



Food and Agriculture  
Organization of the  
United Nations

# A third assessment of global marine fisheries discards



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## ADVANCED EXECUTIVE SUMMARY<sup>1</sup>

Bycatch and discards constitute a considerable threat to sustainable fisheries by inflicting undue mortalities, thus jeopardizing the long-term food security and livelihoods of fishing communities. At the Thirtieth Session of the Committee on Fisheries (COFI 2012), the Committee suggested further attention to managing bycatch and discards to ensure that they were comprehensively addressed in conservation and management of fisheries through an ecosystem approach.

Global assessments of marine fisheries discards were published by FAO in 1994 and 2005. In 2015, FAO considered the necessity to have updated information on how the world fisheries are performing in reducing discards and seafood loss during capture operations. Thus, FAO initiated a project to conduct this third global fisheries discard estimate.

This **technical paper** includes 2 parts: **PART I** is an estimate of annual discards for the period 2010-14 by marine commercial fisheries, and **PART II** includes an investigation of bycatch and discards of Endangered, Threatened and Protected species, providing an updated overview of this specific dimension of the bycatch and discard issue. Finally, this second part also includes a review of current measures available to manage bycatch and reduce discards, as well approaches to address other related sources of fishing mortality (i.e. pre-catch, post-release and ghost fishing mortality).

### PART I

The estimate of global discards used a similar **approach** to that of Kelleher (2005) in the second FAO global discard estimate, which is based on the assumption that **discards are function of a particular fishery**. A fishery is defined as a fleet fishing in a defined area, using the same gear type and targeting the same species group. However, the method has been considerably refined to make it both more robust and replicable by integrated database development and transparent data analysis.

The first step was to create a new database. This relational database is a series of tables that record species-specific landing quantities, fisheries and discard rates. The design of the database fields is based on Kelleher's discard database, but has integrated FAO's FishStat J landings data and global discard records in

<sup>1</sup> This is an advanced copy of the executive summary of the FAO Fisheries and Aquaculture Technical Paper No 633. Hence, the final version might be slightly different.

separate tables. To validate the data, estimate discard rates, and allow easy reproduction of the method for review and updating, an R “markdown” file was produced with full code and explanation. The code reads the data tables, produces statistics to check data consistency, and produces a single joined table-output that contains landings and discard estimates.

The **method** to calculate global discards included **three types of estimates** which were applied in the following order of preference:

- (i) **Country-based estimates:** Discard rates from compiled literature were applied to domestic (locally-based) fisheries of the countries that either have a discard ban or that are understood to have extremely low discard rates.
- (ii) **Empirical estimates:** Fishery-specific discard rates from compiled from scientific publications, national or regional fisheries reports, other grey literature, and correspondences with fisheries experts were applied to fisheries with such available information.
- (iii) **Global gear-specific estimates:** Global gear-specific mean discard rates and margin of error were estimated for 28 gear categories and applied to fisheries with no country-based or empirical discard rate estimates.

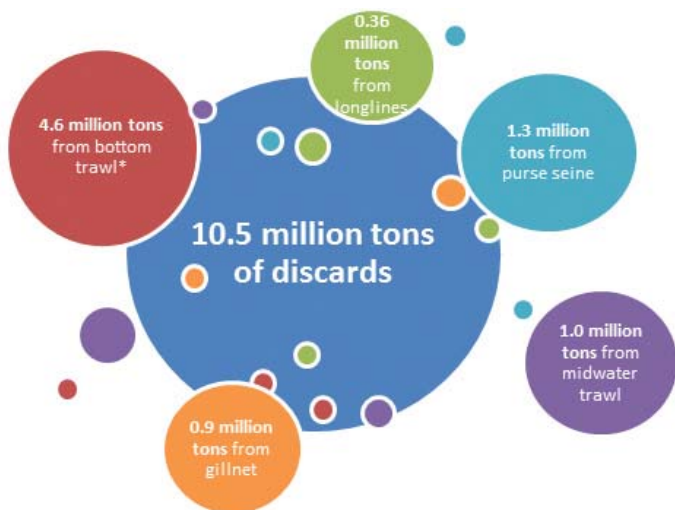
The **scope** of the current assessment is similar to the 2005 study which included **commercial marine and estuarine fisheries** only. It excluded inland fisheries, recreational and subsistence fishing, illegal, unregulated and unreported catches, post-harvest offal, fish deliberately slipped from nets for commercial or safety reasons, shark or other animal carcasses from which some body parts have been removed and retained (e.g. fins), non-edible invertebrates, seaweeds and non-living marine resources (sand, rocks, dead coral, etc.). Another element that was not included in the scope of this assessment is discard species composition. Species composition is a key issue that should be covered in future assessments. It is important to know what species are discarded and why to sustain food security context and for better stock assessments.

