Small-vessel biological discharge and discharge management

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PARKER CONSERVATION

Introduction

Biological discharge (discards) a major attractant

Research focus larger vessels

Small-vessel practises relatively unknown
- Variable
- Parts of small-vessel fleet actively manage biological discharge

Scope

- characterise discharge practises on observed TWL and LL <28m

- explore influence discharge on seabird bycatch

- recommend small-vessel discharge management strategies

Definitions

Discards – biological discharge, or any edible biological material discarded overboard

Discard management practises (DMP) – control *timing* of discards relative to operations, and *position* of discarding relative to gear

Methods: review

Online search: research, reviews, reports, conference material
- Databases, targeted searches (RFMOs, CCAMLR, ACAP)

Contacted FMOs re work in progress

Observer data

Observer trip information
- Trip reports (edited, unedited)
- Observer diaries
- Information for seabird liaison programme

COD data tables for all fishing event and seabird bycatch data

Refine by size, year, fishing method
- TWL and LL vessels <28m, Oct 2013 - Dec 2016

Data extraction

stickers_removed	(y/n)	
mit_used_rept	Mitigation equipment use mentioned in report (y/n/unkn)	OR
mit_rept=COD?	Mitigation equipment use the same in report and COD (y/n)	OR, COD
mit_equip_used	Mitigation equipment used (b, n, o, t, w, unkn)	OR, COD
DM_rept_describes	Discard management described in report (y/n)	OR
DM_COD_describes	Discard management data in COD (y/n)	COD
DM_rept=COD?	Discard management information the same in report and COD (y/n)	OR, COD
bait_retained	Unused baits returned during haul retained on board during haul (y/n/unkn)	OR
offal_produced_disc	offal produced and discarded during fishing at any stage (y/n/unkn)	OR, COD
fish_heads_produced	fish heads produced, discarded any fishing stage (y/n/unkn)	OR, COD
fish_whole_disc	whole fish discarded any fishing stage (y/n/unkn)	OR, COD
shot_disc_any	Discarding of any material during setting or shooting (y/n/u)	OR, COD
tow_disc_any	Discarding of any material during tow (y/n/u)	OR, COD
haul_disc_any	Discarding of any material during haul (y/n/u)	OR, COD
hold_anystage	Holding of any material any fishing stage (y/n/u)	OR, COD
batching_any stage	Batch-discarding of material at any fishing stage (y/u)	OR
deckloss	Loss of material (fish, offal, baits) off vessel via deckwash, occurred (y) or managed (n)	OR
DM_class	Discard management class characterising discard actions (values specific to lining and trawl)	OR, COD
seab_bycatch_rept	Seabird bycatch documented in report (y/n)	OR

trip-level practise
(>2 or >10% events)

trip-level summary

DMP class

DMP classes 1-5 (most to least management of discards)

Different for trawl and longline
- Trawl classes - timing of discharge
- Longline classes also position of discharge

Class DMP lining	Definition
0	No discarded material any stage, OR held until after fishing
1	Discard of anything (offal, baits and/or fish) during breaks in haul OR batches in haul, offside/in wake
2	Discard anything in breaks/batches haul, haulside
3	Discard anything continuously in haul, offside/in wake
4	Discard anything continuously in haul, haulside
5	Any discards during setting
u	Unknown

Results

Trip reports for 193 small-vessel observer trips
- 67% of 287 observed trips in focal period

Compared with COD data for 7,008 fishing events
- Of 9,789 fishing events observed

	trips	vessels	size range (m)	events
bottom longline	45	31	8.5 – 25.4	908
surface longline	40	23	13.8 – 23	489
trawl	108	39	12 – 27	5611
Total	193	93		7008

Characterising DMP

Discharge practises, % of observed lining and trawl trips

	BLL	SLL	TWL
Discharge during fishing	55	75	59
Discharge actively managed	35	25	39
Zero discharge	18	3	26
Unknown	27	23	16

Characterising DMP lining

Longlining		BLL			SLL		
Lining DMP class		events	trips	%BLL trips	events	trips	%SLL trips
no discards any fishing stage	0	161	8	18	7	1	3
disc in breaks/batches haul offside	1	47	4	9	62	4	10
disc breaks/batches haul haulside	2	158	6	13	46	4	10
disc continuous haul offside	3	172	6	13	23	2	5
disc continuous haul haulside	4	189	9	20	242	20	50
disc set and haul	5	0	0	0	0	0	0
unknown	U	181	12	27	109	9	23
Total		908	45		489	40	

Retaining rare

More active DMP

Most frequent

No discharge during set

Problem of unknowns

Active DMP:

BLL
-Offside
-Haulside breaks/batches

SLL
-Breaks/batches offside and haulside

Characterising DMP trawl

Trawl				
Trawl DMP class		events	trips	%TWL trips
no discards any fishing stage	0	1195	28	26
disc tow, none shot & haul	1	2125	42	39
disc tow & haul, none shot	2	27	2	2
disc shot & tow, none haul	3	1215	15	14
disc shot, none tow & haul	4	236	3	3
disc all stages	5	30	1	1
unknown	U	783	17	16
Total		5611	108	

Also common

Most frequent

Disc during haul rare

Problem of unknowns

Characterising DMP

	BLL		SLL		TWL	
	trips	%BLL trips	trips	%SLL trips	trips	%TWL trips
Batch discarding						
batch discarding mentioned	3	7	7	18	12	11
no batching (continuous disc mentioned)	4	9	2	5	2	2
batching unknown	38	84	31	78	94	87
Discard type						
baits discarded (unkn bait discard)	12 (19)	27 (42)	16 (14)	40 (35)		
fish heads	3	7	1	3		
whole fish	11	24	6	15	60	56
offal	26	58	26	65	67	62
deck losses					3	3

