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# Guidance on Implementation of the Policy on Managing Bycatch

**Sustainable Fisheries Framework**

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# Guidance on Implementation of the Policy on Managing Bycatch

## 1. Introduction

The aim of this document is to provide guidance to resource managers and aquaculture management coordinators for implementing, through their respective management planning processes, Fisheries and Oceans Canada's (DFO) *Policy on Managing Bycatch*.

More specifically, this document provides resource managers and aquaculture management coordinators with guidance on the following:

- The categories of catch that are subject to the policy (section 2 and Annex 1);
- Strategies for achieving the policy objectives (section 3);
- Steps for incorporating bycatch considerations into management plans (section 4); and
- Toolbox of measures for managing bycatch (Annex 2).

As stated in the *Policy on Managing Bycatch*, implementation will be done overtime, according to national and regional priorities and resource availability.

## 2. Categories of Catch Subject to the Policy

The purpose of this section is to describe the different categories of catch and to identify those categories of catch that are specifically subject to the *Policy on Managing Bycatch*.

### 2.1 Total catch

“Total catch” can be divided into *retained catch*, which is the portion of the catch that is retained for use, and *non-retained catch*, which is the portion of the catch that is returned to the water.

Retained catch includes landed catch as well as catch that is used in some way but not landed, such as catch that is used for bait.

Non-retained catch includes catch brought on board and thrown back, catch released from gear before it is brought on board (such as catch released from a purse seine before the seine is fully pursed), and catch that becomes visibly entangled in fishing gear, such as entangled whales, birds and sea turtles.

Both categories can be further divided into several sub-categories based on the species or characteristics of the species and on the rationale for keeping or not keeping those species and/or specimens, as follows. (See also Annex 1.)

## **2.2 Retained catch**

The category of “retained catch” consists primarily of the species that the harvester is licensed to direct for or, in other words, the target species of the fishery. In a multispecies fishery, this includes any species that the licence holder is licensed to direct for on a given fishing trip regardless of whether the licence holder did so or not.

Retained catch also includes species, and specimens of the target species, such as specimens of a particular sex, size or condition, that the harvester is *not* licensed to direct for but may or must retain.

In this policy, the latter is considered bycatch.

## **2.3 Non-retained catch**

The category of “non-retained catch” consists of any species or specimens that are not retained for use and that are returned to the water<sup>1</sup>. The returned catch may be alive, injured or dead. From among the catch that is alive or injured, some may subsequently die as a result of their injuries or other stresses resulting from their capture.

In many instances the returned catch is expected to survive, such as with the return of target species of a certain sex or condition. In these instances, the return of the catch to the water can contribute to the conservation of the resource.

The non-retained category thus includes specimens of the target species that are specifically prohibited, such as an undersized fish. It also includes specimens of the target species that the harvester is authorized to return to the water, such as specimens of low market value.

The non-retained category also includes any non-target species that are returned to the water, including species protected under the *Migratory Birds Convention Act* (MBCA), or listed under the *Species at Risk Act* (SARA).

In this policy, all non-retained catch is considered bycatch<sup>2</sup>.

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<sup>1</sup> Non-retained catch also includes situations where species are discarded on land, in the case of regionally specific fishing activities.

<sup>2</sup> with the exception of non-retained catch of the target species in catch-and-release fisheries. See subsection 3.5.

#### **2.4 Catch subject to the policy**

The *Policy on Managing Bycatch* applies to retained and non-retained bycatch. In summary, these are as follows:

- A) *any retained species or specimens that the harvester was not licensed to direct for but is required or permitted to retain;*
- B) *all non-retained catch, including catch released from gear and entanglements, whether alive, injured or dead, and whether of the target species or the non-target species.*

#### **2.5 Catch and other incidental mortality not subject to the policy**

As can be understood from the preceding discussion, the policy does not apply to any catch that harvesters are licensed to direct for and that is retained. This includes, as stated in Sub-section 3.2, any species that harvesters are licensed to direct for on a given trip regardless of whether or not they did so. The management of the retained, targeted catch is guided by *A Fishery Decision-Making Framework Incorporating the Precautionary Approach* (Precautionary Approach Framework Policy, DFO 2009a), another policy under the SFF.

