The Underwater Bait Setting Capsule for Pelagic Longline Fisheries: R&D, operational testing and experimental evaluation of seabird deterrent effectiveness

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1. Brief history of the underwater setting capsule

The concept of the underwater bait setting capsule is the brainchild of New Zealand tuna fisher Dave Kellian, who developed the idea to a basic level before passing the concept to Tony Forster (formerly an ETBF fisherman). Tony experimented with the project on his vessel, but as with Dave Kellian before him Tony lacked the time, money and engineering expertise to finesse the project. In late 2004 Tony approached Phil Ashworth, Ashworth Marine Engineering (AME), Warana, Queensland to take the project on. While AME possessed the engineering capacity to develop the underwater setter to full potential, a lack of dedicated funding prevented the project from progressing.

I became involved in the project in mid 2005 when I commenced seabird by-catch mitigation research in the ETBF and visited Mooloolaba. After meeting Phil Ashworth and touring the AME facilities, and gaining the support of several ETBF fishers for the underwater setter, I commenced raising funds to bring the concept to fruition. In February 2006 Peregrine Adventures donated seed money (about 30% of the total required) for AME to commence the R&D. In September 2006 the David and Lucy Packard Foundation (USA) provided the remainder of the funds required to complete the R&D. The funds donated are held by the AAD and administered to AME on a quarterly basis.

2. Concept

The underwater setting capsule consists of a carriageway mounted to the vessel stern, a cradle to contain the capsule and the capsule itself (see the photos at the end of this document). The device is hydraulically operated. The cradle (and capsule) is connected to the hydraulics by spectra rope. Baited hooks are placed inside the capsule, which upon release falls down the carriageway at about 6 m/s. At the end of the carriageway the capsule flies out of the cradle and free-falls on the spectra rope to a predetermined depth beneath the line of the propeller turbulence. The enclosed shape of the capsule and hydrostatic pressure prevents the baited hook from being washed out of the capsule during the descent. When the target depth is reached the hydraulics reverse and the baited hook is flushed out of the capsule through spring loaded doors in the capsule. The capsule then returns to the carriage way and setting position. The cycle time is 5-7 seconds.

3. R&D and operational testing

The following stages in the development of the capsule are envisaged:

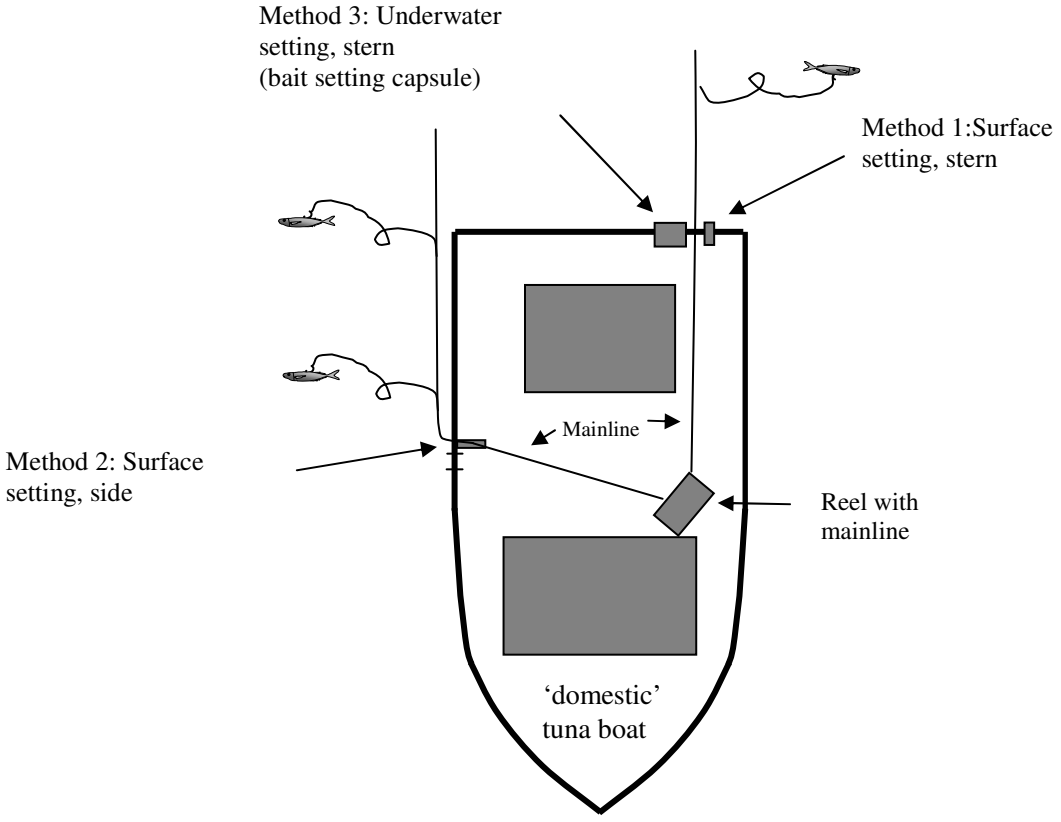
Stage 1: October 2006-July 2007: Research and development; operational testing of units Mk1 & Mk 11 units (Ashworth Marine Engineering; AAD).

Stage 2: July-November 2007: Testing two units in the ETBF under normal operational fishing. One unit is to be deployed from Mooloolaba and one unit to be deployed from Nelsons Bay, NSW. This period will allow any operational issues with the device, should they emerge, to be ironed out. Thereafter – and assuming the device is proven to be operationally robust and well-received by fishers – we will examine ways to have other units adopted in the fishery.

