2005 Grand Prize Winner

Deep-Setting Technique for Reducing Longline Bycatch of Sea Turtles

Steve Beverly, fisheries development officer, Secretariat of the Pacific Community (SPC), New Caledonia

Mr. Beverly is a longtime fisherman who has worked as a longline tuna fisherman, spiny lobster fisherman, commercial diver and tugboat operator in Hawaii; done exploratory fishing for bottom fish and crayfish in Australia, New Zealand and the Pitcairn Islands; fished as a commercial longline fisherman Fiji and Guam; and was a master fisherman for SPC in New Caledonia.

His work at SPC has included several fish aggregating devices (FAD) projects and a two-year tuna longline project in East New Britain, Papua New Guinea as well as several FAD workshops, and fish-handling workshops. Beverly became a full-time fisheries development officer with SPC in March 1996.

Winning idea
Mr. Beverly's entry was specifically tailored to address the problem of sea turtle bycatch in longline tuna fisheries in the Pacific Island countries. For many Pacific Island communities, tuna fishing is the only significant option for economic growth and, of all the commercial tuna fishing methods, longlining has proved to be the cheapest and most effective for local fishermen.

Longline fishing gear consists of baited hooks hanging from a long drifting line that is suspended from buoys that rest on the surface of the water. Occasionally, instead of catching tuna (the target species), the hooks may snag sea turtles (a non-target species, or bycatch).

Fisheries logbook data and studies of sea turtle behavior indicate that sea turtles swim in shallow waters and usually get tangled in or hooked by longlines at depths of 100 meters or less. Tunas swim at much lower depths. Mr. Beverly's idea is to set longlines with baited hooks at a predetermined depth that is deeper than 100 meters (328 feet) which allows longline fishermen to minimize encounters with sea turtles while maximizing their tuna catch.

While most boats fishing for tuna already set their lines deep, normal setting practices, even when setting deep, leave a good portion of the baited hooks in shallow water where they are likely to snare a swimming sea turtle.

Normally, the mainline is suspended between two floats and sags in a curve with the baited hooks floating at a variety of depths ranging from very near the surface and within sea turtle range down to 300 meters or more.

In Mr. Beverly's design the mainline is weighted with lead weights and released or "set" in such a way that the section of mainline, which holds twenty to forty baited hooks,

goes down to and remains below 100 meters which is safely out of sea turtle range yet within target species range. Successful testing of this idea has been carried out by three vessels fishing for tuna in Pacific waters. One of these vessels caught 42 percent more tuna using Mr. Beverly's gear.

The Smart Gear judges voted unanimously to award Mr. Beverly the grand prize because the idea is simple, inexpensive, relies on basic ecological research and modifies existing gear so fishermen will not have to buy or be trained on complicated new gear.

Steve Beverly deploying gear.

