

# **Brickle Curtain Report**

## **Quantifying the Effectiveness of the Brickle Curtain at Mitigating Against Secondary Hooking**

**October 2008**

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# 1 Abstract

The deployment of a bird-scaring curtain, ‘Brickle curtain’ around the hauling bay during the recovery of hooks is a mandatory requirement covered by the Falkland Islands Longline fishing licence. The success of the Brickle curtain is widely accepted; however its effectiveness is yet to be quantified. During this study a number of contact and environmental criteria were devised to test the significance of the presence of the Brickle curtain in reducing bird mortality through secondary hooking. In total, 27 periods (1499 mins.) with curtain and 25 periods (1337 mins.) without the curtain were observed, during which a 97% reduction in interaction rates for all species was recorded in the presence of the Brickle curtain. Behavioural data presented in this study illustrate the effectiveness of this mitigation measure at reducing the potential for injury or mortality to globally threatened seabird species.

## 2 Introduction

### 2.1 Seabird and Longliner Interactions

Unsustainably high incidental mortality of seabirds by fisheries has received much scientific interest worldwide (Brothers *et al.*, 1999; Cooper & Wanless, 1999; Lewison & Crowder, 2003). In the southern oceans Longlining has historically been associated with extensive seabird mortality and is believed to be the principle cause of depleted albatross populations (Croxall, 1990; Bergin, 1997; Nel *et al.*, 2002; Poncet *et al.*, 2006). Consequently 19 of the 21 albatross species are included in the IUCN list of globally threatened species (Birdlife International, 2008).

Incidental mortality predominantly occurs during line setting when birds foraging for bait near the sea surface become hooked through the bill, gullet or wing and are drowned as the line sinks (Bergin, 1997). Secondary hooking, where birds are hooked during line hauling or the ingestion of hooks discarded with bait, heads or bycatch are additional causes of mortality (immediate or delayed); indeed longline hooks have been found in diet samples of albatross chicks (Xavier *et al.*, 2004).

## **2.2 Mitigation Measures**

International concern for the problems facing threatened seabirds has prompted the development of number of conservation measures (Cooper *et al.*, 1999; Brothers *et al.*, 1999), and significantly in 2004 the Agreement on the Conservation of Albatrosses and Petrels (ACAP) came into force. ACAP is currently ratified by 11 countries including the UK. Signatories are obligated to take a number of specific measures to improve the status of albatrosses and petrels including reducing incidental mortality, protecting habitat and supporting research (Cooper *et al.*, 2006). The Falklands Islands, included in ACAP as an overseas territory of the UK, have since the beginning of the 2001/2 season required practical mitigation measures as conditions in the longline Toothfish fishing licence (FIFD). These conditions include the use of Tori line during setting; line weighting of at least 8.5 Kg/40 m; prohibition of discards during setting; use of thawed bait. The use of these mitigation measures have successfully reduced the incidental seabird bycatch from excessively high levels (up to 90 Black-browed albatrosses killed in a single day; Brothers *et al.*, 1995) prior to 2001 to an estimated 134 seabirds in the first season of implementation (Otley *et al.*, 2007), and 16 in 2006/7 (FIFD unpublished data).

In 2003 a bird scaring curtain around the hauling bay, known as and hereafter referred to as the Brickle curtain, was introduced in order to deter birds from the high risk area around the hauling bay thus reduce mortality and injury from secondary hooking. In 2005 the deployment of the Brickle curtain during all hauling operations became a mandatory condition of the longline licence (FIFD). In addition licence requirements obligate the vessel to discard all offal and bycatch from the opposite side of the vessel from the hauling bay, to remove all hooks prior to discarding, and to carry a scientific observer to ensure recommended mitigation measures are adhered and to collect biological data.

## **2.3 Objectives**

Although anecdotal evidence suggests the Brickle curtain plays an important role in maintaining the significantly reduced levels of seabird bycatch (Otley *et al.*, 2007; ACAP, 2008), its effectiveness has not previously been quantified. In this study a protocol for assessing the performance of the Brickle curtain with respect to bird interactions for use on all types of longliners was developed. Effectiveness of this

mitigation measure was subsequently tested in Falkland's waters between July and September on a vessel using the umbrella fishing system.

