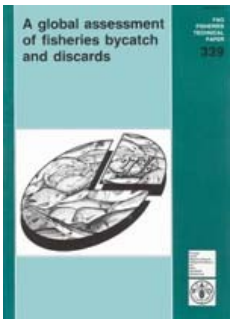
Food and Agriculture Organization of the United Nations

Title: A global assessment of fisheries bycatch and discards
Division: Fishery and Aquaculture Economics and Policy Division
ISBN: 9251035555
ISSN: 0429-9345



FAO FISHERIES TECHNICAL PAPER 339

A global assessment of fisheries bycatch and discards

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Reprinted 1996

M-43
ISBN 92-5-103555-5

Food and Agriculture Organization of the United Nations Rome 1994

PREPARATION OF THIS DOCUMENT

The apparent waste of living resources represented by discards has negatively influenced the image of the fishing industry which must face the issue of selectivity in fishing gear and practices. These issues will be addressed in the FAO Code of Conduct for Responsible Fishing and particularly in its chapters related to fishing operations, management and research.

The present report presents, for the first time, a global and regional analysis of bycatch and discards in fisheries, by gear, target species and fishing areas prepared by Natural Resources Consultants, Inc., 4025, 21st Street, Suite 200, Seattle, Washington, 98199, USA, with support from FAO which has agreed to publish the report.

A majority of the 800 papers examined came from the northern hemisphere. The tropical areas were covered as well as the available information permitted, and it is hoped that the study will stimulate investigations on bycatch and discards in these areas.

A complete Bycatch Database, which was compiled for the study, and a summary of it, are distributed with this document on a DOS compatible diskette to allow the readers of the report to have access to the basic data for their own analysis.

Disclaimer

maintenance or updating and for any damage that may arise from the use of the databases. However, users are kindly requested to report to FAO any errors or deficiencies found in these databases.

Distribution

FAO Fisheries Department
FAO Regional Fishery Officers
Directors of Fisheries
Regional and International Fisheries Organization
Authors

Alverson, D.L.; Freeberg, M.H.; Pope, J.G.; Murawski, S.A.
A global assessment of fisheries bycatch and discards.
FAO Fisheries Technical Paper. No. 339. Rome, FAO. 1994. 233p.

Summary

The authors estimate that between 17.9 and 39.5 million tons (average 27.0 million) of fish are discarded each year in commercial fisheries. These estimates are based on a review of over 800 papers. The highest quantities of discards are from the Northwest Pacific while tropical shrimp trawl fisheries generate a higher proportion of discards than any other fishery type, accounting for one third of the global total.

Of four major gear groups, shrimp trawls stand alone at the top of the list; bottom trawls, long-lines and pot fisheries come next. The third group consists of Japanese high-seas drift net fisheries, Danish seines and purse seines for capelin. Relatively low levels result from pelagic trawls, small pelagic purse seines and some of high seas drift nets. The authors point to inadequate data to determine the biological, ecological, economic and cultural impacts of discards although economic losses run to billions of dollars. However, it appears most likely that socio-cultural attitudes towards marine resources will guide international discard policies.

Techniques to reduce bycatch levels including traditional net selectivity, fishing gear development and time/area restrictions, are discussed. Effort reduction, incentive programmes and individual transferable quotas (that make the vessel responsible for bycatch reduction) are seen as promising avenues for the future. However, quick solutions to the problem are unlikely and much more information is required.

The publication includes a diskette with the complete Bycatch Database, which was compiled for the study, and a summary of it.

ACKNOWLEDGMENTS

The authors are indebted to Drs. Edward Miles and William T. Burke, University of Washington; Drs. Richard Marasco and Taivo Laevastu, National Marine Fisheries Service; Dr. Martin Hall, Inter-American Tropical Tuna Commission; Dr. Robert Trumble, International Pacific Halibut Commission; Dr. Peter Larkin, University of British Columbia; Drs. Jacek Majkowski and Serge Garcia and Staff, United Nations Food and Agriculture Organization; Joseph Blum, American Factory Trawlers Association; Dr. John Twiss, Marine Mammal Commission; Robert D. Alverson, Fishing Vessel Owners' Association; Franklin Alverson; Bo Bricklemyer, Aquatic Resources Conservation Group; Dr. Deborah Crouse, Center For Marine Conservation; and Jay Hastings, Japanese Fisheries Association, for the comments and suggestions on the drafts of this report Special technical help was provided by Brenda Spoonemore and Karma Dunlop of Natural Resources Consultants. Special thanks are given to the hundreds of authors and fishery-related institutions providing papers and references to the authors.

