

Seabird bycatch mitigation measures in pelagic fisheries

BirdLife International

On 14 October 2006 a workshop was held to prioritise research needed to address seabird bycatch mitigation in pelagic longline fisheries. In addition, the workshop participants shared knowledge on known and potential seabird bycatch mitigation measures in pelagic fisheries, examining the effectiveness of measures on both surface-foraging and diving seabirds, and their practicality and safety when used on fishing vessels. The workshop was organised by Washington Sea Grant, University of Washington, and was staged in Hobart to take advantage of experts present for the annual meeting of the ad hoc Working Group on Incidental Mortality Arising from Fishing (IMAF) of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR).

Recognising the intention of the WCPFC to discuss seabird bycatch mitigation measures in December 2006, and the seabird mitigation recommendation drafted by the 2006 meeting of the WCPFC Scientific Committee, this document summarises knowledge shared at the meeting. The attached table discusses strengths and weaknesses of each mitigation measure, the need for combinations of measures, and current data gaps (Table 1). A full copy of the workshop report is available at www.wsg.washington.edu.

Conclusions

- The seabird recommendation from the WCPFC Scientific Committee in August 2006 would be a highly constructive step to reduce seabird bycatch in the WCPFC area.
- With the exception of bait casters, the mitigation measures listed are a good depiction of measures believed to reduce seabird bycatch in pelagic fisheries. However, caveats are associated with most measures. This reiterates the point made at the WCPFC Ecosystem & Bycatch meeting on the need to use combinations of measures. All fisheries in which seabird bycatch mitigation has been successful have found that combinations of measures are essential. As stated at the WCPFC Ecosystem & Bycatch meeting, the strength of the Column A and Column B approach is that it requires such combinations while also providing flexibility to select the combination most suited to their vessel.
- Streamer lines, night setting and weighted branch lines can be highly effective mitigation measures when used properly and in combination. Side-setting has been found effective in Hawaiian fisheries when combined with line weighting and a setting curtain. However, research is urgently needed to test the effectiveness of side-setting in the Southern Ocean, where deeper-diving seabird species are common. Further testing is also recommended on the effectiveness of blue-dyed squid in the Southern Ocean, on the effectiveness of lineshooters, and on best practises for offal management. A plan for research developed across pelagic fishery RFMOs would provide the necessary tools to reduce seabird mortality in pelagic fisheries worldwide.
- As noted at the 2006 WCPFC Scientific Committee meeting, the recommendations on seabird mitigation measures should be considered as interim. Measures will need to be re-evaluated as more information becomes available through research.

Recommendation to the Third Meeting of the WCPFC

- A seabird Conservation Measure based on the recommendation from the WCPFC Scientific Committee would be a highly constructive step to reduce seabird bycatch in the WCPFC area. The strength of the recommendation lies in its requirement for the use of two mitigation measures, providing the necessary use of a combination of measures, while also providing flexibility for fishermen to select the combination most suited to their vessel.

Table 1. Review of seabird bycatch mitigation measures listed in the seabird recommendation from the WCPFC Scientific Committee

