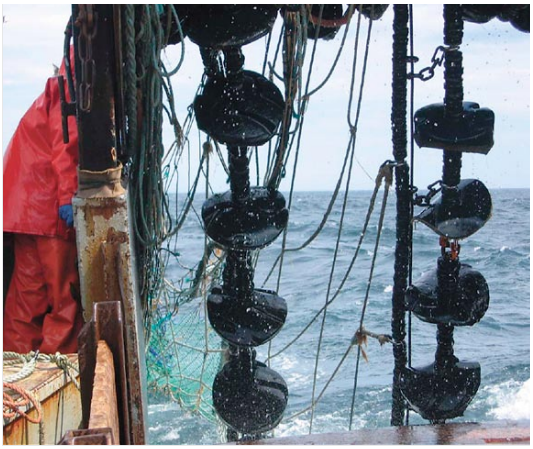
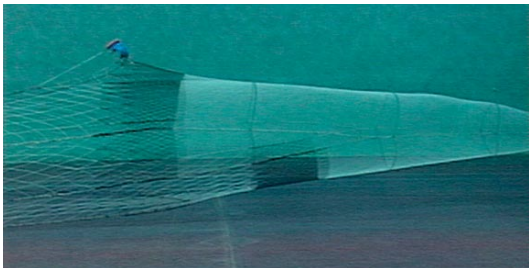
2007 Winner: The Eliminator

Fishermen, Net Manufacturer and Fisheries Specialists Collaborate to Win $30,000 Award

It may sound like the name of the destructive robot in the next big action movie, but the Eliminator is actually a lifesaver: It reduces bycatch of cod in the haddock bottom trawl fishery. Wide use of this device could be of great benefit to badly depleted cod stocks in haddock fisheries. Designed by New England fishermen in collaboration with fisheries extension specialists and a trawl net manufacturer, the new trawl's success turns on the fact that although cod and haddock are similarly shaped bottom fish, they exhibit different behaviors when entering a net.





The winning fishing gear takes advantage of these differences: Haddock swim upward when they encounter the net and are captured in the smaller mesh upper section, whereas cod and other groundfish caught in the tow swim downward and escape easily through the large mesh openings. By separating and releasing bycatch at the mouth of the net, the Eliminator reduces the potential for damage and mortality.

The trawl's unique design requires a four-seam net of large mesh measuring 95 inches (240 cm) through the lower face of the bottom belly, which quickly drops to 32 inches (80 cm) in the side panels and square and 8 inches (20 cm) in the top belly. A three-panel kite provides a vertical lift to between five and six fathoms of the headrope height, and the rockhopper sweep has only one 16-inch (41 cm) disc per bight at the center, making for a lighter sweep with less contact on the seabed.

Proven Results

Following flume tank trials of the experimental net at the Marine Institute at Memorial University in Newfoundland, the design team secured funding from NOAA's Fisheries Cooperative Research Partners Program to carry out field sampling. In the course of four fishing trips totaling 19 days, researchers did 100 side-by-side comparison hauls in a closed area of Georges Bank.

Results were impressive. The Eliminator's total haddock catch was equal to that of the traditional trawl net, but the Eliminator also reduced cod bycatch by 81 percent and flounder bycatch by 95 percent. In addition, the new fishing gear significantly reduced bycatch of skate, dogfish, American plaice and lobsters.

"The collaborative design and development of the Eliminator trawl is a great example of industry, scientists and managers working together to develop innovative solutions to reduce or eliminate bycatch."

David Beutel
Fisheries extension specialist
University of Rhode Island

"We applied our knowledge and understanding of fish behavior and fishing gear and adapted a large mesh squid net with a rockhopper sweep to generate a cleaner catch of haddock. As we tested and refined our idea we found the net had significant potential for reducing bycatch of cod, flounder, skate, lobster and dogfish, resulting in operational efficiencies for the fishing community and conservation of the marine environment."

