Agreement on the Conservation of Albatrosses and Petrels

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Seabird mortality in the Ecuadorian artisanal demersal longline fishery- an update, and priorities

BirdLife International

SUMMARY

- Between 2010 and 2013 the Albatross Task Force observed 415,070 hooks in the Santa Rosa artisanal demersal longline fishery.
- Bycatch peaked in 2010 with a total rate of 0.42 birds/1000 hooks. Bycatch rates were much lower in subsequent years, and the average was 0.11 birds/1000 hooks.
- Experimental line weighting trials were conducted of 900 g concrete weights versus 450 g stone weights each placed at 50 m. Increased sink rate was recorded, but we were unable to determine the effect on bycatch reduction.
- Plastic bottles filled with sand are currently being used as line weights in this fishery; we recommend that further work is conducted to provision optimum line weighting.

1. INTRODUCTION

Investigations into seabird bycatch in the Santa Rosa artisanal demersal longline fishery in Ecuador were conducted by the Albatross Task Force (ATF) between 2010 and 2013, due to the overlap of the Critically Endangered waved albatross (*P irrorata*), with the fishery (Anderson *et al.,* 2003), and the potential for bycatch events. The waved albatross declined by 42% in just 13 years (Anderson *et al.,* 2008), and the number of breeding adults has been declining by 6.3% per year since 2007 (Street, 2013), putting this species at high risk of extinction. Results obtained during ATF investigations from 2010/2011 into seabird abundance, and the effect of experimental line weighting were presented to ACAP (BirdLife International, 2011). One of the future aims at that time was to further quantify the level of seabird bycatch in the fishery, and to investigate the effect of line weighting on seabird

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mortality and target catch. American Bird Conservancy (ABC) conducted experiments in the fishery and developed the NISURI "fast setter" (Brothers *et al.,* 2014). In 2012 a workshop was held to discuss the results of experimental research conducted by the ATF and ABC, an information paper was submitted to ACAP (SBWG5 Doc 55) describing the outcomes.

In this report we describe an overview of the results of these further investigations between 2012 and 2013, as well as giving an update of current priorities for this fishery.

2. METHODS AND MATERIALS

A full description of the study area, fishing vessels, fishing gear and operation are documented in SBWG-4 Doc 23. The onboard protocol and method of data analysis for weight sink rates are also described.

2.1 Data Review

Data collected by five observers was compiled into a single spreadsheet. We reviewed the data and found several trivial formatting and data entry issues which were cleaned and double-checked by referring back to the original observer deck sheets. The results presented in this report have the following limitations;

1. Not all observers recorded the effort (number of hooks) for every set. To allow for this, missing effort values (n=118) were replaced using the number of hooks from the same vessel, first from the same trip, then from adjacent trips. Or ultimately from the closest date available;
2. The time (hh:mm) associated with setting operations was missing from 36 sets and omitted from original deck sheets. This data collection error could not be corrected nor could replacement values be allocated.

These data limitations were not found for trips where seabird bycatch occurred.

3. RESULTS

3.1 Observed effort

Between 19th August 2010 and June 28th 2013 seabird bycatch and abundance data was collected from a total effort of 415,070 hooks, during 833 sets on 22 vessels in the Santa Rosa long line fishery.

3.2 Abundance

Twenty five seabird species were recorded during seabird abundance counts. Of these, four were present in more than 50% of abundance counts: the Magnificent frigatebird *Fregata magnificens* (88.84%), the Waved albatross *Phoebastria irrorata* (80.55%), the Blue-footed booby *Sula nebouxii* (69.39%) and the Parkinson's petrel *Procellaria parkinsoni* (60.50%). All other species were seen in less than 30% of counts (see table 1).

Seabird abundance varied throughout the year, with much higher abundance seen at certain times of year. Waved albatross were recorded in highest numbers during August and September (see figure 1), months which coincide with all records of Waved albatross bycatch in the fishery.

Table 1. Frequency of Occurrence (F.O.) and summary information of susceptible seabird species observed during abundance counts.

