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TECHNICAL CONSULTATION TO DEVELOP INTERNATIONAL GUIDELINES ON BYCATCH MANAGEMENT AND REDUCTION OF DISCARDS

Rome, Italy, 6 – 10 December 2010

SECRETARIAT WORKING PAPER

SUMMARY

This working paper provides information in support of actions requested by the Committee on Fisheries in March 2009 to develop International Guidelines for Bycatch Management and Reduction of Discards. The Annex of the paper provides draft text of the International Guidelines.

INTRODUCTION

The FAO Code of Conduct for Responsible Fisheries (hereinafter referred to as “the Code”) calls for the sustainable use of aquatic ecosystems and requires that fishing be conducted with due regard for the environment. It also promotes the maintenance, safeguarding and conservation of the biodiversity of ecosystems by minimizing the impacts of fisheries on non-target species and the ecosystem in general.

Consequently, given the continuing concern that excessive bycatch and discarding is threatening the long-term sustainability of many fisheries, the twenty-eighth session of the Committee on Fisheries, (COFI) in March 2009, recommended that international guidelines on bycatch management and reduction of discards should be developed through an Expert Consultation process to be followed by a Technical Consultation. Accordingly, an Expert Consultation was held in Rome from 30 November to 3 December 2009 that addressed the development of guidelines for bycatch management and reduction of discards.

From the report of that Expert Consultation it is evident that States and regional fisheries management organizations and arrangements (RFMOs) should have an overall view of all fisheries under their authority in order to readily identify where, when and why bycatch and discard issues occur. In particular, there is a clear need, *interalia*, to:

- identify and quantify the issues associated with bycatch and discards;
- seek solutions to the issues identified through interaction with stakeholders;
- develop fishery management plans and amend, as appropriate, the fisheries legislation and/or related regulations;
- communicate action to be taken to all stakeholders and disseminate information, both technical and regulatory;
- ensure access to training, the availability of tools and equipment; and
- set in place an enforcement programme that also recognises the role of the fishing industry.

Thus, following the direction given by COFI, this Technical Consultation has been convened to further develop International Guidelines for Bycatch Management and the Reduction of Discards.

In preparation for the Technical Consultation the Secretariat prepared the working document attached as Annex I on the basis of the administrative report of the Expert Consultation as submitted to the Director-General of FAO. The document principally focuses on a draft of guidelines for bycatch management and reduction of discards and takes note of provisions in the Code of Conduct for Responsible Fisheries that are applicable to bycatch and discards.

It is also noted, that whereas guidelines may provide advice to States and RFMOs on what should be done, it is evident that in many instances more detailed information may be needed, particularly in relation to the application of the appropriate technological measures. In this regard, the reference material appended to the draft guidelines in the working paper may further assist in comprehension and application of guidelines.¹

¹ This follows the format used with success to date within the series of Technical Guidelines for the implementation of the Code of Conduct for Responsible Fisheries, as referred to in Resolution 4/95 of the Twenty-eighth Session of the FAO Conference on 31 October 1995.

ACTIONS TO FURTHER DEVELOP INTERNATIONAL GUIDELINES FOR BYCATCH MANAGEMENT AND REDUCTION OF DISCARDS

The Technical Consultation is invited to:

- i) further develop the concept and text of the draft International Guidelines for Bycatch Management and the Reduction of Discards;
- ii) provide advice on the ways and means to ensure that the implementation of the International Guidelines would have the desired impact; and
- iii) consider the utility of appending appropriate reference material to the guidelines.

ANNEX I

**DRAFT TEXT OF INTERNATIONAL GUIDELINES FOR BYCATCH
MANAGEMENT AND REDUCTION OF DISCARDS**

SUMMARY

This document provides a draft of international guidelines for bycatch management and reduction of discards that have been prepared on the basis of the administrative report to the Director General of FAO of the outcome of the Expert Consultation on the same held in Rome from 30 November to 3 December 2009.

These draft guidelines are intended to provide assistance to all States and RFMOs in implementing the Code of Conduct for Responsible Fisheries for the specific purpose of managing bycatch and reducing discards.

Therefore, the scope of these draft guidelines is global.

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1. BACKGROUND

- 1.1 The FAO Code of Conduct for Responsible Fisheries (the Code) calls for sustainable use of aquatic ecosystems and requires that fishing be conducted with due regard for the environment. The Code also promotes the maintenance, safeguarding and conservation of biodiversity of ecosystems by minimizing fisheries impacts on non-target species and the system in general. However, despite the Code's endorsement by all FAO Members in 1995, there is growing concern that excessive bycatch and discarding are threatening the long-term sustainability of fisheries and the maintenance of biodiversity, resulting in increased food insecurity, and adversely affecting the livelihoods of millions of fishers and fishworkers dependent on fish resources.
- 1.2 Calls for action on bycatch and discards have been raised at the United Nations General Assembly (UNGA). At the sixty-fourth session of the UNGA, States, subregional and regional fisheries management organizations and arrangements (RFMO/As) and other relevant international organizations were urged to reduce or eliminate bycatch, catch by lost or abandoned gear, fish discards and post-harvest losses, and support studies and research that will reduce or eliminate bycatch of juvenile fish.²
- 1.3 Past efforts taken by FAO to address these issues have included the development of International Plans of Action for seabirds and sharks³ and guidelines to reduce marine turtle interactions with fisheries. Despite these efforts, problems persist with the high levels of unwanted and often unreported bycatch and discards in many fisheries around the world, including the capture of juveniles of economically valuable and ecologically important fish. In 2004, FAO estimated that discarded global catch was approximately 7 million tonnes.⁴ Estimating the total amount of global bycatch, including discards, however, has proven difficult for a variety of reasons. Depending on the definition used, bycatch may be in excess of 20 million tonnes.
- 1.4 At the twenty-eighth session of COFI in March 2009, FAO reported on bycatch and discards and reiterated the concern that in poorly managed fisheries, unreported and unregulated (i) landings of bycatch, (ii) discards, and (iii) pre-catch losses are issues of major concern.⁵ At the same session, COFI agreed that FAO should develop International Guidelines on Bycatch Management and Reduction of Discards through the process of an Expert Consultation followed by a Technical Consultation⁶
- 1.5 Accordingly, FAO organized an Expert Consultation to develop "International Guidelines on Bycatch Management and Reduction of Discards" held from 30 November to 3 December 2009 at FAO in Rome, Italy. The report of that consultation is contained in the FAO Fisheries and Aquaculture Report No. 934 (R934).