### **The assessment in numbers**

The magnitude of **annual discards in global marine capture fisheries** was estimated to be **10.5 million tons** (95% CI: 9.5–11.5 million). An estimated 9.4% of the annual average catch during 2010-14 was discarded (9.3%–9.6%). These estimates were based on a sample size of 1,854 fishery records, an estimated total annual catch of 111 million tons (95% CI: 110–112 million) and annual landed (retained) catch of 101 million tons.



From a regional perspective, the northwest Pacific (FAO Major Fishing Area 61) and northeast Atlantic (FAO Area 27) accounted for a combined 41% (4.26 million tons) of discards. Although the northwestern Pacific Ocean (FAO Area 61) had the highest discards, contributing more than 25% of global discards, it had the fifth lowest mean discard rate. The southwest Atlantic (FAO Area 41) had the highest mean discard rate, it contributed almost 7% of the total annual global discards.



## PART II

### Bycatch and discard of endangered, Threatened and protected species

A review of available data on **estimating and mitigating fisheries interactions with endangered, threatened and protected (ETP) species** in marine commercial and artisanal fisheries was provided. The available literature on bycatch estimates for seabirds, turtles, sea snakes, marine mammals, sharks, rays and teleosts was summarized and analyzed for patterns and trends. Estimates of global discards are highly uncertain for all ETP species, fisheries, and regions. The fate of discarded ETP species is also uncertain. This is due to:

- (i) the occurrences of ETP species are often rare and controversial, and are either unnoticed or unrecorded;
- (ii) different protections are afforded to different ETP species in different countries and fisheries and;
- (iii) discarding practices vary greatly across spatio-temporal scales and according to individual fishing conditions and procedures, which affect post-release mortalities.

Several recent initiatives provide information on such interactions, as well as the development of novel fishing methods and practices that reduce ETP mortality. Reducing ETP interactions in the many small-scale artisanal fisheries in developing countries will be a challenge. This will require comprehensive engagement of all stakeholders in order to maximize and facilitate regional and global scale bycatch assessments and mitigation initiatives.



### **Accounting for and mitigating pre-catch, post capture and ghost fishing mortalities**

The International Guidelines on Bycatch Management and Reduction of Discards (FAO 2011) included recommendations for member States to identify, quantify and reduce impacts of mortality from pre-catch losses and ghost fishing and to maximize post-release survival. All these components of mortality share the characteristic of being largely undetectable in the course of fishing operations. The relative proportions of these components vary by fishing gear and method, by fishery, and spatially, temporally and by vessel within a fishery.

**Methods to avoid, minimize and offset pre-catch fishing mortality** are largely the same as methods for mitigating capture fishing mortality and post-release mortality. These include small modifications on the gear, for example, using pelagic longline circle instead of J-shaped hooks to reduce the injury to captured organisms. While, **methods to reduce ghost fishing mortality** can be preventative such as gear marking to identify the owner and discourage abandonment and discarding of gear, or remedial as using less durable and biodegradable gear.

### **Managing bycatch to reduce discards**

There are various types of **measures available** to manage bycatch and to reduce discards. These can be categorized to those that involve modifications to fishing gear or fishing practice, and to those that include restrictions on periods and areas within which specific types of gear are prohibited, bycatch limits, effort restrictions, minimum landing sizes, and discard bans (landing obligations). In addition, discards can be reduced through improved fleet communication, awareness-raising, training, and economic incentives.

Discard practices are often determined by a wide range of factors and it is therefore difficult to assess the effectiveness of any particular measure or action. Measures to reduce bycatch and discards are usually used in conjunction with other management measures which greatly complicates the analysis of their effectiveness.

The range of policy **options** to reduce discards is **determined both by the biological characteristics** of the fishery and the **social and economic environment**. Best practice in bycatch reduction is illustrated by a number of countries in the Organization for Economic Cooperation and Development (OECD), while many countries especially in Asia provide valuable experiences in utilization of bycatch. Increased bycatch utilization is now widespread in Asia, Africa and South and Central America leading to reduced discards.

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