Species	Average	SD	Max	F.O%
Fregata magnificens	17.73	14.42	104	88.84
Phoebastria irrorata	8.61	10.00	94	80.55
Sula nebouxii	5.14	7.38	50	69.39
Procellaria parkinsoni	4.27	7.87	73	60.50
Pelecanus occidentalis	1.58	4.05	31	27.97
Ardenna creatopus	0.74	1.57	10	25.81
Sula leucogaster	2.85	6.58	42	25.21
Larus sabini	0.77	2.34	18	19.57
Ardenna griseus	0.72	3.38	40	16.81
Pelecanus thagus	0.55	2.07	24	16.09
Pterodroma phaeopygia	0.54	6.02	100	11.28
Larus atricilla	0.59	3.16	35	6.84
Sula variegata	0.33	1.96	20	3.00
Stercorarius pomarinus	0.08	0.35	2	2.88
Sula sula	0.03	0.28	6	1.92
Sula granti	0.02	0.17	2	1.92
Larus dominicanus	0.05	0.61	9	0.96
Sula dactylatra	0.01	0.11	1	0.60
Thalassarche bulleri	0.00	0.03	1	0.12

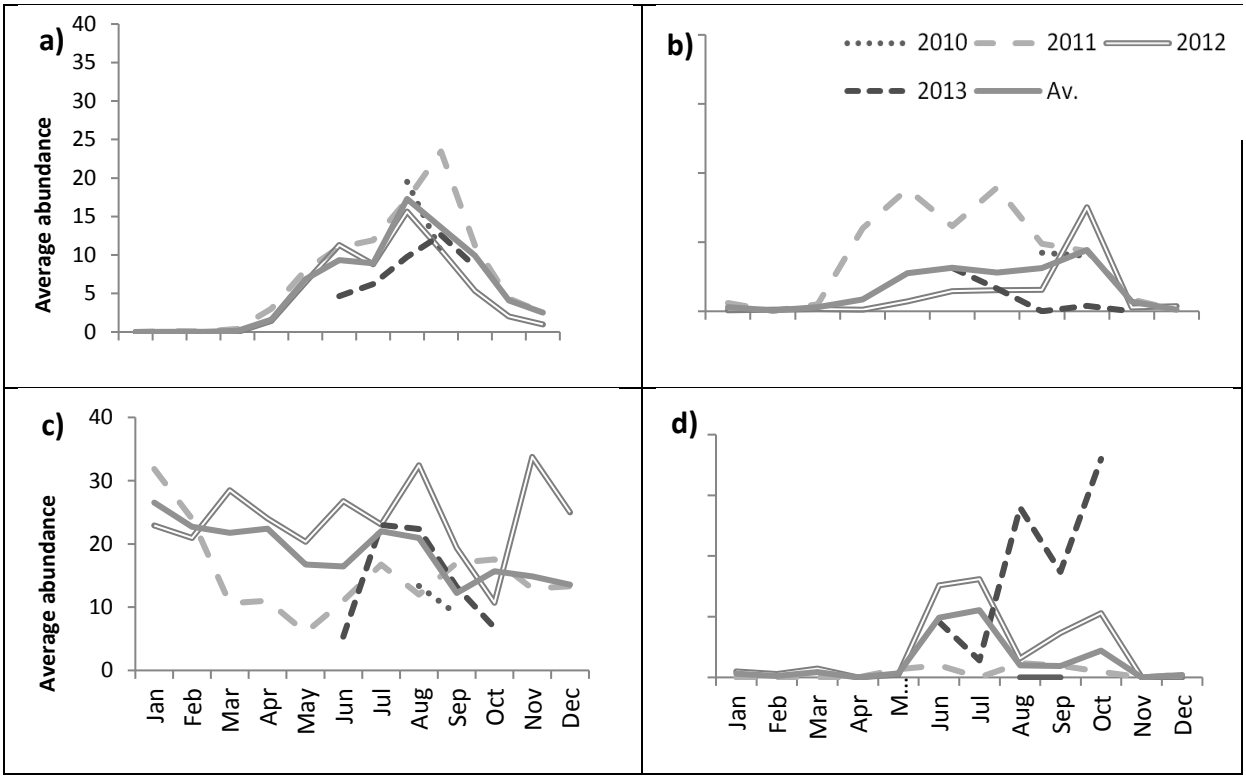

Figure 1. Average monthly abundance each year of the four most commonly seen species; a) Waved albatross, b) Parkinson's petrel, c) Magnificent frigatebird and d) Blue-footed booby.