## 3 Methods

### 3.1 The Brickle curtain

The Brickle curtain is simply a series of hanging streamers suspended around the hauling bay. On the longliner CFL Gambler the curtain consisted of a permanent frame of scaffold support struts and line enclosing an area 5.5 by 18.3 m (Fig 3.1) to which streamer lines can be attached at intervals using shark clips during hauling. Streamer lines are 4 m long and weighted to allow streamers to reach the water surface in calm conditions. Three to five streamers of yellow, green and red oilskin fabric are inserted directly into each laid line (as depicted by the cover illustration). The Brickle curtain is constructed so that it can be dismantled prior to the vessel returning to port or transhipping, however while streaming only the streamer lines are removed by means of a lazy line to access the support line.

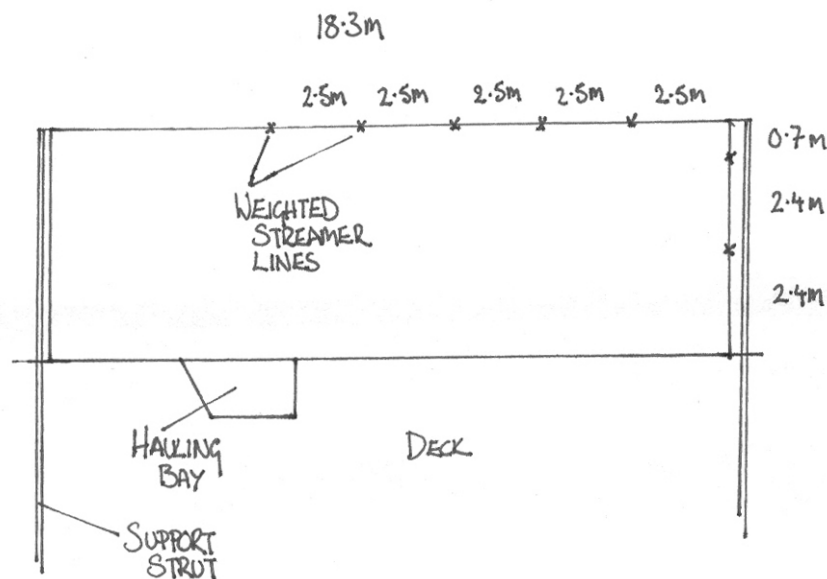


Fig 3.1 Brickle curtain deployed around the starboard hauling bay by the CFL Gambler.

### 3.2 Seabird Interaction Protocols

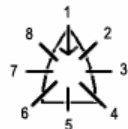
The protocol was designed to be complementary with the standard hauling observation duties of the FIFD longline observer. Hauling observations are conducted from a position forward and above the hauling bay, which affords views of the line, catch and area with the Brickle curtain. The line was observed during daylight

hauling and effort was divided into 1 hour long observation periods (OP). Seabird abundance and environmental data was recorded both at the beginning and end of each OP.

The Brickle curtain was either deployed or removed for duration of each OP. These treatments were alternated to control for locality and environment and was achieved rapidly and easily with out interrupting hauling operations. During unobserved periods the Brickle Curtain was always deployed as a mitigation measure.

Interaction data were collected throughout the duration of the OP for all species of seabirds. Interactions that took place in the defined area contained by the Brickle curtain, whether the Brickle curtain was deployed or not, were recorded to evaluate what effectiveness of the deployment of the Brickle curtain has of preventing secondary hooking of seabirds and addition interaction classes to the FIFD protocol were assigned. Fields included attendance within the Brickle curtain area, behaviour (flying, diving etc) and outcome (nil, minor injury etc) and increased the resolution of the data (Table 3.1).

Details of all required data fields (including additional environmental and interaction fields) for line, environmental, abundance and interaction data are given in Table 3.1. If data is collected concurrently with FIFD longline data, form numbers for recording data in the first instance are given, and if recorded in the FIFD database the field is marked with **F**. Station number and environmental sample number are recorded in order to correlate interactions with the following data (Table 3.1, denoted by **F**): station position, depth, time of hauling operations, seabird abundance, day phase, visibility, cloud cover, discards, line gradient. If the study is to be carried out independently all data can be entered as a hard copy in the associated form (Appendix 1).

