



Agreement on the Conservation of Albatrosses and Petrels

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**Title: Update on the R & D of the Underwater Bait Setter for
Pelagic Longline Fisheries**

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Update on the R & D of the underwater bait setter for pelagic longline fisheries

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The underwater setter (in brief)

An effective underwater bait delivery system has never been developed for any longline fishing method (pelagic or demersal) in the world. The underwater bait setting capsule, or BS30 Bait Setter, is a new underwater bait delivery system designed for tuna and swordfish longline fisheries. The BS30 is stern-mounted and hydraulically-operated, and delivers baited hooks several meters beneath the water's surface. The principal components are the capsule, cart, catcher unit and carriageway. Baits are held inside the capsule which is held in a carrier (the cart), which is fitted to a carriageway mounted to the vessel stern. The cart includes a catcher unit that 'catches' the capsule on the return stroke from the water after the baited hook has been released. The cart and capsule are connected to the BS30 hydraulics by Spectra rope. Upon firing, the cart (and capsule) slides down the carriageway at ~ 6 m/s. At the end of the carriageway the capsule leaves the cart and free-falls to a pre-determined depth in the water column. The hydraulics then reverse, releasing the baited hook from the capsule through spring loaded doors. The capsule returns to the cart/carriageway assembly and then to the setting position for the cycle to be repeated.

The BS30 has the potential to greatly reduce or eliminate seabird mortality in pelagic longline fisheries worldwide. The BS30 is being developed by Amerro Engineering, Queensland, Australia in collaboration with the Australian Antarctic Division. Funding has been provided by the David and Lucile Packard Foundation (USA), Peregrine Adventures (Australia) and the Save our Poles initiative of Peregrine Shipping (Canada).

Progress to date

In the past 15 months the BS30 concept has been brought from a prototype version to a professionally engineered Mk1 version. The prototype was made by a fisherman and was of very basic construction. Development of the Mk1 version required a considerable amount of time computer modeling the design and sourcing the most suitable components. To date, the basic design, hydraulic systems, carriage way (runway down vessel stern), the cart, catcher unit and control box have been completed. The current version of the capsule itself, which is still a prototype version, will suffice until the initial

operational testing phase has been completed, at which point the capsule will be re-designed. The final version of the capsule will be moulded from bronze.

The functions of the underwater setter are controlled by a control box. The functions include the deployment of the capsule, the timing of setting and retrieval, speed of setting and retrieval, underwater depth of bait release and the transmission of operational information to vessel monitoring systems (VMS). Transmission of information on the operation of the BS30 to vessel VMS is essential to ensure fisher compliance when vessels are at sea without an on-board observer.



Engineer Peter Ashworth setting up the control box (right) by computer. The control box controls all the functions of the underwater setter, including speed and duration of cycling and transmission of functions to vessel VMS, which is an essential component of monitoring compliance.



Engineer Chris Ashworth fitting the prototype capsule to the carriage of the BS30 underwater setter. The carriage will be customized to each vessel to accommodate vessels with curved sterns and height differences from water surface to bulwarks (varies with vessel and also with fuel load and quantity of fish in freezers). During line setting operations, the bottom of the carriage will project about 1 m below the surface of the water. When vessels are transiting too and from the fishing grounds the BS30 will be raised about one meter and secured in a purpose-built bracket so the bottom of the carriage does not drag in the water.

Short term aims

Amerro Engineering's short-term aims are to:

- Mount BS30 to vessel and carry out trials (vessel stationary, June 2008),
- Carry out any required changes (in workshop),
- Mount to vessel and carry out trials (vessel underway, June/July 2008),

- Complete any required changes (in workshop),
- Mount to vessel and conduct trials (vessel underway, July 2008).

Plans for the remainder of 2008

- a) Complete the short-term aims above and refine the device until ready for deployment on a commercial fishing vessel.
- b) Once ready for deployment, the operational testing phase will begin. This will involve using the underwater setter for several months in normal fishing operations to identify any problems that emerge. The intention is to reach the end of 2008 having set a large number of hooks with the underwater setter with (preferably) no incidences of mechanical failure or hooks being dragged in the water. It is likely that during operational testing a dedicated data collector will be employed to work full time on the fishing vessel to maintain (if necessary) the BS30 and to record data on its performance. If deemed necessary, the data collector will be an engineer so that the roles of mechanic and data collector can be satisfied in the one individual.
- c) Conduct an experiment on a chartered fishing vessel to determine if setting baited hooks with the capsule affects bait retention on hooks. This experiment will be important to allay fishermen's concerns that bait retention, and therefore fish catch success, may be affected by setting with the BS30. The experiment will most likely involve setting, say, 100 branch lines with the underwater setter and 100 by conventional means, hauling each lot of 100 hooks immediately and counting the number of hooks with and without baits (branch lines will have to be hauled before fish have time to take baits). Perhaps 10-20 sets of 100 branch lines for each of the two treatments (i.e., 1000-2000 hooks/treatment) will be required.

Plans for 2009

In 2009 we intend conducting a designed experiment on a chartered fishing vessel in a high risk area of the southern hemisphere to determine the effectiveness of the BS30 in deterring seabirds. The experiment will compare underwater setting, surface setting from the stern and surface setting from the side in a head-to-head experimental design to determine the most seabird-friendly longline setting method. It is possible that the experiment will be conducted in two parts - first in an area with high abundances of albatrosses and petrels and then in an area with high interactions with shearwaters.

If these experiments go well we would then hope to commence implementing BS30s into southern hemisphere fisheries that continue to take unacceptably high numbers of seabirds.