Agreement on the Conservation of Albatrosses and Petrels

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Hook Pod Update

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Introduction

The Hook Pod , designed and developed through collaboration between BirdLife International and Fishtek Ltd, is an emerging mitigation measure designed to mitigate the incidental capture of seabirds during pelagic longline fishing operations. The Hook Pod is designed to easily attach to pelagic longline gear and prevents incidental seabird capture by protecting the barb of the hook during setting operations. Once the fishing gear sinks to a predetermined depth, the pod opens, releasing the hook to begin fishing. The pod is then simply retrieved during hauling operations closed and stored in standard setting bins until the next set.

Background

At the third meeting of the SBWG, we reported on 2009 trials onboard *FV Strike Force* in the Australian East Coast Tuna Aad Billfish Fishery (ETBF) to investigate how hook pods fit in the deck practices and setting, hauling and storage practices. These trails indicated that the pod would integrate well into standard fishing practices, and helped us identify several areas for improvement (SBWG 3Doc 17). From the start of the development of the pod in 2007, we have worked closely with fishermen to incorporate improvements, including a spring loaded gate to enable the rapid and safe loading of the hook, and a twist collar to enable a quick retro-fit to the longline.

In November 2010, we conduct further trials in the ETBF (onboard the *FV Vanessa S*) with a prototype pressure release mechanism (closed diaphragm) incorporated for the first time. Previous trials in 2008 (Tasmania) and in 2009 had used closed cell foam to achieve the appropriate release depth, but this was always a temporary solution as the foam required replacing after a few sets and did not open with the precision required.

In the 2009 and 2010 trials, two different methods of storing the hook pods in the setting bins were trialed (1) pods were left hanging from the swivels in the bin (Figure 1), and (2) pods were fleeted into the bin along with the branchline (Figure 2). Both methods worked well with no issues with entanglements in our out of the box. In 2010, we added lead weight to the inside of the pod to increase its weight. Using CEFAS G5 Time Depth Recorders (TDRs) we investigated the sink rate of the pod with >60g of weight 'on the hook' compared to a standard weighted swivel placed at 3.5m form the hook. The pod achieved a sink rate 0.475m/second (for dead bait) for the first 2 m. Further sink rate data are available in Appendix I and sink rates under controlled (pool) conditions are available in SBWG-4 Doc 5.

The trials in November 2010 provided more useful data including the second set of trials when the pod was used successfully with a range of bait types and hooking positions (large and small fish, live bait and squid). However, we did encounter some difficulties, including, some release mechanism failures and latches loosening, which enabled hooks to fall out of the pod.

Figure 1 Hook Pods clipped onto the swive

Figure 2 Hook Pods fleeted into the setting box

On-shore development 2010/11

The pressure release mechanism has proved the most challenging element to develop as the pod can potentially be taken to depths of several hundred metres, which creates immense pressure. The difficulties experienced in November 2010 led to a major rethink of the diaphragm, and a completely new approach was taken to the design of the release mechanism. Fishtek completely redesigned the pressure release mechanism (and the springs and latches) to develop an open top cylinder with an O ring sealed piston forming one end. When the pod is closed, the cylinder is sealed forming an air tight chamber. As the pod sinks to depth, the pressure increases and the piston moves up the cylinder, opening the latches, releasing the baited hook. This has been designed to open at 10m ± 1m. But the advantage of the new release mechanism is that is can easily be adjusted to open at any target depth down to 100m. We are currently in discussions with several people/organisations who are interesting in trialing the pod in fisheries with marine turtle bycatch as it is possible that by setting the release depth at >40m the baited hook would pass through the turtle 'danger zone' before being released. It is too early to know if the pod will be effective at reducing turtle bycatch, but the potential of cross taxa mitigation measure is a promising development.

2011 pilot trials

One hundred new prototype pods were manufactured and assembled in May 2011 and sent to Brazil for a three-day pilot to test the new release mechanism and associated latches to confirm that it was functioning correctly before we commenced longer-term trails in late July 2011. The trial was conducted in Brazil onboard FV *Anarthur* , an 18m pelagic longline vessel operating from Itajia.