Field	Code	Definition	FIFD form	
<b>Station data</b>				
Station		FIFD Station #	1	
Line		Line # assigned by vessel	1	
Fishing System		<b>U</b> Umbrella longlining, <b>L</b> Spanish System		<b>F</b>
# hooks recovered		Total number of hooks recovered with line	1b	<b>F</b>
<b>Observation periods</b>		(OP)	1b	<b>F</b>
Brickle curtain		enter <b>yes</b> is BC is present or <b>no</b> if absent		
Start time			1b	
End time			1b	
Duration		Duration of observation period in hours	1b	
# hooks		Number of hooks hauled during observation period.	1b	<b>F</b>
<b>Environmental data</b>				
Day phase		<b>dawn, day, dusk</b> or <b>night</b>	3a	<b>F</b>
Visibility		<b>&lt;50 m, 50-1000 m</b> or <b>&gt;1000 m</b>	3a	<b>F</b>
Cloud cover		Cloud cover in octas (1-8)	3a	<b>F</b>
Discards		<b>yes</b> or <b>no</b>	3a	<b>F</b>
Side of discards		If discarding whole fish or offal <b>port, starboard</b> or <b>both</b>	3a	<b>F</b>
Line gradient		° from horizontal: <b>90-60, 60-30, 30-0</b> or <b>trail</b> when line trailing	3a	<b>F</b>
Wind speed		In Beaufort scale	3a	
Wind rel. vessel		Wind Quartile relative to vessel:		
				
Sea State		In Beaufort scale	3a	
Weather		<b>Nil, rain, snow, sleet</b> or <b>hail</b>	3a	
Deck lights		<b>off</b> or <b>on</b>	3a	
Sample enviro/abun		For correlating to FIFD environmental data: start sample	3a	
<b>Seabird Abundance</b>		Record total numbers of seabirds in 500 m <sup>2</sup> box extending aft of the hauling bay. Use FIFD three letter codes (Appendix 2)	3a	<b>F</b>
<b>Interactions</b>				
Species		Use FIFD three letter codes (Appendix 2)		
Contact		For each individual, record only the highest class of interaction. If an individual bird leaves the BC area and re-enters a new interaction is recorded.		
	0	Proximity: within the BC area		
	1	Pecks at unhooked fish or bait		
	2	Pecks at hooked fish	4	
	3	Pecks at hooked bait	4	
	4	Contact with fishing gear	4	
	5	Secondary hooking	4	
Behaviour	f	Flying		
	w	On the water surface		
	d	Diving		
Outcome	0	Nil		
	1	Minor injury		
	2	Major injury		
	3	Death		

**Table 3.1** Data fields recorded during this study. Codes where in descriptions are given in bold. FIFD form indicates the form number used to record data. **F** indicated the data is stored in the FIFD longline database.

### 3.3 Statistical analysis

For each OP the rate of bird interactions with fishing gear was calculated. These data, expressed as *number of interactions per hour* and *number of interactions per hook hauled* could be resolved to level of species and contact type, and formed the basis of analysis for determining effectiveness of the treatments: presence or absence of the Brickle curtain.

Differences in contact rates between treatments were tested using the Mann-Whitney non-parametric test. Minitab 13.1 statistical package was used for all analyses.