² A/RES/64/72 Sustainable fisheries, including through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and related instruments.

³ International Plan of Action for reducing incidental catch of seabirds in longline fisheries. International Plan of Action for the conservation and management of sharks. International Plan of Action for the management of fishing capacity. Rome, FAO. 1999. 26p.

⁴ Kelleher, K. Discards in the world's marine fisheries. An update. FAO Fisheries Technical Paper. No. 470. Rome, FAO. 2005. 131p.

⁵ COFI/2009/6 Combating illegal, unreported and unregulated fishing, including through a legally binding-instrument on port State measures and the establishment of a global record of fishing vessels.

⁶ Report of the twenty-eighth session of the Committee on Fisheries. Rome, 2–6 March 2009. FAO Fisheries and Aquaculture Report. No. 902. Rome, FAO. 2009. 64p.

- 1.6 Such guidelines as may be developed are to be interpreted and applied in conformity with the relevant rules of international law, as reflected in the United Nations Convention on the Law of the Sea of 10 December 1982 (1982 UN Convention).⁷ Nothing in these guidelines prejudices the rights, jurisdiction and duties of States under the international Law of the Sea as reflected in the 1982 UN Convention.
- 1.7 Likewise, such guidelines would also be interpreted and applied in conformity and accordance with appropriate bycatch measures addressed in the International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries (IPOA-Seabirds), the International Plan of Action For the Conservation and Management of Sharks (IPOA-Sharks), and Guidelines to Reducing Sea Turtle Interactions and Mortality in Marine Capture Fisheries.

2. SCOPE, PURPOSE AND OBJECTIVES

2.1 Scope

- 2.1.1 The scope of the International Guidelines for Bycatch Management and Reduction of Discards (the Guidelines) is global, covering all fishing activities in all seas, oceans and inland waters.

2.2 Purpose

- 2.2.1 The purpose of the Guidelines is to assist States and RFMOs in implementing the Code and the ecosystem approach to fisheries.

2.3 Objectives

- 2.3.1 The objectives of the Guidelines are to promote responsible fisheries by:

- minimizing the capture and mortality of species and sizes which are not going to be used in a manner that is consistent with the Code;
- providing guidance on measures that contribute towards more effective management of bycatch and reduce discards;
- improving, reporting and the accounting of all components of the total catch of which bycatch and discards are subsets.

3. MANAGEMENT ACTION

Box 1. Article 7.3.1 of the Code

“To be effective, fisheries management should be concerned with the whole stock unit over its entire area of distribution and take into account previously agreed management measures established and applied in the same region, all removals and the biological unity and other biological characteristics of the stock. The best scientific evidence available should be used to determine, *inter alia*, the area of distribution of the resource and the area through which it migrates during its life cycle.”

3.1 Governance frameworks

- 3.1.1 States, acting in their capacity as flag States, port States and coastal States, importing or exporting (market) States, or when exercising jurisdiction over their nationals,

⁷ References in these guidelines to the 1982 UN Convention, the 1995 UN Fish Stocks Agreement and other international treaties do not prejudice the position of any State with respect to signature, ratification or accession to those instruments.

should contribute to the attainment of the objectives of the management of bycatch and reduction of discards.

3.1.2 States should establish and implement national policies, legal and institutional frameworks for the effective management of bycatch and the reduction of discards, including those measures agreed by RFMOs in which they participate. Governance and legal frameworks should enable, *inter alia*:

- the application of the ecosystem approach to fisheries;
- the use of effective control of fishing capacity and reduction of effort, especially in fisheries where bycatch and discards are a significant issue;
- as appropriate, the implementation of co-management and community-based management of fisheries to better manage bycatch and reduce discards;
- the implementation of measures and actions set out in internationally agreed guidelines, including monitoring, control and surveillance (MCS) and other international fisheries instruments in order to manage bycatch and reduce discards.

3.2 Institutional frameworks

3.2.1 States should ensure that measures taken to manage bycatch and reduce discards are consistent with the general principles set out in the United Nations Convention on the Law of the Sea of 10 December 1982 (the 1982 UN Convention) and the Agreement for the Implementation of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (1995 UN Fish Stocks Agreement) and with other international instruments including the provisions of the Code;

3.2.2 States should adopt and implement measures necessary to ensure the management of bycatch and reduction of discards:

- in accordance with the precautionary approach, as reflected in Article 6 of the 1995 UN Fish Stock Agreement, and as set out in Article 6.5 and 7.5 of the Code;
- based on the best scientific and technical information available, taking into account fishers' knowledge.

3.2.3 States should promote capacity building for better management of bycatch and the reduction of discards including, if appropriate, participation in the co-management and community-based management of fisheries.

3.2.4 States and RFMOs should:

- develop or amend management plans for their fisheries that include objectives for the use and management of the catch of which bycatch and discards are subsets, and that such plans are consistent with the Code;
- encourage the involvement of fishers in the development of measures to manage bycatch and reduce discards, recognizing the value of their knowledge and experience; and
- ensure that the incentives to manage bycatch and reduce discards are sufficient to encourage the adoption of, and deter evasion of, management measures.

3.2.5 States should strengthen and build the capacity of existing RFMOs in order to manage bycatch and reduce discards, incorporating the established principles of relevant international law and related international instruments into the mandates of these organizations or arrangements. When actions taken by States on bycatch

management and reduction of discards would be more effective if extended to areas under the jurisdiction of RFMOs, the following should be considered:

- when their fisheries overlap, States should encourage RFMOs and cooperating parties to adopt measures complementary to those contained in their bycatch management plans;
- bycatch experts should be included as observers or as members of State delegations in scientific and technical meetings of RFMOs that address bycatch (e.g. bycatch working groups, ecosystem working groups); and
- data collection and regulatory and enforcement regimes should be harmonized.