How to use Steve Beverly's winning idea

- **In English**

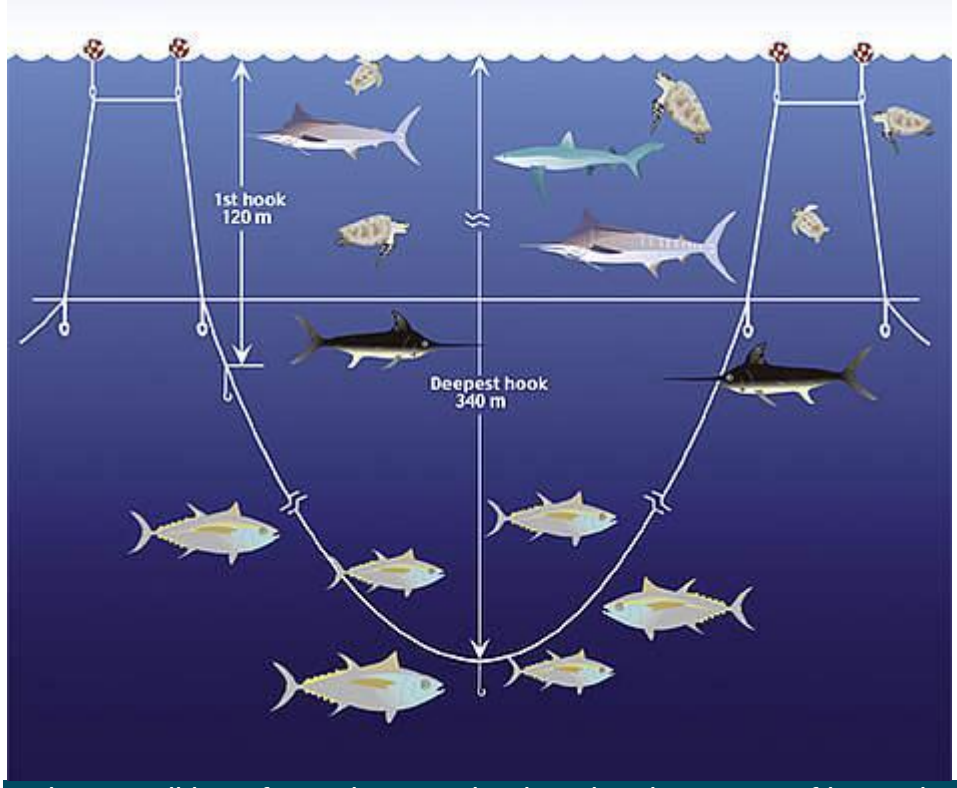
  PDF 712 KB

- **En Español**

  PDF 668 KB

- **En Français**

  PDF 883 KB



Artist's rendition of one deep set basket showing range of bycatch and target species. Bycatch species above the line at 100 m include sea turtles, sharks and some billfish; target species below the line at 100 m include bigeye tuna and day swimming broadbill swordfish. All baited hooks are below the 100 m line. Artist: Youngmi Choi.

2005 Runner-Up Prize Winners

Altering the Chemical Properties of Nets to Prevent Bycatch of Cetaceans (whales, dolphins, and porpoises)

Dr. Norm Holy (chemist), Better Gear, LLC, USA
Dr. Ed Trippel, research scientist, Fisheries and Oceans Canada, Canada
Don King (fisherman), Homeward Bound, Inc., USA

Norm Holy, a chemist and inventor met fisherman Don King in 1988 when Dr. Holy came up with a degradable nylon that could be used in the ocean on gillnets. He sought the expertise of Don King and together the two tested the ropes in Gloucester, Massachusetts.

They continued to collaborate on projects and their next effort produced a gillnet that reduces bycatch of harbor porpoises. Dr. Holy and Mr. King brought their idea to research scientist Ed Trippel, who has researched bycatch of harbour porpoise in

Atlantic Canada for more than a decade and who was able to manage the testing of the ropes in the Bay of Fundy. This group proved to be a winning combination of chemistry, biology and fishing expertise.

Winning idea
The team's winning entry was a combination of different ideas that could help marine mammals detect and avoid gillnets before coming into contact with them as well as allow them to escape unharmed if they still end up tangled in the net. To create avoidable, detectable, safer gear, the team tinkered with the chemical properties of ropes.

Normal gillnets form a single wall of netting that is kept vertical by a line on top called a "floatline" and a weighted rope on the bottom called a "groundline." The net is designed in such a way that when a fish enters the net it gets caught by the gills. Gillnets allow smaller fish to swim through unharmed but they are a huge threat to whales and dolphins, causing hundreds of thousands to die each year. These marine mammals can get tangled in the net itself, the groundline at the bottom of the net or the floatline at the top of the net.

Holy, Trippel and King's gillnets consist of a single wall of netting that is injected with barium sulfate, which makes the netting stiffer less likely to tightly tangle around a fin, flipper or tail. Barium sulfate also makes the nets more acoustically detectable for whales, dolphins and porpoises that are using echolocation to find objects.

The ropes they use for float lines are specially designed to be easily broken (under a force of 1,100 lbs) so large cetaceans can wrestle their way free. In order to keep cetaceans away from the floatlines in the first place, the team designed a glowing rope that may visually deter the animals.