Jon Knight
Net builder
Superior Trawl

Photos, top to bottom: F/V Iron Horse, one of the vessels used to conduct side-by-side comparison hauls; Rockhopper sweep of the Eliminator trawl with one 16-inch disc per bight in the center; Operational test of the Eliminator, Marine Institute at Memorial University in Newfoundland, Canada

2007 WINNER:
THE ELIMINATOR

Benefits to Fishermen and Oceans

- Hauling in less bycatch improves work productivity, with a three-fold reduction in sorting time on deck.
- The design of the four-seam net provides opportunities for longer tows and cleaner fish, as the haddock are not damaged by the bycatch of spiny marine animals.
- The trawl's early release of nontarget marine life reduces their risk of experiencing damage or mortality.
- Longer tows allow fishermen to minimize hauling and setting, so fishing time is more efficient.
- Field tests indicate the catch falls within the possession limit guidelines for the Regular B-Days-at-Sea program, permitting fishermen additional time to selectively fish for haddock.
- The 24-inch (60 cm) spacing of the large discs on the rockhopper sweep provides room for bottom fish to avoid capture.
- The design of the rockhopper makes it lighter than current nets, so the gear has less contact on, and does less damage to, the seabed.
- Cod bycatch was significantly reduced in the field tests, while flounder and skate bycatch was virtually eliminated.

Photos, left to right: Catch from the Eliminator trawl; Jim O'Grady and crew on board the F/V Iron Horse

The Winning Team

In 2003, New England fishermen James O'Grady and the father and son team of Philip Ruhle Sr. and Philip Ruhle Jr. approached Jonathan Knight of Superior Trawl in Wakefield, R.I., with an idea for an experimental net that targets haddock while reducing bycatch. Concurrently, the Rhode Island Sea Grant Fisheries Extension Program at the University of Rhode Island was looking for opportunities to work with the industry. Jon and the fishermen met with fisheries extension specialists Laura Skrobe and David Beutel, and the winning team was established.

Together, the group applied their practical experience, project management skills, and knowledge of fishery-related issues to testing, analyzing and refining the Eliminator. The result is an original, practical and cost-effective bycatch tool that benefits both the fishing industry and marine conservation.

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2007 Runner-Up: The Nested Cylinder

Glenn Parsons' Design to Reduce Bycatch of Juvenile Red Snapper Wins $10,000

The Nested Cylinder Bycatch Reduction Device was designed to reduce the bycatch of juvenile red snapper in the Gulf of Mexico shrimp trawl fishery. Developed by Dr. Glenn R. Parsons of the University of Mississippi, the device takes advantage of natural fish instincts to produce a result that serves both industry needs and marine conservation.

The innovative device is made up of two sleeves – a small cylinder nested inside a larger outer cylinder on the downstream end. The small cylinder is painted white on the inside and is brightly illuminated; the large cylinder is painted black. The device is attached inside a trawl to generate a continuous escape opening around the circumference of the net.

When dark-adapted fish like red snappers find themselves in the brightly illuminated environment of the small cylinder and are presented with the seeming refuge of the darkened large cylinder, they instinctively swim through the larger cylinder, through the escape opening, and out of the trawl.

To further guide unwanted finfish out of the trawl, flow-blocking panels are placed upstream of the escape opening, creating flow shadows. Fish take hydrodynamic refuge in these slow-flow areas, and in doing so find themselves on the outside of the net.

Proven Results

Field testing was carried out in the northern Gulf of Mexico using a parallel towing technique. Initial sampling aboard a National Marine Fisheries Service research vessel showed an average 41 percent bycatch reduction. Field tests were then conducted aboard the working shrimp vessel R/V Simple Man, where results indicated an average 55 percent bycatch reduction. Further, an 81 percent shrimp retention was obtained in the nets equipped with the device – and a 91 percent retention where haulback was closely monitored.

Positive responses from the crew aboard the R/V Simple Man are evidence that the nested cylinder design – a cost-effective device that is simple to install and requires low maintenance – will likely be well received by fishermen.

"The potential for this device to reduce bycatch and subsequent mortality of juvenile red snapper is significant – a cleaner catch and greater profit for the shrimper is a win-win situation for the marine environment and the fishing industry."