4. BYCATCH MANAGEMENT PLANS

Box 2. Summary from Report of the Expert Consultation (R934)

In general, bycatch and discards result from a complex interaction of ecological, technical, legal and economic factors. Therefore, decisions regarding mitigation measures should be based on the adequate analysis of the underlying problems, which in many cases are not clearly identified before solutions are implemented. A bycatch management plan is a framework which lays out the objectives and actions in order to manage bycatch and reduce discards.

4.1 Management planning

4.1.1 States and RFMOs should ensure that all significant sources of fishing mortality in a fishery are addressed in management planning and that such planning is consistent with the Code and an ecosystem approach to fisheries.

4.1.2 States and RFMOs should identify fisheries where bycatch and discarding occurs and specify the requirements for management actions. Such assessments should include, *inter alia*:

- information on the type(s) of fishing conducted or considered, including the vessels and gear types, fishing areas, levels of fishing effort, duration of fishing, as well as the target and bycatch species and their sizes, including threatened, endangered or protected species;
- risk assessments to identify the specific nature and extent of bycatch and discard problems in the fishery, and which impacts are most likely to be significant;
- a review of the effectiveness of existing, ongoing and future initiatives to minimize the identified bycatch and discard problems;
- an assessment of the impacts of bycatch management and discard reduction measures on fishing operations and livelihoods to ascertain the potential effects of their implementation and the support necessary to facilitate their uptake.
- a review of the systems for the regular monitoring of the effectiveness of measures for bycatch management and reduction of discards, and assessed against the over-arching management goals; and
- the regular and independent assessment of plans and management measures for adjustment as appropriate.

4.1.3 States and RFMOs should develop, adopt and implement bycatch management plans for all fisheries that require bycatch management action. These plans should contain objectives, strategies, standards and measures directed at managing bycatch and reducing discards. Bycatch management plans could either stand alone, or be incorporated into broader ecosystem/fisheries management plans.

4.1.4 States and RFMOs should ensure that bycatch management plans include best practices for bycatch management and reduction of discards developed in cooperation with relevant stakeholders. These best practices should, *interalia*;

- identify current bycatch problem(s);
- review the social and economic context, drivers and objectives that are associated with bycatch problem(s);
- list and justify quantifiable and verifiable long-term management objectives;
- develop measures to meet these objectives, tailored to the characteristics of each fishery, to:
 - (i) prevent potential bycatch through spatial and/or temporal measures;
 - (ii) minimize the capture of bycatch through the modifications of fishing gears and practices;
 - (iii) maximize the live release of bycatch;
 - (iv) reduce discards; and/or
 - (v) utilize the bycatch that continues to be taken under these measures in a manner that is consistent with the Code.
- provide incentives for fishers to become full partners in developing, testing and evaluating the performance of mitigation measures;
- support controlled trials under commercial fishing conditions that investigate the effectiveness of mitigation measures;
- encourage innovation through the collaboration of fishers, scientists, resource managers, non-governmental organizations (NGOs) and other relevant stakeholders;
- encourage the collaborative research between States with fisheries that they share or have similar bycatch problems; and
- promote and raise public awareness of actions that successfully mitigate bycatch problems in the fishery.

4.2 Data collection, reporting, and assessment

4.2.1 As part of the development of bycatch management plans, States and RFMOs should:

- establish appropriate and reliable monitoring and assessment techniques to (a) determine how bycatch affects fisheries resources and (b) evaluate and refine the performance of measures for bycatch management and reductions of discards;
- based on risk assessments, identify the highest risks, prioritize these, develop and implement standardized and consistent data collection procedures and protocols, including the use of observers, standardized logbooks and vessel position monitoring systems;
- consider the use of national and regional training programmes for fishers, resource managers and scientific observers to improve bycatch identification, data collection and reporting; and,
- ensure that data collection programs include socio-economic surveys on, *interalia*, the value of landings and employment in harvesting sectors and the social and economic impacts of regulatory measures.

4.2.2 States and RFMOs should give due consideration to the fact that since bycatch management and the reduction of discards often requires different types of data from many sources, improved integrated systems may be required to aggregate, manage and analyse this data.

- 4.2.3 States and RFMOs should recognize that in multispecies, multigear fisheries, reporting the full species composition of catches may not be practical. Consequently, alternative methods, such as reporting on indicators that would include vessels/trips/species-sizes-sexes/areas as may be necessary.

5. MEASURES TO MANAGE BYCATCH AND DISCARDS

Box 3. Article 7.6.9 of the Code

“States should take appropriate measures to minimize waste, discards, catch by lost or abandoned gear, catch of non-target species, both fish and non-fish species, and negative impacts on associated or dependent species, in particular endangered species. Where appropriate, such measures may include technical measures related to fish size, mesh size or gear, discards, closed seasons and areas and zones reserved for selected fisheries, particularly artisanal fisheries. Such measures should be applied, where appropriate, to protect juveniles and spawners. States and subregional or regional fisheries management organizations and arrangements should promote, to the extent practicable, the development and use of selective, environmentally safe and cost effective gear and techniques.”

5.1 Tools to manage bycatch and reduce discards

- 5.1.1 States and RFMOs should ensure that fisheries managers are provided with a range of tools to manage bycatch and reduce discards, through, *inter alia*:

- fishing capacity and effort controls;
- the improvement of the design and use of fishing gear;
- the use of spatial and temporal measures; and
- limits on bycatches,
- bans on discards providing that the retained catch is utilized in a manner that is consistent with the Code.

5.2 Fishing capacity and effort controls

- 5.2.1 States and RFMOs should give careful consideration to the implementation of control of capacity and of fishing effort in a fishery when significant quantities of bycatch and discards occur. In the event that action is contemplated, the provision set out in the FAO “IPOA–Capacity”⁸ should be followed.