3.3 Seabird interactions

From our total observed effort of 415,070 hooks, 31 seabirds were caught at a Bycatch Per Unit Effort (BPUE) of 0.07 birds/1,000 hooks. Total bycatch rates varied by season and year from 0 to 0.17 birds per 1,000 hooks (Table 2). All seabird mortality was recorded during daylight sets deployed between the months of July-September (Table 3). No bycatch was recorded from observations in 2013.

Seabird bycatch occurred on five of the 22 vessels monitored. Seabirds captured on the set drowned and were retrieved on the haul. Those caught on the haul survived and were released alive. The two outcomes are treated separately below.

3.3.1 Seabird mortality

A total of 12 birds were caught on the set and drowned; the Critically Endangered Waved albatross, *P. irrorata* [*n*=*8,* 66.6%] the Vulnerable Parkinson's petrel, *P. parkinsoni* [*n*=3, 25.0%], and the Least Concern blue-footed booby *S*. *nebouxii* [*n*=1, 8.3%]. All lethal bycatch occurred in 2010, with the exception of the blue-footed booby that was killed in 2012. In 2010 the mortality rate for the Waved albatross and Parkinson's petrel was 0.12 and 0.05 birds/1,000 hooks, respectively.

3.3.2 Seabirds caught and released alive

Of the 31 birds caught, 19 were recovered alive including 13 waved albatross [68.4%] Parkinson's petrel [*n*=5, 26.3%], and blue-footed booby [*n*=1, 5.2%]. Bycatch of birds released alive was highest in 2010 with 16 individuals, with two and one birds caught in 2011 and 2012, respectively.

Table 2: Summary of seabird bycatch over time in the Ecuadorian demersal longline fleet

Year	Total Hooks	Birds Dead	Birds Alive	Total bycatch	Birds dead/1000 hooks	Total bycatch/1000 hooks
2010	65,023	11	16	27	0.17	0.42
2011	171,157	0	2	2	0.00	0.01
2012	155,980	1	1	2	0.01	0.01
2013	22,910	0	0	0	0.00	0.00
Total	**415,070**	**12**	**19**	**31**	**0.03**	**0.07**

Table 3: Summary of number of birds (BPUE) captured by season for the three species impacted by the fishery

Quarter	*Phoebastria irrorata*			*Procellaria parkinsoni*			*Sula nebouxii*		
	Birds dead	**Released alive**	**Total bycatch**	**Birds dead**	**Released alive**	**Total bycatch**	**Birds dead**	**Released alive**	**Total bycatch**
Jan-Mar	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Apr-Jun	0 0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Jul-Sep	8 (0.05)	12 (0.07)	20 (0.11)	3 (0.02)	4 (0.02)	7 (0.04)	1 (0.01)	1 (0.01)	2 (0.01)
Oct-Dec	0 (0.00)	1 (0.01)	1 (0.01)	0 (0.00)	1 (0.01)	1 (0.01)	0 (0.00)	0 (0.00)	0 (0.00)
Year average	**(0.02)**	**(0.03)**	**(0.05)**	**(0.01)**	**(0.01)**	**(0.02)**	**(0.002)**	**(0.002)**	**(0.004)**

3.4 Experimental line weighting

We compared 900 g concrete weights versus 450 g stone weights each placed at 50 m intervals along the main line. Results indicating an improved sink rate were presented to ACAP in 2011 (SBWG-4 Doc 23). The experimental trials were continued throughout 2012 and 2013, however no seabird bycatch was recorded on either treatment. As such, we were unable to compare results of the effectiveness of line weighting on seabird bycatch in the longline fishery.

4. DISCUSSION

Our results demonstrate seabird mortality in 2010 at levels which were not observed again during a subsequent monitoring effort of 676 sets throughout 2011-2013. Seabird abundance was not higher in 2010 compared to other years and this factor, known to exacerbate seabird bycatch elsewhere, does not explain annual variation in seabird mortality.