Seabird capture summary

species	birds caught	capture rate
Buller's, white-capped & other albatrosses	158	1.614
Shearwaters and mid-sized petrels	124	1.267
Black petrels & other *Procellaria* petrels	78	0.797
Diving petrels, storm petrels & prions	332 (30)	3.391 (0.309)
Other: black-backed gull & Northern giant petrel	6	0.061

Mostly Buller's (58) and white-capped (45)
Also three Antipodean

	events	trips	trips with captures	%trips with captures	birds caught	capture rate
BLL	908	45	19	42	348 (46)	38.3 (5.6)
SLL	489	40	24	60	131	26.8
TWL	5611	108	33	31	91	1.6
Total	7008	193	76		570	

Seabird capture summary

Lining: most seabirds hooked
- Mainly setting (majority birds retrieved dead)
- Tangled birds also mostly set

Trawl: most seabirds caught in the net
- Net captures generally haul (mostly alive)
- Warp captures almost always dead

Seabird capture rates

Discharge is important

seabird capture rate highest on trips
with fewest actions to limit discharge
overboard

lining and trawl

Seabird captures lining

Lining DMP class	Class	BLL events	birds captured	capture rate	SLL events	birds captured	capture rate	
no discards any stage	0	161	8	5.0	7	0	0	
disc in breaks/batches haul offside	1	47	1	2.1	62	5	8.1	Offside
disc breaks/batches haul haulside	2	158	304 (2)	192.4 (2.6)	46	9	19.6	Haulside
disc continuous haul offside	3	172	2	1.2				
disc continuous haul haulside	4	189	16	8.5	242	85	35.1	Continuous haulside
disc shoot or haul	5							
unknown	U	181	17	9.4	109	32	29.4	
Total		908	348		489	131		

Seabird captures lining

Bait retention halves capture rate

		BLL				SLL			
		events	trips	birds caught	capture rate	events	trips	birds caught	capture rate
baits retained	y	208	14	7	3.4	137	10	27	19.7
baits discarded	n	236	12	20	8.5	183	16	56	30.6
unknown	unkn	464	19	321 (19)	69.2 (5.0)	169	14	48	28.4
Total		908	45	348		489	40	131	

Seabird captures trawl

Trawl DMP class	Class	events	birds captured	capture rate
no discards any stage	0	1195	25	2.1
disc tow, none shot & haul	1	2125	44	2.1
disc tow & haul, none shot	2			
disc shot & tow, none haul	3	1215	7	0.6
disc shot, none tow & haul	4	236	3	1.3
disc all stages	5	30	5	16.7
unknown	U	783	4	0.5
Total		5611	91	

Batching: 11% of trips, but linked to 3.6 *cf* 2.1 cap/100
　　　Real or artefact of large majority unkn

PSH codend: 28% of trips, 2.2 *cf* 1.4 capt/100
　　　Needs exploring further

Mit device effects lining

Lining capture rates with DMP:
pattern similar with tori line use

BLL

SLL

Highest least DM + tori
Lower disc in breaks/batches + tori
Lowest disc offside

Highest least DM + tori
Lower disc offside + tori

TWL baffler use reduces captures, across discharge categories

Baffler effects trawl

TWL		no device used		bird baffler		tori lines		other device	
		events	capture rate	events	capture rate	events	capture rate	events	capture rate
no discards any fishing stage	0	662	3.5	533	0.4				
disc tow	1	619	1.0	678	1.3	614	3.3	214	4.2
disc tow & haul	2								
disc shot & tow	3	1006	0.6	148	0			61	1.6
disc shot	4	58	0	92	0	86	3.5		
disc all stages	5								
unknown	U	581	0.7	167	0				

Baffler < other device types

Highest capture rate when other mitigation device used

Operational mit trawl

Sticker removal?
- Capture rate 0.3 *cf* 7.1 birds/100 events when not removed
- But only one known negative
- 77% trips unkn sticker removal

Net surface time?

Summing up

Discharge practises highly variable across small-vessel TWL, BLL, SLL fleets
    Target spp. pooled
    Also vessel variability

Active DMP 25% to 40% of vessels

Active DMP reduce seabird capture rates
    Particularly lining: DMP > mit device
    Trawl: device more influence on captures   } Combination approach

Recommendations

Reducing risk: Lining

Retain during fishing ▷

Hold during setting ✓

Offside discharge hauling ▷

Tori + other device/practise ▷

Haul mitigation ?

Night-setting + other ▷?

Lighting? ?

Recommendations

Reducing risk: Trawl

Retain during fishing   ✔▷
Tow discharge   ✔
Batch discharge   ?

Baffler effective   ✔▷
Warp captures   ?
Net cleaning   ?
PSH effects?   ?
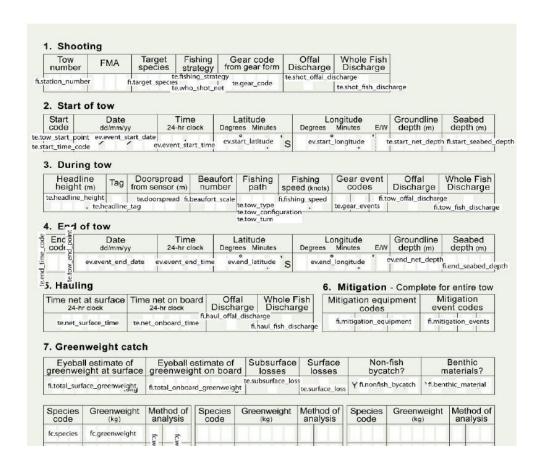Time at surface?   ?

Recommendations

Better understand risk and mitigation

Data-poor areas
Data completeness
- <null>
- Differing third; missing birds

Standardised recording of
discharge practises
More detail on seabird captures

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