- 5.2.2 Controls on fishing capacity and effort to address bycatch and discards issues should be targeted at the fishery causing the issue.

- 5.2.3 Excess capacity and effort excluded from one fishery/area/time should not lead to increased capacity and effort, and therefore bycatch and discards, in other fisheries/areas/times.

5.3 Improvement of the design and operation of fishing gear

- 5.3.1 Because bycatch and discards can be reduced by improving the selectivity of fishing gear, States and RFMOs should consider utilizing technological measures to reduce bycatch and discards, including *inter alia*:

- changing the design, rigging and deployment of fishing gear (e.g. mesh size, hook size, aimed trawling);
- installing bycatch reduction devices (e.g. turtle excluder devices, sorting grids, square mesh panels);

⁸ International Plan of Action for the management of fishing capacity. Rome, FAO. 1999. 26p.

- using operational techniques during fishing to reduce encounters with bycatch (e.g. the backdown manoeuvre during purse-seining, tori lines on longlines);
- using equipment, practices and handling techniques that increase the probability of survival of the released catches;
- substituting a gear with an alternative that has lower bycatch; and
- the appropriate use of integrated vessel and fishing gear position monitoring and habitat mapping systems.⁹

5.3.2 In the preparation of gear-based regulations, States and RFMOs should ensure that they are practical, enforceable, effective and compatible with other measures, such as the minimum legal landing sizes and that the consequences of implementing such regulations are known and acceptable.

5.4 Spatial and temporal closure measures

5.4.1 States and RFMOs should consider measures to reduce interactions with particularly vulnerable bycatch (e.g. juveniles, rare, endangered or vulnerable species) the creation of *interalia*: marine protected areas, marine parks, no-take zones and areas where certain gears are prohibited (e.g. no-trawl areas).

5.4.2 States and RFMOs should consider the use of adaptive or real time closures to reduce the capture of bycatch species as they migrate or aggregate, as long as real-time information on both bycatch species and fleets is available through, for example, vessel position monitoring and near real time reporting systems.

5.4.3 States and RFMOs should encourage information-sharing among fishers and managers to identify areas/times of high bycatch so that they effectively avoid them.

5.4.4 States and RFMOs should give careful consideration to the use of closure measures since the consequences can be complex and unforeseen, such as the displacement of fishing effort into other areas or fisheries. Accordingly, closure decisions should be based on the best available scientific information and take into account potential indirect and unintended consequences of such measures.

5.5 Limits on bycatches and discards

5.5.1 States and RFMOs should consider the use of no-discard regimes, individual and fleet-wide bycatch quotas to limit bycatch in those fisheries where bycatch is unavoidable.

5.5.2 When implementing bycatch quotas, States and RFMOs should give consideration to:

- the time required for fishers to adjust to any new restrictions;
- distributing bycatch quotas to fishers that have adopted satisfactory mitigation technologies and practices;
- the use of complementary measures that may be necessary to enhance their effectiveness (e.g. reporting requirements); and
- the type and level of monitoring required to achieve adequate compliance;
- the transferability of such quotas between individuals and or fleets.

⁹ International Guidelines for the Management of Deep-sea Fisheries in the High Seas. Directives internationales sur la gestion de la pêche profonde en haute mer. Directrices Internacionales para la Ordenación de las Pesquerías de Aguas Profundas en Alta Mar. Rome/Roma, FAO. 2009. 73p.

- 5.5.3 When introducing individual and/or fleet-wide bycatch quotas, States and RFMOs should aim, to the extent possible, to ensure that the sum of all quotas for a fleet reflects the expected species composition of the catch that fleets may take in the area of operation.
- 5.6 Economic incentives for reducing bycatch and discards.
- 5.6.1 States and RFMOs should take into consideration the fact that fishers are more likely to adopt fishing techniques and comply with regulations that are designed to reduce bycatch if such measures improve their revenue, the quality of their catch, their operational efficiency and/or safety. Furthermore, it should also be considered that:
- a strong economic incentive for adoption of bycatch mitigation measures is access to a fishery;
 - the uptake of bycatch management measures may be enhanced when positive incentives are available such as rewarding compliant fishers with preferential access to resources;
 - the costs to fishers for installation of bycatch mitigation technologies could be lessened through the application of grants/loans and preferential treatment on duties and taxes for investment in such technologies;
 - some markets may drive the harvesting of bycatch, thus the development of alternative products may ease the pressure on bycatch species;
 - markets are increasingly seeking to promote fish from sustainable fisheries that meet the criteria provided in the FAO Guidelines on fisheries ecolabelling.¹⁰ Reducing or maintaining low bycatch levels may be an important requirement to achieve these criteria.
- 5.7 Other measures to manage bycatch
- 5.7.1 In situations where bycatch must be released, techniques may have to undergo further development to maximise their survival after release.
- 5.7.2 The management of bycatch should be supported by technological development in the post harvest sector.

6. MONITORING, CONTROL AND SURVEILLANCE (MCS)

Box 4. Article 7.7.3 of the Code

“States in conformity with their national laws, should implement effective fisheries monitoring, control, surveillance and law enforcement measures, including where appropriate, observer programmes, inspection schemes and vessel monitoring systems. Such measures should be promoted and, where appropriate, implemented by subregional or regional fisheries management organizations and arrangements in accordance with procedures agreed by such organizations or arrangements.”

- 6.1 States and RFMOs should:
- regulate the catch, effort and operational aspects of fishing that affect bycatch and discards (e.g. places and times of fishing, the gear used);
 - report all relevant information related to bycatch and discards; inspect vessels and gear prior to the commencement of fishing operations; and

¹⁰ Guidelines for the ecolabelling of fish and fishery products from marine capture fisheries. Revision 1. Rome, FAO. 2009. 108p.