The Barium Sulfate Nets are currently being trialed as part of a 2 year experiment to find a solution to the bycatch of Franciscana dolphins off the coast of Argentina. WWF-US and FVS have provided funding for these trials and the first trials conducted in Jan 2008 proved very successful. The nets may also have potential to address the issue of vaquita bycatch in the Gulf of California.

Dr. Ed Trippel at the St. Andrews Biological Station preparing barium sulfate gillnet and weak rope for experimental field trials in the Bay of Fundy, Canada.

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Group photo of the team in the Institute research vessel MFB Sagar Shakthi. FROM LEFT: Mr. Sabu, Mr. Gibin Kumar, Dr. Boopendranath, Dr. Pravin.

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Modifying Shrimp Trawls to Prevent Bycatch of Non-Target Species in the Indian Ocean

Dr. Boopendranath, principal scientist, Central Institute of Fisheries Technology, India
Dr. Pravin, scientist, Central Institute of Fisheries Technology, India
Mr. Gibin Kumar, senior research fellow, Central Institute of Fisheries Technology, India
Mr. Sabu, senior research fellow, Central Institute of Fisheries Technology, India

This device was recently featured in a demonstration and training workshop, cosponsored by industry and the Central Institute of Fisheries Technology . Regional optimization trials with fishermen are also being undertaken in a number of regions around India. An important issue retarding the uptake of this and other bycatch devices in this country is the loss of potential bycatch as a payment for the crew. A political or legislative solution is being investigated.

Winning idea
This team's entry specifically addresses the bycatch problems faced by shrimp trawlers in the Indian Ocean. They developed a system of angled metal grids and net meshes that work to reduce bycatch of undersized shrimp and fish in trawls.

Trawl fishermen in India and other tropical fisheries depend on both finfish catches and shrimp catches to keep the commercial operations economically viable. Christened the Juvenile Fish Excluder cum Shrimp Sorting Device (JFE-SSD) by its inventors, this solution traps mature shrimp in the bottom portion of the net while allowing juvenile shrimp to swim out of the mesh net unharmed. The device also retains mature finfish in the upper portion of the net while allowing small fish of low commercial value to safely exit the shrimp trawl.

The sorting of the shrimp and the finfish between the lower and upper parts of the net enhances profitability because it reduces sorting time on the deck which increases the useful fishing time of the trawler fishermen, and it prevents shrimp from becoming crushed under the weight of fish and bycatch hauled on deck which increases the shrimp's market value.

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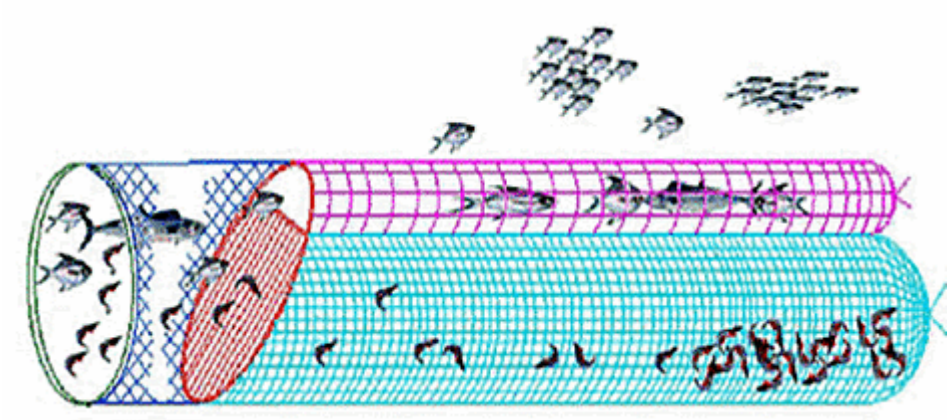

Artistic rendition of the Juvenile Fish Excluder cum Shrimp Sorting Device (JFE-SSD), courtesy of the Central Institute of Fisheries Technology.