Dr. Glenn R. Parsons
Designer of the Nested Cylinder

Photos, top to bottom: Dr. Glenn Parsons working on the Nested Cylinder Bycatch Reduction Device; Shrimping boat, Dry Tortugas National Park; Close up of Nested Cylinder Bycatch Reduction Device; Nested Cylinder Bycatch Reduction Device during field testing

2007 RUNNER-UP:
THE NESTED CYLINDER

Benefits to Fishermen and Oceans

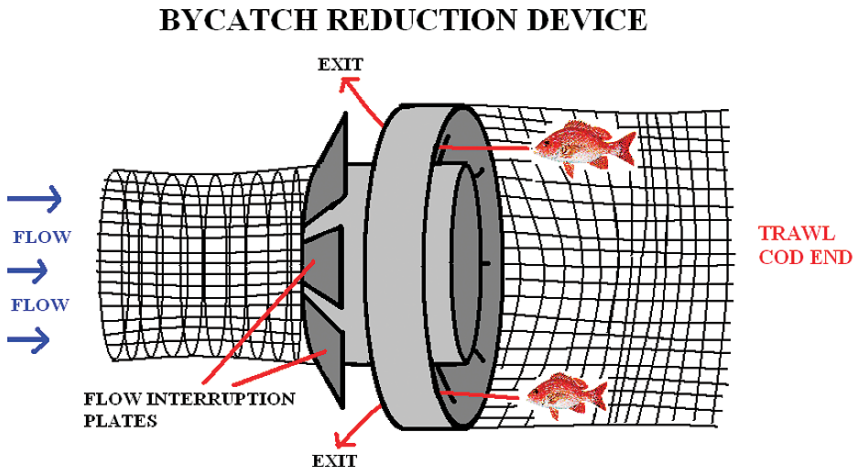
- The reduction in bycatch that could be achieved through use of the Nested Cylinder device may result in a significant drop in trawl sorting time.
- Increased net retention of target species would result in a smoother and faster operation, saving fishermen on fuel costs.
- As a result of reduced sorting time on deck, the quality of the target species may improve to a "cleaner" product – which could generate a higher profit margin.
- Reducing bycatch of juvenile red snapper promises a chance for the stock in the region to rebuild.
- Fishing vessels with improved operational efficiencies that spend less time at sea may reduce marine pollution from boat emissions and leaks.

Photos, left to right: Giant shrimp, Gulf of California, Mexico; Dr Glenn Parsons (left) working with a crew member on the Nested Cylinder Bycatch Reduction Device

Dr. Glenn R. Parsons: 2007 Runner-Up

Dr. Parsons has spent almost 30 years conducting fish and fisheries research in the Gulf of Mexico and the Atlantic Ocean. He is a professor of biology at the University of Mississippi.

For the past five years Dr. Parsons has been immersed in bycatch reduction research. He has worked closely with both recreational and commercial fishers throughout Alabama, Florida and Mississippi. His most recent major contribution was the publication of the book *Sharks, Skates and Rays of the Gulf of Mexico: A Field Guide*. He is donating the book's royalties to Hurricane Katrina relief funds.



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Special UK Prize Winner: The Passive Porpoise Deterrent

Aquatec Group Ltd. Awarded $5,000 for Idea to Eliminate Threat of Harbor Porpoise Bycatch from Fishing Nets

At risk of becoming "incidental catch," harbor porpoises and other marine mammals are threatened by gill nets and other fishing gear that often extend over many miles.

Developed by Aquatec Group Ltd., the Passive Porpoise Deterrent is an advance in current technology, drawing on the mammal's echolocation system to reduce bycatch. It alerts porpoises to the presence of fishing nets using resonant acoustic reflectors that increase the net's "acoustic visibility" — and do so in a less expensive, less complicated way than the currently used pingers.

Since the 1990s, acoustic pingers have been effective in reducing porpoise bycatch. However, their relatively high cost has hindered implementation, as have concerns over whether they cause noise pollution.

The winning design combines passive acoustic reflectors with a small number of active pingers. The reflectors are fitted into the fishing net every five meters. When an echolocating porpoise emits a click, the reflectors transmit back a stronger echo, making the reflectors appear to the porpoise to be much larger objects than they are.