We chartered the vessel and conducted the trip in order to achieve the maximum sample size possible over three days. A total of 20 lines (1,033 hooks) were set and hauled over four days fishing from the 29th May to the 1st June 2011, between 26°58' S, 048°01' W and 27°40' S, 047°36' W. Between 50 and 53 branch lines were deployed per set. Lines were set immediately after hauling was completed and the soak time between sets did not exceed 30 minutes. Between two and eight lines were set per day.

Pelagic fishing gear was configured using the American System, and included a continuous 3.8 mm monofilament mainline with branched 2.0 mm monofilament branch lines. Branch lines consisted of a snap which connected the branch line to the mainline, a 17.0 m top section, an un-weighted swivel, 2.0 m of bottom section and a 0.9 m wire tracer placed before the hook. The hook pods were attached to the branch line directly below the un-weighted swivel and a 40 g Safe Lead attached directly below the pod[1].

All branch lines were monitored on the set and haul to detect mechanical or operational problems with the hook pods and/or fishing gear. Of the 1,033 hooks set, 94.5% were deployed and retrieved without incident. Non of the problems encountered occurred on more than 1% of hooks observed (Table 1). The crew members adapted easily to the set and haul operation and commented that the pods did not represent an additional effort in the routine.

[1] The latest version of the pod, that was not available at the time of these trials weighs 70 g, but the model used in this trial did not have the weight included, because the housing had been designed to contain and LED (see below) not the lead weight as the previous prototype had contained. Hence, the Safe Lead was added above the pod to simulate the weight of the new pod.

Table 1: Summary of set and haul data for hook pods deployed during pilot tests in brazil during May 2011.

Comment	Number	% of total
Pod returned having opened correctly	976	94.48
Single over-hand knot below the pod found on hauling	10	0.97
Pod pops open during setting operation	9	0.87
Gear tangled during setting operation	9	0.87
Tangled line due to break in tori line during set	9	0.87
Pod returned closed, but having released the hook	7	0.68
Gear tangled during haul operation	5	0.48
Pod returned with hook still locked during haul	3	0.29
Pod does not close correctly after hauling	2	0.19
Gate was broken (repaired)	1	0.10
Pod not opened, but due to position next to float (<10 m)	1	0.10
Pod opened but hook was trapped in chamber	1	0.10
Total general	1033	100.00

The results of these trials were very promising and gave us the confidence that the new pressure release mechanism was working as designed. It also highlighted a few issues that we worked to refine prior to manufacturing 500 units for longer-term, trials which started in Brazil in late July 2011.

Post May 2011 developments

Many pelagic longline fisheries use disposable chemical light sticks, which are recognised as a major source of marine pollution with millions being discarded into the world's oceans each year. In addition to the new release mechanism, in 2010/11 a LED light (and associated circuitry) was developed specifically to be incorporated into the housing of the pod. The current prototype is a flashing light that is operated by a magnetic 'read' switch so it is turned on when the pod opens and releases the hook and is switched off during the haul when the pod is closed. The LED is driven by two small alkaline batteries and will last up to 1000hrs in flashing mode. If the pod proves to be effective at reducing seabird bcyatch and is taken up by fisheries, the inclusion of LED in the pod will remove the need for disposable light sticks in many fisheries and make the economics of the pod much more attractive to fishermen. The inclusion of the LED meant that the lead weight that had been incorporated inside the pod could no longer be housed internally. To replace this, the collar which attaches the pod to the

brancline which was originally made of polycarbonate, was replaced with a brass collar. This makes the collar more rigid/strong and also gives the pod a total weight of around 75g, an increase form 60g. This may mean that the sink rates reported in SBWG-4 Doc 5 may be slightly improved.

The fact that a few hooks (7) were released without the pod opening, 9 pods opened during setting and further 9 would not close properly after hauling suggested that there was still a slight problem with the side latches that hold the pod closed tight. These were remodeled with new stronger springs and a new nylon material that gripped the polycarbonate pod housing more tightly. Several other minor modifications were made to try to try to iron out a few other minor problems.