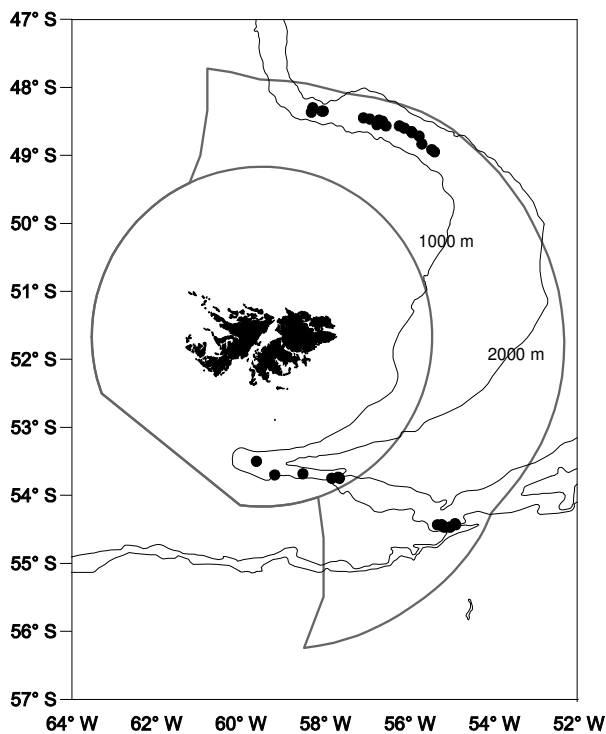
## 4 Results

### 4.1 Fishing and Observation Effort

The CFL Gambler is a 56.7 m, longlining specific fishing vessel targeting Patagonian toothfish (*Dissostichus eleginoides*) and has been operating in Falkland's waters since 2004 (currently it is the sole longliner in these waters). The vessel operates year round, generally in the deeper waters of the FOCZ, fishing day and night. This study was conducted over two cruises: 31 July to 9 August 2008 and 25 August to 8 September 2008 during which the CFL Gambler operated in two distinct areas: waters northeast of the Falkland Islands during the first cruise between 48° 20' and 48° 45' S and between 55° 18' and 58°46 W; and waters around the Burdwood Bank south of the Falklands between 53° 27' and 54° 29' S and between 54° 55' and 59° 31' W during the second cruise. Lines were set in waters between 812 and 1940 m deep (Fig 4.1). The 'Umbrella system', as opposed to the 'Spanish system' of longlining was use for all lines.

All daylight hauls were observed as per the standard protocol with the exception of occasions when fish sampling took precedence or environmental conditions/observer fatigue necessitated a break. Night haul observations were completed if sufficient light conditions facilitated accurate abundance counts at the onset of the OP. 47.3 h of

hauling observations were completed over 32 lines of which 17 lines (28 OP) were in the north and 15 lines (23 OP) were in the south.



**Fig 4.1** Distribution of observed lines during the study period. The start position of the haul is represented by ● and overlap may occur.

The FICZ, FOCZ, 1000 m and 2000 m isobaths are shown for reference.

## 4.2 Environmental Conditions

Environmental conditions encountered during observations varied considerably. Wind speed and sea state ranged from 1-7 and 1-6 (BF) respectively. During hauling the vessel operated either into the wind or with the wind on the starboard beam (i.e. wind relative to vessel codes 8, 1, 2, 3 and 4; Table 3.1). Cloud cover ranged from 0 to 8 octas, typically with no weather, although snow, rain and hail were recorded in a total of 9 OP. Observations were conducted both while discarding and not discarding and with and without deck lights. The gradient of the main line was 90° in all OP.

## 4.3 Seabird Abundance

Species and numbers of seabirds attending fishing vessels is highly variable, and dependant on environmental factors (including time of day, season, oceanographic and meteorological conditions), location and discard rates (Weimerskirch *et al.*, 2000). Eleven species of birds were observed during hauling (Table 4.1). Cape petrels (*Daption c. capense*) were the most abundant and frequent species attending the vessels during observation periods. Giant petrels (*Macronectes spp.*) were prevalent

during hauling operations, and although the presence of both northern and southern giant petrels were confirmed at each OP, this level of differentiation is not presented for further analysis due to inherent difficulties in identifying to this level at a distance. Southern Royal Albatrosses (*Diomedea empomorpha*), Black-browed albatrosses (*Thalassarche melanophrys*), Grey-headed Albatrosses (*Thalassarche chrysostoma*), Antarctic Fulmars (*Fulmarus glacialoides*), Kelp Gulls (*Larus dominicanus*), and Wandering albatrosses (*Diomedea exulans*) were also frequent attenders; present in 15 or more observed periods.