The reflectors alone can reduce bycatch, but they are more effective when used in combination with a small number of pingers. The Passive Porpoise Deterrent includes pingers because porpoises do not echolocate all the time. They sometimes use their optical vision to detect fish; they sometimes simply run silent. Therefore, a reduced number of pingers are used in combination with the reflectors to stimulate porpoise clicks and alert them to danger.

Initial tests of the technology were tried on bottlenose dolphins to keep them from becoming bycatch in drift nets. When drift netting was banned worldwide, the development and testing focus switched to pingers. However, with the increasing struggle of fisherman to purchase, use and maintain the pingers – and the need to overcome noise pollution from the pingers themselves – Aquatec further developed their innovative design, resulting in the award-winning device.

"Passive acoustic reflection to reduce bycatch is not new, but past designs have been largely unsuccessful in making the net visible to porpoises. Our proposed technology uses passive devices with a size of several acoustic wavelengths at dolphin sonar frequencies, making the reflector appear acoustically larger than the largest prey. Because the design is cost-effective and simple to maintain it may be easily implemented by fishing communities across the world, resulting in a significant reduction of harbor porpoise bycatch in areas where deterrent or detection devices had been limited in availability or use."

Andy Smerdon
Founder
Aquatec Group Ltd.

Photos, clockwise from top left: Habour of Henningsvær, Norway; AQUAmark 100 pinger acoustic porpoise deterrent; Andy Smerdon (right), founder of Aquatec Group Ltd., and Elliot Morley, UK Environment Minister, 2004; Harbor porpoise

SPECIAL UK PRIZE WINNER: THE PASSIVE PORPOISE DETERRENT

Benefits to Fishermen and Oceans

- The Passive Porpoise Deterrent is cost-effective: A one-kilometer stretch of fishing net could be equipped with 200 passive devices at a total cost of US$200.
- Because the reflectors are similar to existing fishing floats in construction and durability, they could also replace floats.
- Widespread use of the device could support less expensive regulatory compliance with the Harbor Porpoise Take Reduction Plan (U.S.) and Council Regulation (E.C.) 812/2004 to mitigate incidental catches of cetaceans by fishing vessels.
- The low-cost, simple design results in more attainable implementation for fishermen in both developed and developing countries.
- Fewer pingers are needed when they are used in combination with the passive reflector devices, potentially reducing noise pollution in the marine environment.
- Implementation of the Passive Porpoise Deterrent may significantly reduce bycatch of harbor porpoises.

Photos, left to right: Bottle-nosed dolphin, Bahía Islands, Honduras; Fishermen pulling up nets, Mafia Island, Tanzania

Andy Smerdon: Special UK Prize Winner

Andy Smerdon earned a degree in electronic engineering from Birmingham University, UK, in 1984 and six years later formed Aquatec Group Ltd. The company designs and develops underwater acoustic and nonacoustic instrumentation that is used by oceanographers and marine scientists around the world.

In 1998, Smerdon met with the late David Goodson of Loughborough University, UK, and the idea of the pingers was inspired and developed. Patented as the AQUAmark 100, their device became the leading pinger used for porpoise bycatch reduction in Europe. At the same time, Goodson was very enthusiastic about the use of passive reflective devices to enhance net visibility, which he believed could provide an alternative solution for fisheries in developing countries.

Since 1998 Aquatec has developed a range of devices for both detecting and deterring marine mammals. The company has participated in international research projects for the development and improvement of bycatch reduction in commercial fisheries.