Next steps

We are currently conducting medium term at-sea studies in Brazil that we plan to continue until September /October 2011. These trails were designed to investigate the following:

1) the long term operational ease and durability of the pod, and associated LED;
2) the effectiveness of the pod at reducing seabird bycatch during the peak season in Brazilian water;
3) to start to investigate if the pod has any effect on the catch rate of target species.

Once these trails are completed we will assess our next steps but we are in the early stages of planning trails in South Africa for 2012 and hope to conduct further trials in Australia, and possibly New Zealand. While we have a some way to go before we can prove the effectiveness and durability of the pod, the critical ingredient to effective bycatch mitigation is to provide fishermen with an option that is easy to sue, cost effective and has operational or economic advantages to their business. The pod has these features.

Acknowledgements

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Thanks also to the team at Projeto Albatroz for their fantastic work to organise the preliminary trials in 2011, and the skipper and crew of the FV *Anarthu.*

Appendix I

To investigate the sink rate of baited hooks with hook pods and compare that with the sink rate of standard gear in the ETBF (60g lead swivel (LSW) placed 3.5m from the hook), Time-Depth-Recorders (TDRs, Wildlife Computer MK9) were added to a selection of branchlines with bait pods and to two branchlines with 'standard' gear. TDR were attached adjacent to the bait pod or 15cm from the hook on 'standard' gear on branchlines that were close to the middle of a 'bubble set' i.e. branchlines number 3 or 4 out of 7.

The TDRs indicated that the baited hook inside the bait pod sank to two metres at 0.4725 m/sec, which is around twice the speed of the 'standard' gear (0.2400 m/sec), and to five metres at slightly less than twice the speed of the 'standard' gear (0.5083 m/sec vs 0.3120 m/sec) (Figure 3, Tables 1 and 2). Interestingly, at around 8m the sink rate of the bait pod treatments is greatly reduced and is exceeded by 'standard' gear. This is likely to be caused by the pod releasing and acting like a 'parachute' under water, and thereby slowing the sink rate of the pod. As the TDRs were attached adjacent to the pods the reduced sink rate after release reflects that of the pod not the baited hook.

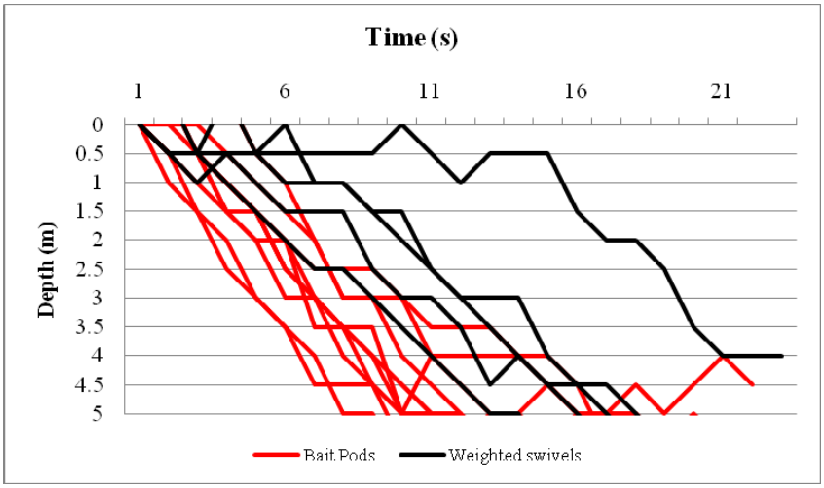

Figure 3: Sink rate profiles for bait pods and weighted swivels (60g).

Table 1: Sink rate (m/sec) descriptive statistics for bait pods down to two, five and ten metres

	N	Mean	Std. Error
Two	12	.4725	.03748
Five	12	.5083	.03123
Ten	12	.2242	.04012

Table 2: Sink rate (m/sec) descriptive statistics for weighted swivels down to two, five and ten metres

	N	Mean	Std. Error
Two	5	.2400	.04461
Five	5	.3120	.03382
Ten	5	.2880	.06208