- monitor all relevant fishing operations, including catch handling on board the fishing vessel and landings at ports (see the Port State Measures Agreement ¹¹).
- 6.2 States should establish and implement the appropriate national policies, as well as the legal and institutional frameworks, for effective monitoring, control and surveillance. This should comprise measures accorded by RFMOs, and be consistent throughout the regions.
- 6.3 States and RFMOs should encourage the participation of fishers in policy development, implementation and self-policing (e.g. through co-management and community-based management). This can lead to greater voluntary compliance and improved enforcement of bycatch management measures.

7. RESEARCH AND DEVELOPMENT

Box 4. Article 12.10 of the Code:

“States should carry out studies on the selectivity of fishing gear, the environmental impact of fishing gear on target species and on the behaviour of target and non-target species in relation to such fishing gear as an aid for management decisions and with a view to minimizing non-utilized catches, as well as safeguarding the biodiversity of ecosystems and the aquatic habitat.”

- 7.1 Prior to the implementation of mitigation measures, States and RFMOs should conduct assessments to compare the socio-economic cost of each bycatch management measure with their effectiveness, ease of implementation and likelihood of uptake by fishing fleets. Social studies of fishing communities will assist in facilitating the adoption of new technologies and procedures in order to manage bycatch and reduce discards.
- 7.2 Gear and method-based measures should be tested under commercial fishing conditions, using properly trained personnel and with the cooperation and collaboration of the fishing sector from the initial stages of testing through to implementation.
- 7.3 States and RFMOs should collaborate in assessing bycatch issues throughout the entire distribution range of the species of concern.
- 7.4 In fisheries having high bycatch, or if discarding occurs and effective measures for reduction are not available, States and RFMOs should establish research and development programmes for alternative fishing methods that are practical, safe, effective, economically viable and environmentally friendly.
- 7.5 States and RFMOs should map seabed habitats, distributions of bycatch and fishing effort to support spatial and temporal management measures.
- 7.6 States, RFMOs and fishing sectors that require additional resources to develop or implement research on bycatch should partner or collaborate with appropriate research providers and funding bodies, including private foundations.

¹¹ <http://www.fao.org/Legal/treaties/037t-e.pdf> Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing.

8. AWARENESS, COMMUNICATION AND CAPACITY BUILDING MEASURES

Box 5. Summary text from Report of the Expert Consultation R934

There is a need to raise awareness of bycatch and discard problems and for the resolution of these problems with the involvement of fishers, all levels of government, policy-makers, special interest groups and the general public. Because the involvement of these stakeholders is important, mechanisms for communication, cooperation and coordination in the development of bycatch management measures should be a requirement.

- 8.1 States and RFMOs should raise the level of awareness of bycatch and discard problems and the need for their resolution with fishers, governments, policy-makers, special interest groups and the general public.
- 8.2 States and RFMOs should collate and share best practice methods for monitoring, estimating and managing bycatch, reducing discards, preparing appropriate legislation and for effective communication and training.
- 8.3 In order to facilitate the development of necessary policies and legislation, States should ensure that fisheries managers and policy-makers are provided with applied training in bycatch and discard issues, as well as in their solutions.
- 8.4 States should also ensure that fishing gear technologists receive the specialised training in technical measures which may be adopted to mitigate bycatch and discards, as well as provide adequate training to fishers in the use and maintenance of the technology and practices so developed.
- 8.5 Several specific steps are needed by States to train and promote the cooperation and uptake of bycatch management and discard reduction measures, including:
 - the coordination and strengthening of the activities and programmes of fishers' cooperatives and similar organizations to manage bycatch and reduce discards;
 - maintaining continuous communication with fishers on the causes and conditions that lead to bycatch, the evolution of bycatch reduction programmes, the results of experiments and the status of species of interest;
 - providing clear explanations to fishers on why it is necessary to reduce bycatches in their fisheries, the consequences of failing to do so and the benefits of adopting bycatch management measures;
 - incorporating fishers' opinions and suggestions on effective bycatch and discards reduction measures; and
 - providing adequate training to fishers in: the use and maintenance of technology and practices that reduce bycatch; techniques that allow fishers to develop their own solutions; the handling, recovery and release of bycatch species captured alive; and communication techniques to allow their bycatch reduction work to be elucidated to appropriate target audiences.

9. CONSIDERATIONS FOR IMPLEMENTATION OF GUIDELINES

Box 6. Article 8.4.3 of the Code

“States should make every effort to ensure that documentation with regard to fishing operations, retained catch of fish and non-fish species and, as regards discards, the information required for stock assessment as decided by relevant management bodies, is collected and forwarded systematically to those bodies. States should, as far as possible, establish programmes, such as observer and inspection schemes, in order to promote compliance with applicable measures.”

- 9.1 States and RFMOs should collaborate to address common issues, such as the development of compatible standards, tools and information aimed at facilitating the implementation of these Guidelines.
- 9.2 States and RFMOs should collaborate with FAO and other relevant organizations to standardize monitoring and reporting procedures on bycatch and discards, and for fishing gears that are known to be problematic.
- 9.3 States and RFMOs should keep all stakeholders and the wider public well informed of progress in bycatch management and reduction of discards and use a variety of tools to ensure effective communication of such progress.
- 9.4 FAO should review the progress made in the implementation of internationally agreed guidelines on the basis of biennial reports from States and RFMOs.
- 9.5 In implementing International Guidelines, consideration should be given to, *inter alia*, accountability, socioeconomic aspects, timeliness and transparency.

10. SPECIAL REQUIREMENTS OF DEVELOPING STATES

Box 7. Summary text from Report of the Expert Consultation R934

In the implementation of internationally agreed guidelines, States and RFMOs should fully recognize the special requirements of developing States in relation to the management of bycatch in their fisheries. To this end, States, RFMOs, the United Nations system (including FAO, the United Nations Development Programme and the United Nations Environment Programme), other relevant international and regional intergovernmental and non-governmental organizations and financial institutions should assist developing States in implementing such guidelines.