Column A	Scientific evidence for effectiveness in pelagic fisheries	Caveats /Notes	Need for combination	Research needs	Minimum standards
Night setting	Duckworth 1995; Brothers et al. 1999; Gales et al 1998; Klaer & Polacheck 1998; Brothers et al. 1999; McNamara et al. 1999; Gilman et al. 2005; Baker & Wise 2005.	Less effective during full moon, under intensive deck lighting or in high latitude fisheries in summer. Less effective on nocturnal foragers e.g. White-chinned Petrels (Brothers et al. 1999; Cherel et al. 1996).	Recommend combination with tori lines and/or weighted branch lines	Data on current time of sets by WCPFC fisheries. Effect of night sets on target catch for different fisheries.	Night defined as nautical dark to nautical dawn
Side setting	Brothers & Gilman 2006; Yokota & Kiyota 2006.	Only effective if hooks are sufficiently below the surface by the time they reach the stern of the vessel. In Hawaii, side-setting trials were conducted with bird curtain and 45-60g weighted swivels placed within 0.5m of hooks. Japanese research concludes must be used with other measures (Yokota & Kiyota 2006).	Must be combined with other measures. Successful Hawaii trials use bird curtain plus weighted branch lines. In Southern Hemisphere, strongly recommend use with tori lines until side-setting is tested in the region.	Currently untested in the Southern Ocean against seabird assemblages with diving seabirds and albatrosses - urgent need for research. In Japan, NRIFS will continue testing in 2007.	In Hawaii, side setting is used in conjunction with a bird curtain and 45 weighted swivel within 1m of the baited hook.
Single tori line	Imber 1994; Uozomi & Takeuchi 1998; Brothers et al. 1999; Klaer & Polacheck 1998; McNamara et al. 1999; Boggs 2001; CCAMLR 2002; Minami & Kiyota 2004. Melvin 2003.	Effective only when streamers are positioned over sinking baits. In pelagic fisheries, baited hooks are unlikely to sink beyond the diving depths of diving seabirds within the 150m zone of the tori line, unless combined with other measures such as line weighting or underwater setting. Entanglement with fishing gear can lead to poor compliance by fishers and design issues need to be addressed. In crosswinds, tori line must be deployed from the windward side to be effective.	Effectiveness increased when combined with other measures e.g. weighted branch lines and/or night setting	Optimal design for pelagic fisheries still under development: refine to minimise tangling, optimise aerial extent and positioning, and ease hauling/retrieval. Current research by Ed Melvin (Washington Sea Grant), also program for small vessels by Global Guardian Trust in Japan. Controlled studies demonstrating their effectiveness in pelagic fisheries remain very limited.	Current minimum standards for pelagic fisheries are based on CCAMLR Conservation Measure 25-02

Table 1 continued.

Column B	Scientific evidence for effectiveness in pelagic fisheries	Caveats /Notes	Need for combination	Research needs	Minimum standards
Paired tori line	Two streamer lines best in crosswinds to maximise protection of baited hooks (Melvin et al. 2004).	Potentially increased likelihood of entanglement - see above. Development of a towed device that keeps gear from crossing surface gear essential to improve adoption and compliance.	Effectiveness will be increased when combined with other measures. Recommend use with weighted branch lines and/or night setting	Development and trialling of paired streamer line systems for pelagic fisheries.	
Weighted branch lines	Brothers 1991; Boggs 2001; Sakai et al. 2001; Brothers et al. 2001; Anderson & McArdle 2002; Gilman et al. 2003a; Robertson 2003; Lokkeborg & Robertson 2002, Hu et al. 2005.	Supplementary measure. Weights will shorten but not eliminate the zone behind the vessel in which birds can be caught. Even in demersal fisheries where weights are much heavier, weights must be combined with other mitigation measures (e.g. CCAMLR Conservation Measure 25-02).	Must be combined with other measures e.g. tori lines and/or night setting	Weight and position of weight both affect sink rate. Further research on weighting regimes needed. Safety issues and effect on target catch must be considered. Research on use of integrated-weight branch lines in pelagic fisheries also needs further exploration.	Global minimum standards not yet established. Requirements vary by fishery and vessel. Hawaii minimum requirements are 45g less than 1 m from hook. Australia requires 60 or 90g located 3.5 or 4 m from the hook, respectively.
Blue dyed bait	Boggs 2001; Brothers 1991; Gilman et al. 2003a; Minami & Kiyota 2001; Minami & Kiyota 2004; Lydon & Starr 2005. Double and Cocking, in press.	New data suggests only effective with squid bait (Double & Cocking). Onboard dyeing requires labour and is difficult under stormy conditions. Results inconsistent across studies.	Must be combined with tori lines or night setting	Need for tests in Southern Ocean.	Mix to standardized colour placard or specify (e.g. use 'Brilliant Blue' food dye (Colour Index 42090, also known as Food Additive number E133) mixed at 0.5% for a minimum of 20 minutes)
Line shooter	Reduced bycatch of Northern Fulmar in trials of mitigation measures in North Sea, Lokkeborg & Robertson 2002; Lokkeborg 2003. Increased seabird bycatch in Alaska (Melvin et al. 2001).	Supplementary measure. No published data for pelagic fisheries. May enhance hook sink rates in some situations but will not eliminate the zone behind the vessel in which birds can be caught. More data needed. Found ineffective in trials in North Pacific demersal longline fishery (Melvin et al. 2001).	Must be combined with other measures such as night setting and/or tori lines or weighted branch lines	Data needed for pelagic fisheries.	Not established