The study was sponsored by the following organizations and businesses: American Factory Trawler Association, Arctic Alaska Fisheries Corporation, Center for Marine Conservation, Farm Credit Services, The Highliners Association, Inter-American Tropical Tuna Commission, International Pacific Halibut Commission, Japanese Fisheries Association, Key Bank, Marine Mammal Commission, Minister of Fishery and Oceans - Canada, National Bank of Alaska, National Fisherman Magazine, North Pacific Fishery Management Council, Northwest Marine Technology, Ocean Trust Foundation, Pacific States Marine Fisheries Commission, Sunmar Shipping, UniSea, Inc., United Nations Food and Agriculture Organization, U.S. Department of Commerce/U.S. Department of State.

EXECUTIVE SUMMARY

The authors have examined several hundred articles concerned with bycatch and discards in world fisheries. Over 800 papers containing quantitative and qualitative information were used to characterize the nature and scope of regional and global bycatch problems. Mortalities associated with discarding practices were also reviewed.

The authors provide a provisional estimate of global discards in commercial fisheries of 27.0 million mt with a range of from 17.9 to 39.5 million mt. The region with the highest discard estimate is the Northwest Pacific. Shrimp trawl fisheries, particularly for tropical species, were found to generate more discards than any other fishery type and account for just over one-third of the global total. On a weight per weight basis, fourteen of the highest 20 discard ratios were associated with shrimp trawls. The fisheries associated with the twenty highest numbers-based ratios represented a more eclectic mix of shrimp trawl, pot, fish trawl, and longline fishery gear types. At the opposite end of the scale, fish trawl, seine, and high seas driftnet fisheries accounted for the majority of the gear types in the authors' list of the ten lowest discard ratios.

It should be noted that although data are tremendously variable, four major gear groups stand out. Shrimp trawls are alone at the top of the list, while relatively low levels are recorded for pelagic trawls, purse seines targeting on menhaden, sardines, and anchoveta, and some of the high seas driftnet fisheries. Between these two extremes lie two other groups. The first of these is comprised of bottom trawls, unspecified trawls, longline gear, and the majority of the pot fisheries. The final group fits between the very low ratios of the pelagic trawl group and the moderate ratios of the aforementioned bottom trawl/pot/line assemblage. Fisheries in this last group include the Japanese high seas driftnet fisheries, Danish seines, and purse seines for capelin.

The authors note there is in most instances inadequate data to determine the real biological, ecological, economic, or socio-cultural impact of discards. Nevertheless, data do suggest that survival of most discarded species is low, declines in some non-target species have been significant, overfishing often involves a significant discard component, and shifts in species dominance and the occupation of certain ecological niches have been in part due to discarding. The extent to which discarding alone and not the fishing process as a whole is responsible for these shifts is, however, unclear.

Economic losses tied to the act of discarding and objectives of monitoring or preventing discards presently run into billions of dollars. Such losses include those associated with discards of species of commercial value to other fisheries, discards of non-legal individuals (for reasons of sex, size, or management policy), and indirect costs related to discarding of non-target species of little commercial value. Included in the

bundle of monitoring and prevention costs are bycatch-related marine fisheries management expenditures, lost fishing opportunity due to premature target fishery closures following the attainment of bycatch caps, observer costs, enforcement expenses, modifications to fishing behavior, and increases in sorting and handling times.

The authors feel socio-cultural attitudes toward marine resources should be an important consideration in the development of international discard policies. Unfortunately, to date the policy process has paid too little attention to socio-cultural perspectives which are often influenced by differing national dependencies on marine resources as a protein staple. The authors also note the growing importance of non-consumptive uses to fisheries and bycatch policy changes. They urge evolution of global discard policies be ear-marked by the minimization of social conflicts, be independent, to the degree possible, of ideological differences, and be based on sound conservation principles.

Case studies are provided for bycatch and discard problems in the Northeast Pacific, as well as the Northeast and Northwest Atlantic. Bycatch and bycatch issues have been intensively studied in these locations relative to other areas. In the Northeast Pacific, a suite of fisheries produces a bycatch total exceeding one billion individuals annually. Impacts appear low on most species except the Pacific halibut and possibly king and Tanner crab.

Discard problems in the Northwest Atlantic were classified into four groups: (1) marketable species too small or otherwise prohibited from landings, (2) species for which no current market exists, but are caught along with commercial or recreational species, (3) species-specific fleet sectors discarding another fisheries target species, and (4) non-fishery bycatch species, including marine mammals, turtles, and birds. Regulatory approaches and management actions to address these problems are also discussed.

