



2009 Winner: The Underwater Baited Hook

Winners Awarded \$30,000 for System That Reduces Bait Loss and Bycatch

The name “underwater baited hook” says it all. This stern-mounted, hydraulically driven device delivers baited hooks underwater, below vessel propeller turbulence, in a method much different from setting baits on the water’s surface. The design could substantially reduce seabird bycatch. And, because it minimizes the drag caused by devices that remain underwater while setting, it is considered the most fuel-efficient method of delivering baited hooks at required underwater depths.

To operate the device, fishermen place a baited hook in a capsule chamber, then mount the capsule in a docking station that is fixed to the vessel. There, it is secured to a carriageway by spectra rope attached to pulleys and operated by hydraulics. With the press of a button, the hydraulics propel the capsule down the carriageway, out of which the capsule freefalls to a preprogrammed depth. At the end of the descent, the system reverses the hydraulics, flushing the baited hook from the capsule through a spring-loaded door. The capsule then returns to the docking station to be set again. The aim is to release baited hooks beneath the lower limit of propeller turbulence, so that the turbulence forms a curtain of opaque water above the sinking bait, shielding it from the eyes of scavenging seabirds.



Ian Carlyle of Amerro Engineering works with a deckhand to prepare the prototype underwater setter for testing at sea.

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The new system puts baited hooks beyond the reach of deep-diving seabirds like this wedge-tailed shearwater.

“Until now, underwater hook setting has never been developed to the point where it can be considered to be a practical proposition for commercial fishing operations. By bringing together a professional engineering company and fiscal support for the basic idea to materialize, we have created a never-before-seen underwater setting technology for longline fishing that is practical, cost-effective, and supported by members of the fishing industry.”

Phillip Ashworth
Amerro Engineering

Because it is a workable alternative to baited hooks on the water’s surface, this device has the potential to eliminate the mortality of surface-seizing species such as albatrosses, and to reduce or eliminate the mortality of deep-diving species such as white-chinned petrels, shearwaters and grey petrels. It may also enable fishing at any time of the day or night cycle, and in all seasons – including in seabird breeding seasons, when attacks are most intense. It also allows government regulators to monitor fishing vessel compliance in the absence of an onboard observer.

Proven Results

In March 2009, researchers set 300 underwater baited hooks and ran extremely successful trials. Results showed that bait quality and bait retention on hooks were not affected by the new method of deployment, so that use of the device is unlikely to affect the catch rates of target and nontarget fish species.

THE UNDERWATER BAITED HOOK



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The underwater baited hook could eliminate bycatch of albatrosses and other species that try to seize bait from hooks set on the water's surface.

Benefits to Fishermen and Oceans

- Potential elimination of the bycatch of seabirds that attempt to eat fish bait set at the water's surface
- Elimination of loss of bait to seabirds (because underwater baited hooks reach the necessary depths)
- Reductions in crew labor and vessel fuel consumption
- Connection of the underwater baited hook machine to vessel monitoring systems allows authorities to track compliance without using onboard observers



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The underwater baited hook team at Amerro (l to r): Peter Ashworth, Phillip Ashworth and Ian Carlyle.

The Winning Team

The underwater baited hook was the brainchild of New Zealand fisher Dave Kellian. Australian tuna fisher Tony Forster contributed to the concept and ran trials of a basic model on his fishing vessel. However, Dave and Tony's version of the machine was extremely rudimentary because they had neither the engineering skills nor (as working fishermen) the time to perfect it. Tony sought the assistance of Phil Ashworth, general manager at Amerro Engineering, a company with links to the Australian tuna fishing industry. Ashworth agreed to help advance the concept to the point where production fishing could be conducted without compromise. Subsequently, Dr. Graham Robertson – principal research scientist (seabird ecology and bycatch) in the Southern Oceans Ecosystem program of the Australian Antarctic Division (AAD) – became involved when he saw a prototype of the device at Amerro Engineering. That fateful sighting led to the initial round of fundraising for the device and cemented the collaboration between Amerro and the AAD.

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