- 10.1 Consideration should be given to enhancing the capacity of developing States to manage bycatch and reduce discards in their fisheries through financial and technical assistance, technology transfer, training and scientific cooperation, in conformity with international law and the Code.
- 10.2 FAO should give special consideration to providing technical assistance to developing States, including fostering international cooperation, as the needs arise in areas such as:
 - the development of effective bycatch management plans;
 - bycatch and discard monitoring and reporting;
 - technical assistance in developing, adapting and implementing measures related to bycatch management;

- development of policy and supporting legislation;
- development of effective MCS;
- support to implement the FAO International Plan of Action-Illegal, unreported and unregulated fishing (IPOA-IUU) and IPOA-Capacity, IPOA-Sharks and IPOA-Seabirds; and
- other priority issues that occur during implementation of the guidelines.

11. PRE-CATCH LOSSES AND GHOST FISHING

Box 8. Summary text from Report of the Expert Consultation R934

In some fisheries, the mortality of organisms may occur as a result of interacting with fishing gear without actually getting caught (termed “pre-catch losses”). Furthermore, lost, abandoned or otherwise discarded fishing gears may continue to cause mortalities (“ghost-fishing”) and because the organisms involved are not actually caught; different tools and measures are needed for their assessment and mitigation.

- 11.1 States and RFMO should consider measures to address the impact of pre-catch losses and ghost fishing. Possible actions to assess and mitigate such impacts include *inter alia*:
- adopting objectives in fisheries management plans to minimize mortalities as a result of pre-catch losses and ghost-fishing;
 - improving the scientific information on the magnitude and effects of pre-catch losses and ghost fishing, so that these effects can be included in stock, fishery and ecosystem assessments; and
 - developing technologies and measures that quantify, and reduce, the mortalities and impacts associated with pre-catch losses and ghost fishing. This may include tools that estimate pre-catch losses by various gear-types, identify the ownership of gears, reduce gear losses, aid in the retrieval of lost gears, and extinguish the fishing power of lost gear through the use of degradable materials.

APPENDIX 1

CHARACTERISTICS OF BYCATCH

Bycatch is internationally accepted as a major issue when it comprises a significant proportion of the catch in a fishery, or a large proportion of a particular stock, population or species. A tool for understanding how bycatch relates to sources of fishing mortality is the Generalized Catch Concept Model (see Appendix 3).

The Expert Consultation (Rome 30 November–3 December 2009) found that developing a standard international definition of bycatch is difficult because of the variations in how bycatch has been, and continues to be, defined nationally, regionally and from fishery to fishery. Furthermore, ambiguities exist in the meanings of various bycatch-related terms. The Consultation concluded that bycatch could be generally summarized as:

“Catch that a fisher did not intend to catch, did not want to catch, did not choose to use, or which should not be caught for whatever reason”.

Types of bycatch includes *inter alia*:

- ecologically and economically important species;
- juveniles;
- all species and sizes not specifically targeted in a fishery;
- the incidental capture of organisms for which there is no intended use;
- discards
- prohibited, endangered and or protected species

For fisheries having an effective management plan, bycatch is considered the portion of the capture that is inconsistent with the goals of that management plan, or is designated as bycatch in the plan. In fisheries where management plans do not exist, or are not effectively implemented, bycatch can be considered to be the portion of the capture that is not harvested in a manner consistent with the Code or for which the species and/or sizes of species cannot sustain exploitation.

Notwithstanding how bycatch is defined, the unreported elements of catch and bycatch can be significant for some capture methods and fisheries. If not taken into account, these elements may be aggravating factors to overfishing and pose a serious risk to the effective management of fisheries.

APPENDIX 2

CAUSES OF DISCARDS

NOTE: This table has been taken from FAO Fisheries Technical Paper No. 470. Rome, FAO, 2005. 131p. Although not fully deliberated by the Expert Consultation, it was agreed to include it as a useful guide to some of the causes of discarding.