Stage 3: Scheduled for spring 2008. This stage involves conducting a controlled experiment on a chartered fishing vessel (the vessel will not be catching fish) to determine the most seabird-friendly method of setting longlines in pelagic longline fisheries. The methods to be compared are:

- Surface setting from the stern,
- Surface setting from the side, and
- Underwater setting from the stern

The basic layout of the proposed setting methods is shown in the diagram below. Each of the three methods will be employed on the same sets of the longline on a randomised basis with 200-300 hooks being set/method.



Surface setting from the stern of vessels is the conventional method and is used by thousands of pelagic vessels worldwide. Surface setting from the side has recently been trialled in the Hawaiian longline fishery with promising outcomes for seabird conservation. However, the species of seabirds in Hawaii are not as difficult to deter as those in the southern hemisphere and it remains to be seen if side setting will be a useful setting alternative for southern hemisphere seabirds. The third method -

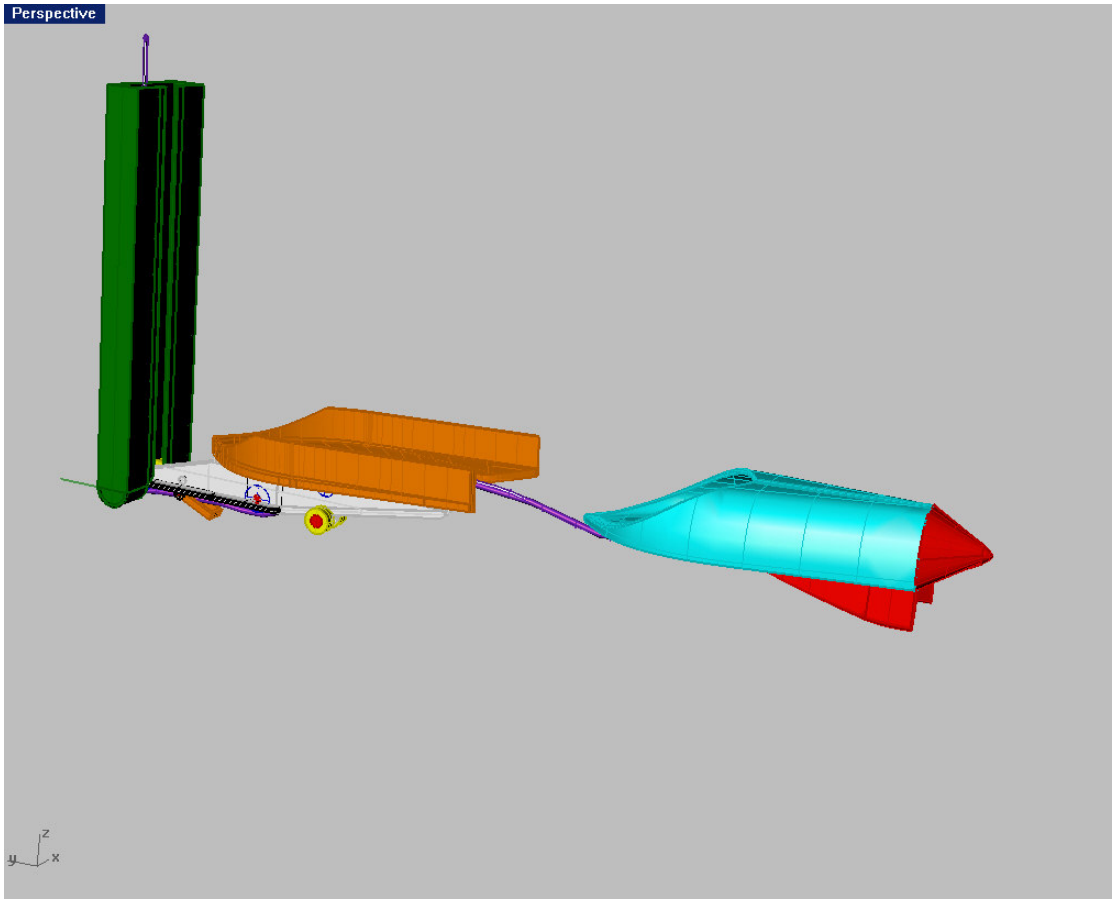
underwater setting - is a possible panacea. Underwater setting has the potential to eliminate the mortality of surface-seizing species such as albatrosses, and greatly reduce, or even eliminate, mortality of deep diving species such as white-chinned petrels and *Puffinus* spp. shearwaters. The results of this research will be relevant not only to the ETBF but to pelagic longline fisheries worldwide. In the proposed experiment underwater setting will be achieved using the underwater bait setting capsule.

4. Implementation

With all seabird by-catch mitigation methods implementation in fisheries is the most difficult stage in the process. In about one year from now, and assuming the underwater setting capsule will be operationally effective and effective in deterring seabirds, the main issue will be how best to achieve uptake by industry. The creation of incentives will be important. Potential incentives include:

- Government subsidies,
- A reduction in licence fees for vessel owners using the underwater setting capsule,
- A reduction in level of observer coverage for vessels using the underwater setter,
- Relaxation of other mitigation requirements,
- Vessel accreditation (and associated benefits)

Note that any relaxation in requirements for other mitigation methods would depend on the outcomes of the setting methods experiment and - assuming the underwater setting capsule is the 'winner' and is proven to be seabird-safe - the dependability of the device and the capacity to link the setting capsule's operation to vessel monitoring systems and be monitored by the compliance section of fisheries management agencies.



Computer generated diagram of the bottom of the carriageway, the cradle and capsule.

Phil Ashworth (AME, right) and Steve Hall (AFMA) examining the yet-to-be-assembled carriageway of the underwater setting capsule