The section covering the Northeast Atlantic focuses on discarding in the mixed-species trawl fisheries for North Sea gadoids. The impact of discards on mortality rates for haddock and whiting and the effect of reductions in fishing effort draw particular scrutiny. Most of the discard problems noted in earlier chapters pertaining to North American fisheries are also noted in the fisheries of the Northeast Atlantic. Local variations associated with misreporting and environmental effects are, however, discussed. Also provided is a review of regulatory and gear management measures commonly applied in the region. The authors point out that many supposed technical solutions can generate unsuspected side effects which may impair their effectiveness. Further, they remind the reader voluntary bycatch reduction measures are unlikely to be successful if they are not in the short-term economic interest of the affected fisher.

A variety of techniques have been attempted by managers, engineers, and scientists to reduce bycatch/discard levels. These have included traditional net selectivity approaches, the development of fishing gear taking advantage of differential species behavior, and time/area fishing restrictions. These methodologies have worked with varying degrees of success depending on the species being managed and the willingness of industry to work together for positive solutions.

Emerging ideas include effort reduction, incentive programs, and individual transferable quotas that move the responsibility for bycatch reduction to the individual vessel level. The authors feel major gains against the global bycatch problem are likely to occur as such shifts towards individual responsibility take place. Progress may be impeded, however, because observer programs, an uncommon characteristic of today's fisheries, are necessary to audit progress toward bycatch goals adequately. For many fisheries suffering from growth overfishing, a reduction in effort may be the most straightforward means of reducing bycatch and improving fisheries conservation and management. Because the solution to global discard problems will vary between fisheries and regions, a clear understanding of the nature and scope of specific fishery problems should precede the introduction of management and other measures.

In the final chapter of the report, the authors scrutinize their work, remind the reader of particularly noteworthy findings, and discuss weaknesses in an analysis of the proportions associated with a global review. They also point out that actual data are often at odds with common perceptions and that many commercial and recreational fishers see bycatch as someone else's problem when, in fact, it is an all too common heritage. Finally, the authors note the many inconsistencies and inadequacies associated with current bycatch data and call upon the scientific community to work toward standardizing data presentation, if not collection, formats. In saying that, however, the authors recognize particular numbers and ratios may have little to do with actual ecological impacts. Consequently, they encourage heightened scientific attention to the assessment of population, community, and ecosystem impacts, in conjunction with improvements in our quantification of bycatch and discard losses.

Quick solutions to the bycatch problem are unlikely. Instead, a concerted national and international effort that will take money and time is necessary. A critical component of such action will be the reduction in effort levels from today's excessive amounts to quantities which will avoid conservation and ecological problems and will efficiently harvest the sea's resources.

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GLOSSARY

ADF&G - Alaska Department of Fish and Game (U.S.)

DANIDA - Danish International Development Agency

DFO - Canadian Department of Fisheries and Oceans

EEZ - Exclusive Economic Zone

ETP - Eastern Tropical Pacific

FAO - Food and Agriculture Organization

FCMA - Fisheries Conservation and Management Act (U.S.)

FFA - Forum Fisheries Agency

IATTC - Inter-American Tropical Tuna Commission

ICCAT - International Commission for the Conservation of Atlantic Tunas

ICES - International Council for the Exploration of the Sea

ICLARM - International Center for Living Aquatic Resources Management

IDCA - International Dolphin Conservation Act

IFC - International Fisheries Commission

INPFC - International North Pacific Fisheries Commission

IPHC - International Pacific Halibut Commission

IUCN - International Union for the Conservation of Nature

IWC - International Whaling Commission

MFCMA - Magnuson Fisheries Conservation and Management Act

MMPA - Marine Mammal Protection Act (U.S.)

MSY - Maximum Sustainable Yield

NAFO - Northwest Atlantic Fisheries Organization

NMFS - National Marine Fisheries Service (U.S.)

NOAA - National Oceanic and Atmospheric Administration (U.S.)

NRC - Natural Resources Consultants, Inc. (U.S.)

NRI - Natural Resources Institute (U.K.)

ODA - Overseas Development Administration

PSC - Prohibited Species Catch

SPC - South Pacific Commission

UN - United Nations

UNCED - United Nations Conference on Economic Development

UNCLOS - United Nations Convention on the Law of the Sea

UNGA - United Nations General Assembly

USFWS - United States Fish and Wildlife Service