEZ on the 8th with an observer (Table A.2) | Total closure of fishing grounds south of 52°30’ (Fig.1) | Compulsory usage of SED only south of 52°30’; 3 vessels with 25 cm mesh trials (Table A.3**)** | Compulsory usage of SED in entire *Loligo* Box; ropes inside SED banned; from 3 Sep, 8 vessels with observer coverage; from 5 Sep, 11 vessels with observer coverage | Compulsory usage of SED in entire *Loligo* Box; 100% observer coverage |
| **Mitigation efficiency** | Non-efficient | | EZ non-efficient, seals also caught outside of the EZ | Grid efficient to avoid seals entering fish bin but mortality not addressed | EZ + manoeuvring non-efficient; SED efficient (Table 2) | Non-efficient, transfer of mortality from FS to SL; efficient SED trials in EZ (Table A.2) | SED efficient; 25 cm mesh with high mortality (Table A.3) | 90% | 100% |
| ***Loligo* Box area** | N 52° | S 52° | S 52°; west of EZ | EZ; west of EZ | West of EZ | North of 52°30’ | Whole | Whole | Whole |
| **Species** | SL | FS | FS, SL | FS | FS, SL | FS, SL | FS, SL | FS | FS, SL |
| **Abundance** | ~12 | ~100-300 | Medium-high | High | FS high, SL low | Medium | High | High | High |
| **Behaviour** | SDC | SDC, NF | SDC, FS, AS | SDC, FS, AS | SDC, FS, AS | SDC, FS | SDC, FS, AS | SDC, FS, AS | SDC, FS, AS |
| **Mortalities reported** | 3 SL | 7 FS | 9 FS | 50 FS (41 in EZ) | 43 (41 FS, 1 SL, 1 UN) | 10 (5 FS, 5 SL) | 15 (14 FSa, 1 SLb) | 5c FS | 1 FSd |
| **Live individuals reported (deck releases & SED escapees)** | 1 SL | 5 FS | 5 FS, 1 UN | 16 FS (5 in EZ), 1 SL | 25 (24 FS, 1 SL) | 42 (40 FS, 2 SL) | 60 (59 FS, 1 SL) | 100 (99 FS, 1 SL) | 65 (64 FS, 1 SL) |

EZ= Exclusion zone; WEZ= West of exclusion zone; FS= *Arctocephalus australis*; SL= *Otaria flavescens*; DC=scavenging from discard chute; NF=net feeding; FS=following ship; AS=approaching ship.

a=5 individuals killed (2 in shoot, 3 in haul) while fishing with a SED with a two-piece grid that collapsed.

b= killed in the north, where SED still not compulsory.

c=1 head entangled in net wing/broken neck; 1 possibly killed on turn; 1 drowned during haul; 2 killed after SED escape passage closed in shoot.

d=inside SED but with clear signs of being killed by a propeller.