Species	m Abn	% Attn
Cape Petrel	130	100
Giant Petrel sp.	97	100
Black-browed Albatross	32	97
Southern Royal Albatross	27	89
Great Albatross sp.	25	48
Wandering Albatross	2	48
Kelp Gull	1	19
Grey-headed Albatross	1	12
Antarctic Fulmar	4	10
White Chinned Petrel	1	1
Blue Petrel	1	2

**Table 4.1** Mean abundance when present and percentage attendance of Seabird species from abundance counts during line hauling . Abundance given to nearest whole number.

#### 4.4 Interactions

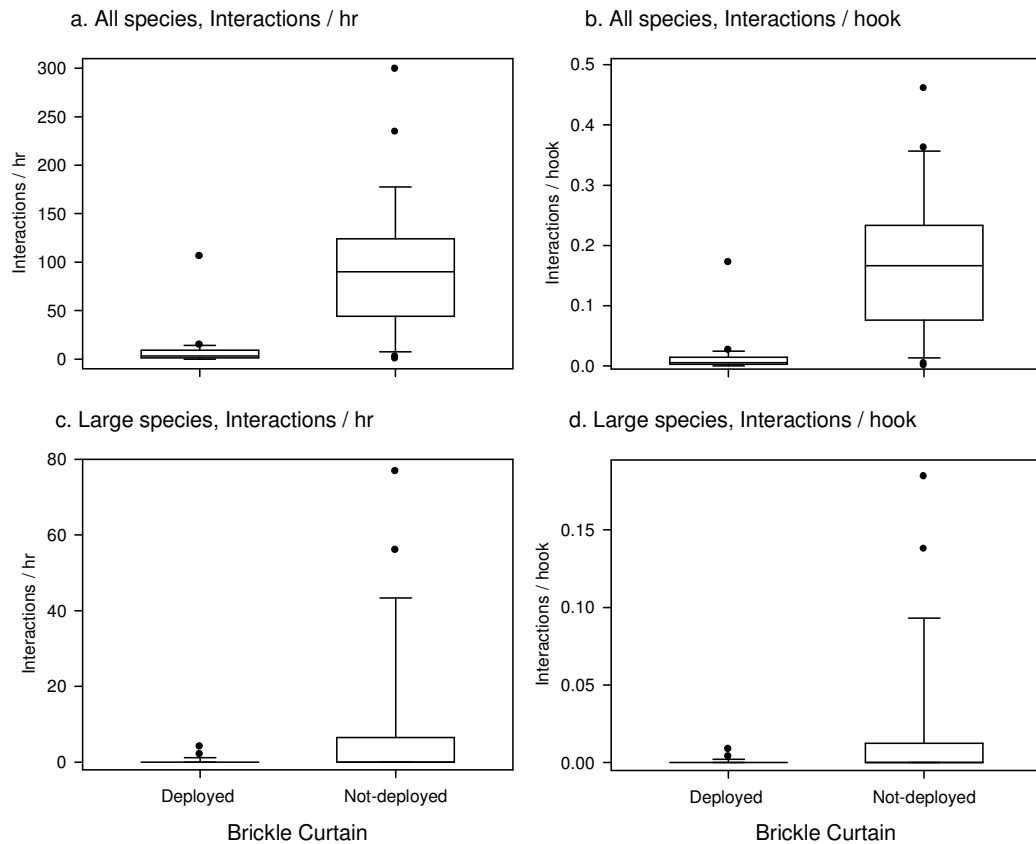
No bird mortalities or injuries were observed during this study. All observed interactions are summarised in Appendix 3. Consistent with the high abundance the vast majority of interactions within the Brickle curtain were by cape petrels. When the Brickle curtain was present, Black-browed albatrosses and giant petrel interactions were only recorded when fish became unhooked and were available for scavenging.

#### 4.5 Brickle Curtain Effectiveness

Over the course of the study 27 OPs (1499 mins. and 14864 hooks) with the Brickle curtain deployed and 25 OPs (1337 mins. and 12890 hooks) without the Brickle curtain were observed. Throughout the study period interaction rate for both treatments varied considerably (Table 4.2).