The majority of observed bycatch occurred over a month period from 25 August - 25 September 2010, on five vessels of the fleet. The sets that caused bycatch all took place in daylight hours. Fatal bycatch was only recorded between July and September, which coincides with the months with the highest abundance of Waved albatross and Parkinson's petrel. Bycatch that resulted in birds being released alive occurred also between July and September and in November.

We were unable to draw further conclusions on bycatch reduction levels from line weighting experiments as we did not see significant levels of bycatch in the fishery after 2010 in either the experimental or control treatment.

A joint workshop with the American Bird Conservancy was held with representatives of the fishing industry in November 2012 (SBWG-5 Doc 55). Discussions in the workshop suggested that there had been a gradual evolution in fishing gear across the fleet towards using heavier line weighting, which may explain the reduced bycatch rate observed in 2011-13. Our recommendation was therefore to incorporate 900 g concrete weights at 50 metre intervals in the fishery.

Since the workshop, vessel owners have began to use plastic bottles filled with sand as an alternative weighting regime (Brothers *et al.,* 2014), which may lead to variations in bottle

content including inappropriate materials, inevitable damage and therefore loss of mass plus a likely source of plastic pollution.

4.1 Future objectives

As seabird bycatch occurred during a single year, and no clear reason for the reduction in bycatch has been possible to identify, it must be considered a risk that bycatch could increase in this fishery again. We recommend therefore that the fishery is reviewed to ascertain current information on fishing gear configurations and fishery operations. We also recommend a project is developed to provision optimum line weights for the fleet. Future activities could include:

1. A port survey to engage demersal longline captains [target 100% of active captains] to identify the current fishing gear configurations being employed on vessels of the fleet;
2. Liaise with the local fishing community and manufacturers to develop optimum line weights designs for the demersal longline fishery. The line weight design should minimise the chance of entanglement with the sea substrate and maximise the sink rate of baited hooks. Weights should have a minimum mass of 900 g and include a simple and durable mechanism to attach the weights to the longline;
3. Line weights should be designed to be compatible with the NISURI fastsetter;
4. Procure sufficient weights for provision to all vessels of the demersal longline fishery. Provision of weights on completion of an educational / awareness workshop on the issues [and solutions to] bycatch of vulnerable taxa and reduction of plastic pollution in the oceans;

5. REFERENCES

Anderson, D.J., Huyvaert, K.P., Wood, D.R., Gillikin, C.L., Frost, B.J. and Mouritsen, H., *2003*. At-sea distribution of waved albatrosses and the Galapagos Marine Reserve. Biological Conservation, 110(3), pp.367-373.

Anderson, D.J.; Huyvaert, K.P.; Awkerman, J.A.; Proaño, C.B.; Milstead, W.B.; Jiménez-Uzcátegui, G.; Cruz, S.; Grace, J.K. *2008*. Population status of the critically endangered Waved Albatross Phoebastria irrorata, 1999-2007. Endangered Species Research 5(2-3): 185-192.

BirdLife International. 2011. Developments in experimental mitigation research- Artisanal demersal longline fishery (Ecuador). SBWG-4 Doc 23. Fourth Meeting of the Seabird Bycatch Working Group Guayaquil, Ecuador, 29 August – 2 September 2011.

Ecuador. 2013. Informe del Taller de presentación de los avances y resultados de los programas dirigidos a la reducción de la mortalidad de los Albatros de Galápagos (Phoebastria irrorata) en Ecuador. SBWG5 Doc 55. Fifth Meeting of the Seabird Bycatch Working Group La Rochelle, France. 1 – 3 May 2013.

Brothers, N., Freifeld, H., Suarez, G., and Wallace, G. 2014. NISURI Fastset – a simple, cheap and effective artisanal demersal longline setting system to reduce seabird bycatch. SBWG6 Doc 14. Sixth Meeting of the Seabird Bycatch Working Group Punta del Este, Uruguay, 10 - 12 September 2014.

Street, P.A. *2013*. Abundance, survival and breeding probabilities of the critically endangered Waved Albatross. MSc thesis. Colorado State University, Fort Collins, Colorado, USA. 116 pp.