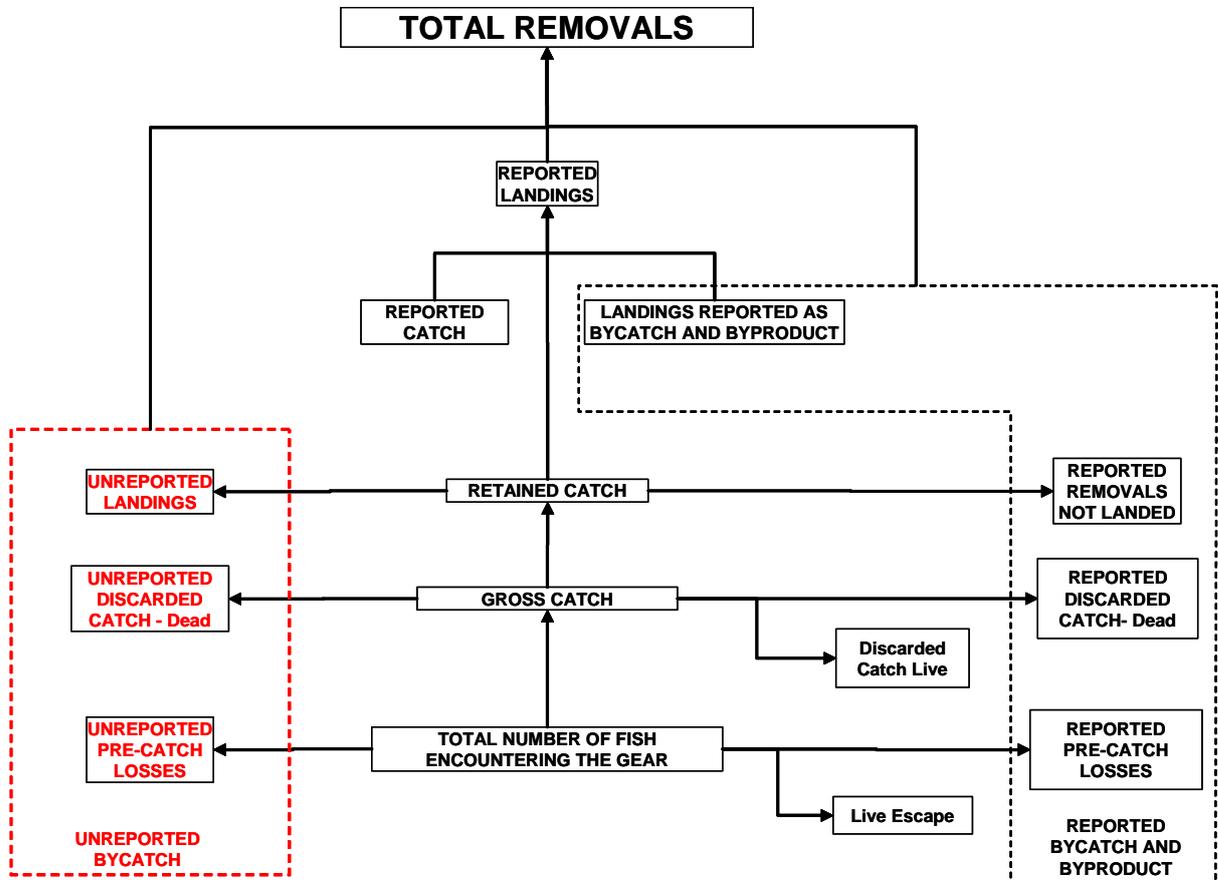
TABLE 36

A classification of causes of discards

Cause/parameter	Comment/examples/trends
Biological	
Species composition	High species diversity is likely to increase untargeted species harvested. Changes in the species composition in fisheries may increase or decrease discards and may be directly linked to overfishing. Changes in discarding practices are likely to be related to change in the proportion of target species
Year class	Large juvenile year class may increase discards
Exploitation status (overfishing)	Overfishing may result in a larger proportion of smaller fish in the catch and large discards of juveniles or fish under the MLS; low stock density of target species may lead to increased fishing effort and unwanted bycatch
Sex	Target is roe fish only, immature/male fish may be discarded
Poisonous/dangerous	For example, landings of <i>Lujanus bohar</i> are prohibited in Réunion; stingrays
Vessel characteristics	
Size of fish hold	Bycatch may occupy space designated for target species
Freezing capacity	Quality of more valuable target species may suffer; insufficient freezing capacity; different freezing duration for shrimp and bycatch, for example
Limited ice on board	Quality of target species may suffer if ice is used for bycatch
Catch quantity	If catches are large, then discards may be higher
Processing plant	Catches exceed capacity of plant (e.g. surimi plant, fishmeal plant). Small/very large sizes cannot be handled by filleting machines
Catch composition	Small sizes, damaged fish, impossible to sort (small pelagics)
Fishing operations	
Skipper	Payment mechanism, personal preferences, skills
Selectivity	Wide range of effects on target species and bycatch
Crew remuneration	Payments linked to bycatch recovery, or not
Trip length	Discards higher at start of long trip
Haul length	Discards may be higher if trawl haul time is long, because of damage to fish
Soak time	Discards higher with long soak time because of damage to fish, e.g. Celtic Sea French gillnets
Time of trip	Differences in fish behaviour day/night /tides, e.g. Nephrops North Sea; discards may be higher at the start of a trip
Fishing area	Some areas known to have high concentrations of juveniles/unmarketable fish/predators (line fisheries)/jellyfish
Fishing season	Restrictions often applied to avoid large unwanted catches of juveniles
At-sea transfer	Payment, theft of target catch
Gear	
Rigging of gear	May have a major influence in trawl and longline fisheries, e.g. chafers
BRDs	Major effect in some fisheries, e.g. in Norway, in NAFO, square mesh panels in Nephrops trawls, numerous Australian trawl fisheries
Hook/line type/bait	Related to mouth, feeding behaviour and fishing depth, e.g. tuna/shark
Mitigation measures	Assessment of effectiveness difficult because of low incidental catch rates
Selectivity	Gear characteristics may not be in harmony with regulations, e.g. MLS
Market	
No/poor market for bycatch	Common in many fisheries, e.g. Guianas shrimp, Mozambique shrimp. Uneconomical to freeze low-value bycatch
Damaged fish	For example, crushed in the codend, decomposed, shark damaged
Taboos, customs	Low or non-consumption of shark in Jamaica
Bycatch retention reduces value of target species	Use of crew time for sorting, reduced efficiency of freezers, cold store efficiency compromised
Highgrading	Common in many quota fisheries (e.g. EU, United States)
Poor economic performance	May result in retention of more bycatch to cover costs (marginal profitability). May also result in reduced fishing effort and reduced discards

Regulatory	
Licensing	Fishing licence may restrict catch/landings to certain species
Observer effect	Presence of observer may result in greater retention of bycatch, increased discards (e.g. if the observer is monitoring quotas), or increased reporting of discards
Highgrading/quotas	Common where quotas are strictly enforced
Target species as % of landings	May result in "discards" or disposal of non-target species after landing, i.e. bycatch retention only until landing and subsequent dumping, e.g. France
MLS	The less selective the gear the higher the discards
Bycatch quota	Requires effective enforcement, probably by observers and possibly retention of bycatch
Time/season	Effective in reducing bycatch and discard of juveniles
Level of enforcement	All regulatory discards are closely related to the level of enforcement or fishing community peer pressure

GENERALIZED CATCH CONCEPT MODEL ¹²



¹² From the report of the Expert Consultation R934.