Table 1 continued.

Column B	Scientific evidence for effectiveness in pelagic fisheries	Caveats /Notes	Need for combination	Research needs	Minimum standards
Bait caster	Duckworth 1995; Klaer & Polacheck 1998.	Not a mitigation measure unless casting machines are available with the capability to control the distance at which baits are cast. This is necessary to allow accurate delivery of baits under a tori line. Needs more development. Few commercially-available machines have this capability.	Not recommended as a mitigation measure.		
Underwater setting chute	Brothers 1991; Boggs 2001; Gilman et al. 2003a; Gilman et al. 2003b; Sakai et al. 2004; Lawrence et al. 2006.	For pelagic fisheries, existing equipment not yet sturdy enough for large vessels in rough seas. Problems with malfunctions and performance inconsistent (e.g. Gilman et al. 2003a and Australian trials cited in Baker & Wise 2005)	Not recommended for general application	Design problems to overcome	Not yet established
Management of offal discharge	McNamara et al. 1999; Cherel et al. 1996.	Supplementary measure. May reduce the number of birds attracted to the vessel, and strategic discharge can be used to distract birds. Effectiveness in pelagic fisheries is not well established. There may be storage space constraints on smaller vessels.	Must be combined with other measures	Further information needed on effects in pelagic fisheries (long and short term)	Not yet established for pelagic fisheries. In CCAMLR demersal fisheries, discharge of offal is prohibited during line setting. During line hauling, storage of waste is encouraged, and if discharged must be discharged on the opposite side of the vessel to the hauling bay.
Thawing bait	Brothers 1991; Duckworth 1995; Klaer & Polacheck; Brothers et al 1999.	Supplementary measure. Must be combined with other measures. If lines are set early morning, full thawing of all bait may create practical difficulties.			

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Appendix: Seabird bycatch mitigation measures recommended by the WCPFC Scientific Committee in August 2006.

1. All longliners should thaw their bait before it is deployed.
2. In addition, south of 30°S and north of 23°N, CCMs should require their longline vessels to use at least two of the mitigation measures presented in Table 1, including at least one from Column A.

Table 1: Recommended mitigation measures

Column A	Column B
Side setting [with bird curtain]	Tori line*
Night setting with minimum deck lighting	Weighted branch lines
Tori line	Blue-dyed bait
	Deep setting line shooter
	Bait caster
	Underwater setting chute
	Management of offal discharge

* If tori line is selected from both column A and column B this equates to simultaneously using two (i.e. paired) tori lines.

3. In other areas, where necessary, CCMs are encouraged to employ one or more of the seabird mitigation measures listed in Table 1.
4. Other mitigation measures may be tested under *bona fide* research programmes.
5. Every effort should be made to ensure that seabirds captured alive during longlining are released alive and that wherever possible hooks are removed without jeopardising the life of the seabird concerned.
6. CCMs are encouraged to seek feedback from fishers and observers on the effectiveness and practicality of mitigation measures.
7. These measures should be reviewed regularly, particularly when information becomes available on new or existing measures or on seabird interactions from observer or other monitoring programmes. An updated suite of recommended measures should then be considered.
8. To the extent possible CCMs should endeavour to harmonise their NPOAs with these measures.