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| **Date (2017) (2018** | **08 Aug** | **15 Aug** | **16 Aug** | | **17 Aug** | | **18 Aug** | | **19 Aug** | |
| **Location** | WEZ | EZ | EZ | EZ | EZ | | WEZ | | WEZ | EZ |
| **SED** | Model i | Model i | Model i | Model ii | Model i | Model ii | Model i | Model ii | Model i | Model ii |
| **N° of trawls** | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 3 | 2 |
| **Problems encountered** | High speed funnel broken; squid lost; bent grid; seal inside SED on deck | Grid bars unweld; still losing squid, so for 2nd trawl high-speed funnel widened 40cm to increase flow of water; FS either inside SED or net wings | None in first trawl; grid bent a bit in 2nd trawl | Grid destroyed by a rock | Grid bent more; grid’s bar space too big (19cm) | NA | None | | Ropes that attach funnel to the grid | SED with a six-piece composed grid collapses during hauling, preventing seals to escape; difficult to manoeuvre on deck |
| **SED Efficiency** | 100% for seals but very small squid catches | 100% | 90% | 100% | 90% | 100% | 100% | 100% | 90% | 100% |
| **Trawl N° and catch**  **(metric tonnes)** | T1=5t; T2=6t; T3=2t | T1=7t; T2=17t | T1=31t; T2=41t | T1=20t; T2=29t | T1=21t; T2=31t | T1=12t; T2=20t; T3=14t | T1=19t; T2=7t | T1=12t;  T2=6t | T1=5t; T2=16t;T3=14t | T1=10t; T2=28t |
| **Species** | FS | FS | FS | | FS | | FS | | FS | |
| **N° of mortalities** | 0 | 0 | 1 | 0 | 1 | 0 | 0 | | 1a | 0 |
| **Cause of mortality** | NA | NA | UNb | NA | Head in between grid bars | NA | NA | | Entangled in rope that attached high-speed funnel to SED’s grid | NA |
| **N° of live captures** | 1 (deck release) | 5 (deck releases) | 1 (deck release) | 6 (SED live escapees) | 7 (especial manoeuvring; SED live escapees) | 0 | 2 (especial manoeuvring; SED live escapees) | 5 (especial manoeuvring; SED live escapees) | 14 (SED live escapees) | 7 (5 SED live escapees) |
| **Modifications to be made**  WEZ= West of exclusion zone; EZ= Exclusion zone; FS= *Arctocephalus australis*; SL= *Otaria flavescens*; a= pregnant and lactating; b= possibly killed by pressure in the net extension due to a big catch (41t). | Funnel with smaller mesh; rebuild grid: stronger material + vertical bars | Rebuild grid; widen funnel to the extent of net’s width to allow flow in higher trawling speeds; manoeuvre to make seals escape through SED when it still is in the water | Manoeuvre to make seals escape through SED when it still is in the water | Improve the strength of the grid | Rebuild grid stronger and with smaller bar spacing (12cm) | NA | None | | Eliminate ropes that attach funnel to the grid; attach the funnel to the walls of the net | Change collapsible grid for a one piece grid. |

Table A.2: SED trials.

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| **Date (2017)** | 20 Aug | 21 Aug | 22 Aug | 24 Aug | 25 Aug | 27 Aug |
| **Location** | WEZ | WEZ | WEZ | EZ | EZ | EZ |
| **N° of trawls** | 2 | 3 | 3 | 3 | 6 | 1 |
| **Trawl N° and catch (metric tonnes)** | T1=4t; T2=14t | T1= 7t; T2=4t; T3=4t | T1= 3t; T2=2t; T3=4t | T1=3t; T2=9t; T3=8t | T1=6t; T2=6t; T3=3t; T4=8t; T5=7t; T6=5t | 4t |
| **Problems encountered** | Low catches; skate clogging | Interactions of seals with net; clogging | Low catches; skate clogging; probable seal cryptic mortality | Low catches; skate clogging; probable seal cryptic mortality | High squid concentrations but small catches; high seal bycatch, injuries and mortality; probable cryptic mortality; net clogging | Small catch; high seal bycatch and mortality |
| **Species** | NA | FS | NA | FS | FS | FS |
| **N° of mortalities** | 0 | 0 | 0 | 0 | 4 | 5 |
| **Cause of mortality** | NA | NA | NA | NA | Entanglement (wrapped) in the square mesh | Entanglement in the square mesh |
| **N° of live captures** | NA | 2 | 2 | 1 | 3 | 4 |

**Table A.3:** Square mesh net barrier trials.

WEZ= West of exclusion zone; EZ= exclusion zone; FS= *Arctocephalus australis*; NA= not applicable.