Species	Rate	Brickle Curtain				<i>P</i> value	
		Deployed	Not-deployed	Range	Median		
All	Interactions/hr	0-105.7	3.0	0-299.0	90.0	<0.00001	***
All	Interactions/hooks	0-0.171	0.005	0-0.460	0.166	<0.00001	***
DIM, MAS, DIP	Interactions/hr	0-4.0	0.0	0-76.7	0.0	0.0149	*
DIM, MAS, DIP	Interactions/hooks	0-0.008	0.000	0-0.184	0.000	0.0141	*

**Table 4.2** Comparison of interaction rates for all bird species and Black-browed Albatrosses, all Giant petrel species and Southern Royal Albatrosses (DIM, MAS, DIP) within the defined area during hauling. Rate for all interactions as a function of time and number of hooks hauled.



**Fig. 4.1** Interaction rates for the two treatments (Brickle curtain deployed and not-deployed) for (a) all species (no. /hour) (b) all species (no. /hook) (c) DIM, MAS, DIP (no. /hour) and (d) DIM, MAS, DIP (no. /hook). DIM, MAS, DIP: Black-browed Albatrosses, all Giant petrel species and Southern Royal Albatrosses. Box plots indicate variance, whiskers represent 95% confidence intervals and outlying points are shown.

Significant differences at  $P < 0.001$  between interaction rates during in the presence or absence of the Brickle curtain was observed for all species (Table 4.2; Fig 4.1). Despite low numbers of interactions by at risk species; black-browed albatrosses, giant petrels and southern royal albatrosses; significant differences ( $P < 0.05$ ) between the two treatments were recorded (Table 4.2; Fig 4.1). No interactions by

wandering albatrosses, grey-headed albatrosses and white chinned petrels were observed with either treatment.

## **5 Discussion**

Southern Ocean seabirds are typically long-lived, late to reach breeding maturity and exhibit low fecundity; as such populations are vulnerable to anthropogenic mortality. Within the Falkland's waters, where rich upwellings support a valuable commercial longlining industry, 8 species of albatrosses and petrels are commonly found (Barton, 2002; White et al., 2002). Populations of these species, including the black-browed and wandering albatross and white-chinned petrels are globally threatened, however the enforcement of effective mitigation measures is hoped to halt declining populations and improve the future prospects for albatrosses and petrels.

Two year after the implementation of tori lines, increased line weighting, prohibition of frozen bait and discarding during setting, Otley *et al.* (2007) reported significant reductions in sea-bird bycatch in Falkland Islands water to 0.005 birds per 1000 hooks in 2003/4. This figure was further reduced to 0.002 birds per 1000 hooks for 2005/6. The latest mortality rate reported for 2006/7 was 0.0034 birds per 1000 hooks (Fisheries Statistics, FIFD; 2007).

These mortality rates, consistent with the vast majority of published estimates, however, do not take into account possible delayed mortality as a result of injuries (particularly to the throat and bill) sustained by secondary hooking. Otley *et al* (2007) reported observed secondary hookings of 56 and 10 seabirds respectively in 2002/3 and 2003/4 seasons and annual estimates of between 46 and 239 birds hooked for these seasons, and since 2004 fifteen birds have been observed secondary hooked in Falklands waters, of which none resulted in immediate death (Unpublished data, FIFD).

Results reported in this study clearly show the efficacy of the Brickle curtain at maintaining these low figures of incidental mortality. The high resolution of the seabird behaviour recorded here facilitated a robust test of the effectiveness of the Brickle curtain at minimising bird interactions by reducing the number present within

a the high risk area. A reduction of 97% of the median rates of interaction for all species was observed when the Brickle curtain was deployed. As the presence of a seabird is an essential (and logical) precursor to negative interactions with the hooks/line, the Brickle curtain is thus a valuable mitigator against secondary hooking when deployed around the hauling bay.

