

# Working with Fishers to Reduce Bycatch: The Tuna-Dolphin Problem in the Eastern Pacific Ocean

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Large yellowfin tuna (*Thunnus albacares*) typically associate with several species of dolphins, particularly *Stenella attenuata* (spotted), *S. longirostris* (spinner), and *Delphinus delphis* (common), in the eastern Pacific Ocean (EPO). Tuna purse seine fishers take advantage of this association by finding the dolphins at the surface to locate the tuna beneath them. The tuna and dolphins are herded and captured together in the net, but prior to retrieving the entire net and the tuna, the captain and crew attempt to release the dolphins by a procedure called "backdown," while utilizing various dolphin safety gear. Though a great majority of the dolphins are released unharmed, some die during the fishing operation. The Tuna-Dolphin Program of the Inter-American Tropical Tuna Commission (IATTC) is charged with monitoring this incidental mortality, studying its causes, and encouraging fishers to adopt fishing techniques which minimize it.

In the early 1970s, the U.S. National Marine Fisheries Service (NMFS) began sending biologists to sea as observers aboard U.S. tuna seiners to monitor dolphin mortality and collect other biological data on dolphins. At that time, the EPO fleet consisted almost entirely of U.S. vessels. Later in the decade, as other national fleets began to enter the fishery, the IATTC initiated a similar program which included vessels of other nations in addition to U.S. vessels. The data support numerous studies by IATTC staff, including dolphin mortality estimation, analyses of the causes of mortality, trends in dolphin abundance, tuna and dolphin behavior and ecology, and bycatch of other species. In 1992,

the nations which participate in the purse seine fishery for tunas in the EPO adopted the Agreement for the Conservation of Dolphins. Since then, the observer data have also been used for dolphin population management and for enforcement of national and international dolphin safety regulations.

Since 1986, dolphin mortality has been reduced by 97%. Analyses of observer data show that many factors cause dolphin mortality, such as fishing areas; dolphin species and herd sizes; environmental factors; gear malfunctions; and crew motivation, skill, and decision-making. Given this, it is clear that there can be no simple solution, no "silver bullet." A combination of major and minor technological developments, training in their use, better decision-making skills, and constant pressure to improve performance are the basis of the current success. This process took many years and was quite costly. It took large data sets to identify the causes, and years of experimentation to find the technological solutions and spread their use throughout the fleet. The training of fishers is continuing.

An important part of the IATTC's efforts to reduce incidental dolphin mortality is the dolphin safety gear program, which has several functions, including: (1) recommending minimal dolphin safety vessel gear requirements to governments; (2) research and development of new or modified safety gear, and alternative methods of fishing for dolphin-associated yellowfin tuna which do not involve encirclement of the dolphins; and (3) providing other extension services to the international fleet. IATTC staff members have worked closely with tuna fishers and commercial companies in improving gear technology and developing alternative fishing methods. The IATTC has been involved in two projects to study the feasibility of utilizing fish-aggregating devices (FADs) as an alternative method of capturing large yellowfin tuna. One was conducted jointly with NMFS, the Mexican government, and a major seafood company. The IATTC has also supported the NMFS dolphin-safe research program in its efforts to develop alternative methods of detecting subsurface swimming tuna from aerial platforms.

Other extension services available to the fleet are useful in helping fishers minimize dolphin mortality. A dolphin safety gear inspection and dolphin safety panel (DSP) alignment procedure is conducted by an IATTC technician during a trial set of a vessel's net. During the set, the vessel and crew conduct a backdown while the technician monitors the procedure from a raft. A DSP that is properly installed and aligned in a vessel's net will facilitate the release of dolphins during backdown, but an improperly

installed or aligned DSP may impede or prevent their release. Most problems require only simple adjustments, but some may require extensive net modifications. After the trial set, a written report is provided to the vessel owner which points out any dolphin safety gear deficiencies or problems with the installation or alignment of the DSP that should be addressed. The IATTC has performed this service approximately 270 times since 1988 to a fleet that averages 90 to 100 vessels.

Providing feedback to fishers of information that is extracted from data collected aboard their vessels is accomplished through dolphin mortality reduction workshops convened by the IATTC. These workshops are important educational forums during which fishers, vessel owners, other industry personnel, and IATTC staff members discuss the following topics: (1) causes of, and solutions to, incidental mortality; (2) responsibilities of vessel owner, fishing captain, and crew; (3) dolphin safety gear; (4) mortality limits; (5) regulations; (6) fleet and individual performance; and (7) other bycatch problems and solutions. Since 1988, the IATTC has conducted 46 workshops that have attracted nearly 650 attendees, including almost 300 fishing captains.

A main point of discussion at a workshop is that dolphin mortality is the product of two components: average mortality per dolphin set and the number of sets made on dolphins. Various factors that affect both components are reviewed, including those mentioned previously, plus fleet size, economics, and regulations. Detailed information on trends in mortality rates for sets with specific types of mortality-causing factors is presented. Examples of sets affected by environmental factors are those in which strong ocean currents are present and sets during which the backdown procedure is carried out in darkness (night sets). For the 1986-1995 period, the mortality per set for both types of sets has declined approximately 97%. The frequency of sets with strong currents has remained stable during the period, indicating that better current-detection methods are needed.

Examples of sets affected by adverse gear operation are those in which major gear malfunctions occur, typically causing significant delays, and sets during which the net collapses, jeopardizing captured dolphins. For the 1986-1995 period, the mortality per set for both types of sets declined approximately 96%. The frequency of sets with major gear malfunctions has decreased slightly in recent years, indicating the need for improved gear maintenance. The frequency of net-collapse sets has declined over 60% as a result of improved skills of fishers in preventing them.

One workshop objective is to convey the idea that there are three lines of defense to reduce dolphin mortality that fishers should develop. The first involves a strategic plan by vessel management to avoid unnecessary dolphin mortality, formulated before a vessel departs for the fishing grounds. Areas that produce higher mortality rates should be avoided. A gear maintenance plan should be established and followed between and during trips, and the following dolphin safety gear should be onboard at all times: (1) a DSP of minimum required dimensions, (2) an inflatable raft for use as a dolphin rescue platform, (3) a high-intensity floodlight for use in the event backdown occurs during darkness, (4) net towing bridles and tow lines for all speedboats, and (5) diving masks and snorkels. Selection of experienced and motivated crew members is a very important factor as well.

The second line of defense involves tactical decision-making and skills by the fishing captain at sea. High-risk situations, such as areas of strong currents, must be avoided, and proper net-setting procedures must be followed to avoid gear problems.

The third line of defense is reached after the dolphins are captured. Skilled net retrieval by captain and crew, a controlled and efficient backdown procedure, and deployment of dolphin-rescue platforms and motivated rescuers ensure the likelihood of successful release of all captured dolphins.

Diligent efforts by fishers of the international fleet are the main reason that dolphin mortality levels have dropped from an estimated 133,000 in 1986 to less than 3,300 in 1995. These efforts have been influenced by the IATTC and NMFS, and by national programs in other countries. Increased dialogue among environmental groups, the fishing industry, and governments has greatly contributed to the international effort. The IATTC will continue to work closely with all parties to further reduce, and eventually eliminate, incidental dolphin mortality in this fishery.