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| **Date**  **(2017)** | **Trawl N°** | **Phase** | **Footage length (s)** | **Escaping seal** | **Species** | **N° individuals** | **Time in SED (s)** | **Behaviour** | **Grid contact** |
| 24/08 | 2 | S/T | 7161 | Y | FS | 2 | #1=1; #2=12 | #1=AS; #2=GI | #1=NC; #2=PF |
| 26/08 | 3 | S/T | 6062 | Y | FS | 2 | #1=3; #2=3 | #1=AS; #2=AS | #1=FL; #2=SN + FL |
| 26/08 | 5 | S/T | 7016 | N | \_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_ |
| 27/08 | 4 | S/T | 5704 | N | \_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_ |
| 28/08 | 1 | S/T | 1473 | N | \_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_ |
| 29/08 | 2 | S/T | 735 | Y | FS | 4 | #1=2; #2=1; #3=5; #4=2 | #1=AS; #2=AS; #3=RE + AS; #4=AS | #1=SN; #2=NC; #3=RC; #4=NC |
| 29/08 | 1 | S/T | 5711 | N | \_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_ |
| 30/08 | 1 | S/T | 2188 | Y | FS | 1 | 72 | RE+AW+EH+CB+AW+EH+SG+AS | AW+SG |
| 30/08 | 2 | S/T | 7045 | N | \_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_ |
| 30/08 | 3 | S | 451 | N | \_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_ |
| 31/08 | 2 | S/T | 3483 | Y | FS | 1 | 3 | AS | NC |
| 31/08 | 3 | S | 651 | Y | FS | 2 | #1=17; #2=32 | #1=EH+CB+AS; #2= EH+CB+AS | #1=NC; #2=NC |
| 02/09 | 1 | S/T | 5446 | MORTALITY | FS | 2 | \_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_ |
| 03/09 | 1 | S/T | 5699 | N | \_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_ |
| 04/09 | 2 | S/T | 6361 | N | \_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_ |
| 05/09 | 1 | S/T | 6189 | N | \_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_ |

**Table A.4:** Underwater footage analysed.

FS= *Arctocephalus australis*; S=shoot; T=trawl; AS=active swimming; GI=grid inspection; PF=pectoral fins; FL=four limbs; SN=snout; NC=no contact; RE=rope entanglement; RC=rope contact; EH=entering SED through hatch; AW=actively “walking” on grid; CB=curious behaviour towards camera & light; SG=stands on the grid.

Fig.A.1 (Table only). License conditions regarding SED requirements.

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| **Grid** | Must be rigid and have vertical bars spaced ≤ 15 cm. |
| **Top escape hatch** | Either semi-circular or triangular shape with the base at the top of the grid. The distance **a** from the base to the apex of a triangular design or zenith of a semi-circular design must be at least 100 cm. The width **b** of the escape hatch must be at least 120 cm or 90% of the top bar of the grid, or whichever is greater. The top escape hatch must not be obstructed by any mesh or ropes. |
| **Inner escape hatch** | Must be at least 120 cm wide and its height **c** must be at least 100 cm above the bottom of the net. The inner escape hatch must not be obstructed by any mesh or ropes. |
| **Small mesh funnel** | Must be at least as wide as the escape hatch at the top of the net and must be attached only to the sides of the net extension. Attachment ropes to the grid are not acceptable. The horizontal distance **d** from the mouth of the small mesh funnel to the bottom of the grid must be at least 100 cm. Explanatory note: for attachment of the mesh funnel a PVC tube with a rope inside can give stability. |
| **Small mesh panel** | The escape hatch must have the same dimensions as the escape hatch at the top of the net. The base of the mesh panel must be attached only to the sides of the net extension. Attachment ropes to the grid are not acceptable.  The point [level] at which the small mesh panel connects or meets the grid must be at least 100cm above the bottom of the net when measured vertically. Explanatory note: for attachment of the mesh panel a PVC tube with a rope inside can give stability. |
| **Grid angle** | **Ꝋ** Must be 45-70° with respect to the bottom of the net to easily guide the seals to the escape hatch. |
| **Flotation** | Several floats **F** must be attached to both the upper side of the grid and the border of the escape hatch in order to prevent the SED from collapsing during shooting/hauling of the net. |
| **Optional wing** | If it is installed at the base of the top escape hatch, its maximum width should be not more than a quarter of the SED’s escape hatch length (apex) and it should have enough flotation to avoid covering part of the top seal escape hatch, as it may discourage seals from escaping. |