A notable difference in general behaviour of bird species toward to hauling area was observed and is reflected in the interaction data. Larger bird species (giant petrels and albatrosses) appeared to show greater regard for the Brickle curtain and indeed the area surrounding the hauling bay (evident when the Brickle curtain was not deployed) and generally stood off at a distance of several meters. Small birds, such as cape petrels and fulmars, however appeared much less apprehensive of the hauling bay area, and, indeed, on many occasion were seen to associate the Brickle curtain in social activities much like a game. Even though larger species were generally less abundant than the smaller species around the hauling bay, and the number of interactions of larger species within this high risk area was very low, the Brickle curtain was still found to be a significant deterrent to these seabirds species.

This study also highlights the importance of the additional measure of prohibiting discards on the same side as the hauling bay during hauling operations. Interactions involving species most susceptible to secondary hooking, such as black-browed albatrosses and giant petrels, were recorded during periods when the Brickle curtain was present only when unhooked fish was available for foraging.

During this study the ‘umbrella system’ of longlining was used exclusively. In this system net umbrellas cover the hooks (and catch) during hauling in order to deter whale depredation (Moreno *et al.*, 2008). A net covering the fish and bait from view of the seabird is likely to further reduce the numbers of bird interactions and secondary hookings. It is recommended that the protocol established in this study is used to investigate the rates of secondary hookings in vessels using the ‘Spanish system’ to assess the role of both the Brickle Curtain and the umbrellas at reducing anthropogenic mortality.

Testing the effectiveness of the Brickle curtain at the end of winter (1 May – 31 Aug) and beginning of Prospecting (1 – 30 Sept) has the advantage of minimising the risk

to the birds (Reid et al, 2004). During this period, although the interactions are sufficiently high for valid analysis, non-aggressive foraging behaviour during the non-breeding season resulted in no high risk contacts. If further studies are conducted using this protocol in temporal periods associate with potentially higher interaction rates due to aggressive foraging, such as egg guarding or young chick periods (1 Oct – 31 Dec and 1 Jan – 28 Feb) caution must be excised as to avert research at the expense of the seabirds.

## **6 Conclusion**

Despite the inherent difficulty of estimating the number of vulnerable seabirds lost by delayed mortality resulting from secondary hookings and a dearth of data pertaining to secondary hooking mortality prior to the introduction of a number of mitigation measures for longliners in Falkland's waters, by recording high resolution interaction data this study demonstrated the effectiveness of the Brickle curtain at reducing bird interactions during hauling and quantified it's performance during the late winter/egg laying period in Falklands' waters. Together with prohibition of discard at the hauling bay and setting specific mitigation measures the continued use of the Brickle curtain is recommended to maintain target low rates of bird mortality.

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## **8 Appendices**

**Appendix 1 (overleaf)** Data form to be used for recording all necessary fields for independent studies



**Appendix 2 Bird Key:** Seabirds commonly encountered in the Falkland's waters arranged by order, family and species, and 3 letter codes used by FIFD to be used when recording seabird abundance and interactions. Note: many of these codes are different to those used by CCAMLR, BAS and Falklands Conservation.