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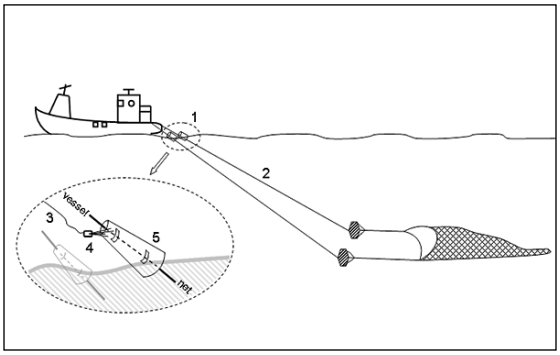
2007 Runner-Up: The Traffic Cone

Diego González Zevallos Awarded $10,000 for a Device to Reduce Seabird Bycatch

On the street, a traffic cone warns drivers away from potholes and other dangers. Attached to a fishing trawler, a new device, also called Traffic Cone, warns seabirds away from perilous contact with warp cables. Thousands of seabirds are injured or killed every year as they feed on fishing boat discards. As they dive for discards floating in the wake, birds can be struck by the cables, dragged underwater, and drowned. The Traffic Cone reduces the volume of seabird bycatch by making the cables more visible.

Diego González Zevallos developed this winning idea in response to the increasing number of seabird fatalities – particularly of kelp gulls and the endangered black-browed albatross – occurring in high seas trawl fisheries on the Argentine Continental Shelf.

The 1-meter-long orange plastic cone measures 10 centimeters in diameter at one end and 20 at the other. A cone is attached to each of the trawler's warp cables. It opens in half to allow easy deployment from the deck, and has a rope to help lower the device to where the cable enters the water.



Proven Results

During the high season in January and February 2006, the Traffic Cone was tested aboard a commercial hake trawler operating in Golfo San Jorge, one of the most important seabird areas in Argentina.

Cones were set in 12 of 22 alternate hauls over the course of eight fishing days, and the numbers of fatal and non-fatal contacts were recorded. At five-minute intervals, observers estimated the distance from the cone maintained by the three closest seabirds. An average bird-to-cone distance was calculated for each haul.

In hauls employing Traffic Cones, no seabirds were killed and the number of warp cable contacts was reduced by 89 percent; in hauls without the device, 11 fatalities were recorded. Kelp gulls and black-browed albatross were present in all the trawls. Among the 11-man trawler crew, nine thought the device did not affect fishing practices and eight expressed willingness to adopt the device.

"The traffic cone employs size and high color contrast to increase detection of the forward moving cable by scavenging birds. It is a simple, cost-effective, practical device that could be easily applied in trawl fisheries operating in Argentine waters and around the world. Given the impact of this particular bycatch problem on seabird populations, increased effort should be put into the testing of measures that decrease the cable-related mortality associated with high seas trawlers."

Diego González Zevallos
Designer of the Traffic Cone

Photos, top to bottom: Diego González Zevallos works to free a seabird caught in a fishing net; Diagram of the cone device: 1. cones, 2. warp cables, 3. rope, 4. aluminum hook, 5. fastener; Traffic cone device in use during a field test; Traffic Cone device on warp cable cone at surface water

2007 RUNNER UP: THE TRAFFIC CONE

Benefits to Fishermen and Oceans

- The Traffic Cone is a simple and cost-effective device that requires minimal time and resources to implement.
- It is a mitigation device that may help fishermen comply with international conservation agreements such as the Agreement on the Conservation of Albatrosses and Petrels.
- At a time when seabirds are threatened at a higher rate globally than all other species-groups of birds, reducing seabird injuries and fatalities due to bycatch could result in critical population growth over time.
- Responsible fishing practices help protect seabirds, whose natural adaptations require them to live and feed off the sea.

Photos, left to right: Black-browed albatross and imperial cormorants (or blue-eyed shags) on New Island, Falkland Islands; Diego González Zevallos with Traffic Cone device

Diego González Zevallos: 2007 Runner-Up

Diego González Zevallos, a marine biologist for the Centro Nacional Patagónico in Argentina, has worked for the last five years on board commercial fishing vessels including ice and freezer trawlers and artisanal longliners.

He has focused on gathering data on seabirds, fish, invertebrates and marine mammals, with a particular emphasis on the use of discards by seabirds in the trawl fisheries in Golfo San Jorge, Patagonia, Argentina.

Institutional support for the development and testing of the Traffic Cone came from the Centro Nacional Patagónico, logistical support from Secretaría de Pesca de la Provincia de Chubut, and financial support from the Wildlife Conservation Society and Fundación Patagonia Natural.

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