ANNEX

LIST OF TERMS USED IN APPENDIX III

Term	Description
Discarded catch – dead	The total weight of undersized, unshakeable or otherwise undesirable whole fish discarded dead at the time of capture or shortly afterwards
Discarded catch – live	The total weight of undersized, unsalable or otherwise undesirable whole fish discarded live at the time of capture or shortly afterwards
Fish	Fish in this context refers to organisms that will be impacted during and after fishing, including fish, shrimp, seabirds, marine mammals, turtles, live coral, jellyfish, etc.
Gross catch	Total live weight of fish caught and available for further processing
Landings reported as bycatch and by-product	The live weight of fish caught incidentally during certain targeted fisheries and reported as bycatch or byproduct
Live escape	The total weight of fish that encounter the fishing gear, but avoid or escape it and remain alive
Reported landings	The live weight of fish retained as a useful product and reported at the time of landing
Reported removals not landed	The live weight of fish, e.g. used as bait, consumed by the crew or spoiled in handling
Pre-catch losses	The total weight of fish that die as a result of encountering the fishing vessel or fishing gear, but are not available for further processing. May be reported or unreported
Reported catch	The portion of the retained catch reported as catch
Retained catch	The total weight of fish retained as a useful product
Total removals	Total live weight of fish killed during the fishing operation
Unreported landings	The live weight of fish not reported at the time of landing for whatever reason

APPENDIX 4

BYCATCH PROBLEMS AND CHALLENGES FOR THEIR MANAGEMENT

(Drawn from the report of the Expert Consultation on International Guidelines for Bycatch Management and Reduction of Discards, Rome 30 November–3 December 2009).

1. Population and ecosystem effects

The most obvious and direct effect of bycatch is the discard, mortality and wastage of organisms that, if left alone, would add to subsequent populations of those species and their reproductive potential.

Depending on the fishing method, the intensity of fishing and features of the ecosystem being fished, bycatch can have a number of direct and indirect effects on the structure, diversity and productivity of the ecosystem. These effects should be considered when developing mitigation measures.

Although the effects on ecosystems will be specific to a particular fishery, the major ecosystem impacts of bycatch include:

- the increased mortality of species or sizes of species taken as bycatch. This is of particular concern when the species has a long life span, is late in maturing, has low fecundity, or can sustain only low rates of fishing mortality;
- the reduction of the number of predators and/or important prey items;
- affecting species (especially benthic species) that comprise part of the structural habitat of the ecosystem and/or part of the food web;
- the provision of large quantities of dead organisms (as discards) that may add to the food available for scavengers and alter natural food webs. These dead organisms may also artificially boost nutrients in nutrient-poor benthic ecosystems.

Bycatch can result from a complex interaction of ecological, technical, legal and economic factors that need to be identified before solutions are attempted.

2. Data and information

Throughout the world, data on fisheries are often inadequate (usually because of a lack of resources). To effectively manage bycatch, it is important that sufficient information be available concerning fishing gears, fishing operations and the total removals of fish (including bycatches and discards).

In some regions and fisheries, unreported bycatches are known to be significant and caused by a variety of factors, including ineffective or non-existent reporting, or deliberate misreporting of catches.

Reported data on catch and bycatch are often aggregated, which can preclude their complete analysis and the characterization of bycatch for a particular species, stock, population or fishery. This is inadequate for purposes of bycatch monitoring or for the evaluation of mitigation measures.

The reliability of assessments of stocks, fisheries and ecosystems is weakened by incomplete information on total removals. When estimating fishing mortalities, unreported catches and bycatches may represent a significant source of uncertainty. This results in less reliable assessments that may contribute to poor management decisions and overfishing.

3. Socio-economic implications of bycatch

A significant proportion of the world's bycatch is comprised of juveniles of economically valuable species which, if left to grow to maturity, would produce higher yields and larger economic gains.

Where fisheries interact, bycatch and discarding in one fishery can reduce catches and revenue in another, and lead to significant conflict.

Catching and handling bycatch can be costly for fisheries and reduce harvesting efficiency. Bycatch reduction can reduce these costs and increase the quality and value of retained species.

The uptake and adoption of selective fishing techniques is often constrained by cost and fishers' limited awareness of, and access to, bycatch reduction methods. Costs associated with monitoring bycatches, improving fishing gears and training fishers in their use can be expensive for governments and/or fishers.

Public perceptions regarding bycatch and associated wastage in fisheries can contribute to negative public attitudes about fishers and cause significant social problems.

The short-term effects of introducing bycatch reduction measures could result in significant food shortages and economic losses – especially for communities that are heavily reliant on bycatch for nutrition. Similarly, if bycatch is used as feed in aquaculture or for other livestock, bycatch reduction can have considerable and concomitant negative impact on these other sectors.

4. Governance, management and legal challenges

Fisheries occur in dynamic ecosystems, so bycatch problems often change throughout time, requiring swift, adaptive responses in management.

Overcapacity, overfishing and IUU issues in many fisheries are significant contributors to bycatch problems.

Limitations in legal and institutional regimes to manage bycatch and reduce discards are significant challenges. Legal frameworks to control fishing operations and fishing gears are often inadequate or difficult to implement.

Regarding shared fisheries, there is frequently a lack of consistency between States in their objectives and measures for bycatch management.

5. Selective fishing

Improved fishing gear selectivity can address many bycatch issues. However, because of insufficient expertise and facilities there is often a lack of safe, effective and practical alternatives.

When the selectivity of a fishing method is inherently poor, bycatch can be reduced by substituting it with one that is more selective. However, there are several factors that affect this substitution: (i) the lower efficiency of the new method, (ii) fishers' reluctance to change; (iii) a lack of economic incentives; (iv) a need for food security (in some cases, daily survival); and (v) the compatibility, cost and safe use of the new methods.

When developing and implementing more selective fishing gears, researchers and managers need to avoid causing any serious adverse effects on the genetic diversity of exploited populations that result from the removal of specific sizes, sexes and/or ages.

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EC:IGBMRD/2009/Inf.3: *Examples of definitions of bycatch and discards.*

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- No. 1, Suppl.2: Fishing operations. 2. Best practices to reduce incidental catch of seabirds in capture fisheries.
- No. 2: Precautionary approach to fisheries management and species introduction.
- No. 4, Suppl. 1: Fisheries management. 1. Conservation and management of sharks.
- No. 4, Suppl. 2: Fisheries management. 2. The ecosystem approach to fisheries.
- No. 4, Suppl.2 add. 2: Fisheries management. 2. The ecosystem approach to fisheries. 2.2. The human dimensions of the ecosystem approach to fisheries.
- No. 4 Suppl. 3: Fisheries management. 3. Managing fishing capacity.
- No. 12: Information and knowledge sharing.