			FIFD code
Order Procellariiformes	<b>Albatrosses, Petrels, Prions and Shearwaters</b>		
Family Diomedidae	<i>Diomedea</i> spp.	Great albatrosses	ALZ
	<i>Diomedea exulans</i>	<b>Wandering albatross</b>	DIO
	<i>Diomedea [empomorpha]</i>	<b>Royal albatrosses</b>	DIX
	<i>Thalassarche melanophrys</i>	<b>Black-browed albatross</b>	DIR
	<i>Thalassarche chrysostoma</i>	<b>Grey-headed albatross</b>	DIM
	<i>Phoebetria palpebrata</i>	<b>Light-mantled sooty albatross</b>	DIC
	<i>Phoebetria fusca</i>	Sooty albatross	PHE
			PHU
Family Procellariidae	<i>Macronectes</i> spp.	Giant petrel spp.	MAX
	<i>Macronectes giganteus</i>	<b>Southern giant petrel</b>	MAG
	<i>Macronectes halli</i>	<b>Northern giant petrel</b>	MAH
	<i>Fulmarus glacialis</i>	<b>Antarctic/Southern fulmar</b>	FUG
	<i>Daption c. capense</i>	<b>Cape petrel</b>	DAC
	<i>Thalassoica antarctica</i>	<b>Antarctic petrel</b>	THA
	<i>Pterodroma incerta</i>	<b>Atlantic petrel</b>	PEI
	<i>Pterodroma brevirostris</i>	<b>Kerguelen petrel</b>	APB
	<i>Pterodroma mollis</i>	<b>Soft-plumaged petrel</b>	PTO
	<i>Halobaena caerulea</i>	<b>Blue petrel</b>	HAC
	<i>Procellaria cinerea</i>	<b>Grey petrel</b>	PRC
	<i>Procellaria aequinoctialis</i>	<b>White-chinned petrel</b>	PRO
	<i>Pachyptila</i> spp.	Prion spp.	PAX
	<i>Puffinus gravis</i>	<b>Great shearwater</b>	PUG
	<i>Puffinus griseus</i>	<b>Sooty shearwater</b>	PFG
Family Hydrobatidae/Oceanitidae			OCE
	<i>Oceanites oceanicus</i>	<b>Wilson's storm-petrel</b>	OCO
	<i>Oceanites nereis</i>	<b>Grey-backed storm-petrel</b>	GAN
	<i>Fregatta tropica</i>	<b>Black-bellied storm-petrel</b>	FRT
Order Pelecaniformes			
Family Phalacrocoracidae	<b>Cormorants</b>		
	<i>Phalacrocorax</i> spp.	Blue eyed shag spp.	SHA
	<i>Phalacrocorax atriceps</i>	<b>Imperial Shag/King cormorant</b>	COR
Order Charadriiformes	<b>Skuas, Gulls and Sheathbills</b>		
Family Stercorariidae	<i>Catharacta antarctica</i>	<b>Antarctic/Brown/Falkland skua</b>	CAA
	<i>Catharacta chiliensis</i>	<b>Chilean skua</b>	CAT
Family Laridae	<i>Larus</i> spp.		
	<i>Larus dominicanus</i>	<b>Southern black-backed/Kelp gull</b>	LAD
	<i>Larus maculipennis</i>	<b>Brown-hooded gull</b>	LAM
Family Chionididae	<i>Chionis alba</i>	<b>Snowy sheathbill</b>	CHA
Family Sternidae	<i>Sterna</i> spp.	<b>Tern spp.</b>	STE
Order Sphenisciformes	<b>Penguins</b>		
Family Spheniscidae	<i>Aptenodytes patagonicus</i>	<b>King penguin</b>	APP
	<i>Eudyptes chrysocome</i>	<b>Rockhopper penguin</b>	EUR
	<i>Pygoscelis papua</i>	<b>Gentoo penguin</b>	PYP
	<i>Spheniscus magellanicus</i>	<b>Magellanic/jackass penguin</b>	SPM
	<i>Eudyptes chrysolophus</i>	<b>Macaroni penguin</b>	EUC

**Appendix 3** Summary of observed seabird interactions during hauling.

Species	Interaction	Behaviour	Outcome	Brickle curtain	
				Present	Absent
Cape Petrel	Proximity: within the BC area	flying	nil	26	784
		on water	nil	113	1101
	Pecks at unhooked fish or bait	diving	nil	0	11
		flying	nil	1	0
		on water	nil	5	29
		diving	nil	0	1
Black-browed Albatross	Proximity: within the BC area	on water	nil	0	20
	Pecks at unhooked fish or bait	on water	nil	0	2
Southern Royal Albatross	Pecks at unhooked fish or bait	on water	nil	0	3
Antarctic Fulmar	Pecks at unhooked fish or bait	on water	nil	0	1
Southern Giant Petrel	Proximity: within the BC area	on water	nil	0	1
	Pecks at unhooked fish or bait	on water	nil	0	2
Northern Giant Petrel	Proximity: within the BC area	flying	nil	0	2
		on water	nil	0	57
	Pecks at unhooked fish or bait	on water	nil	4	32
Giant Petrel sp.	Proximity: within the BC area	on water	nil	0	22
	Pecks at unhooked fish or bait	on water	nil	2	5
Total				151	2073