The policy also does not apply to any catch that licence holders are authorized to direct for in catch-and-release fisheries. Even though the targeted catch is returned to the water, the capture and release of the catch is not incidental to the activity that the licence holder is authorized to carry out. The management of the targeted catch in catch-and-release fisheries is guided by the Precautionary Approach Framework Policy. (However, this policy does apply to any catch that licence holders are *not* authorized to direct for in catch-and-release fisheries.)

Also not covered by the policy is bycatch of corals, sponges, marine plants and other benthic organisms. These are considered to be better protected under habitat-related policies, which, in Canada, is the *Policy for Managing the Impacts of Fishing on Sensitive Benthic Areas* (DFO 2009b).

Finally, the policy does not generally apply to incidental fishing mortality that results from pre-catch losses<sup>3</sup> (e.g., fish that break free or fall out of a net before the net is hauled and that subsequently die from their injuries) or ghost-fishing (lost or abandoned fishing gear that continues to catch fish). While the policy promotes accounting for all sources of fishing-related mortality, the manner in which this mortality would be assessed and managed would differ significantly from the assessment and management of bycatch-related mortality. DFO has undertaken efforts in some fisheries to investigate and/or address issues of pre-catch losses and ghost fishing. If necessary, a further policy and

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<sup>3</sup> In the case of some regionally specific fishing activities, including marine mammal subsistence harvests, pre-catch losses due to struck/loss and wounded/escaped animals are recognized within the scope of this policy.

accompanying procedures may be developed under the SFF concerning pre-catch losses and ghost fishing.

### **3. Strategies for Achieving the Policy Objectives**

The following strategies describe the actions and activities that may be required to achieve the overall policy objectives. The strategies can be implemented as required, on a fishery by fishery basis.

#### ***3.1 Develop data collection and monitoring systems that will support timely, reliable, and aggregated reporting on retained and non-retained bycatch species.***

Timely and reliable information on catch from all fishing activity<sup>4</sup>, including retained and non-retained bycatch species, validated by appropriate levels of monitoring, is a key component of effective management of fisheries. Reliable estimates of mortality where catch is returned to the water are also important for effective fisheries management. Information on catch can be collected using a variety of methods, including hauls; records from at-sea observers and dockside monitors; licence holders logs; vessel positioning systems; video cameras; and recreational creel and phone surveys. Traditional Ecological Knowledge (TEK) and Aboriginal Traditional Knowledge (ATK) can also provide catch information.

Catch information is generally comprehensive for the portion of the catch that is retained for use in commercial fisheries. Obtaining reliable information for the portion of the catch that is returned to the water is more challenging, and currently there is significant variation across fisheries in the extent to which this data is available.

The procedures and protocols for collecting reliable catch information should be appropriate for the type and the scale of the fishery, take into account biological, ecological and management risks as well as cost effectiveness, and, to the extent feasible, be standardized.

To support fishery management, data systems should be such that information can be aggregated at different scales (e.g., at the stock, fishery, and regional scale, depending on the nature and extent of the issue). Aggregation of information will also help meet the emerging requirements for reporting out on the occurrence and extent of bycatch – both retained and non-retained – in Canadian fisheries and on the actions that DFO is taking to successfully address bycatch problems.

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<sup>4</sup> Commercial, recreational and Aboriginal fishing.

Improvements in monitoring and reporting may be required to provide accurate catch information to fisheries managers in order to meet the objectives of the policy. Improvements should be informed by a *risk assessment* (**BOX 1**) that considers the nature and the extent of bycatch issues, specific to a fishery or fisheries. Where it is not feasible to record data on some bycatch species, alternative methods such as reporting on indicator species or other suitable proxies should be considered. In addition to traditional census approaches – which aim at acquiring and recoding bycatch information for the totality of fleet effort – other sampling designs and methodologies should be considered, where appropriate.

**BOX 1**

*Risk* is the likelihood and consequence of an event occurring. *Risk assessment* is the process of determining a risk level(s). Risk assessment may be qualitative or quantitative and can be used to inform the **prioritization** of issues or actions.

The ability to implement appropriate levels of at-sea monitoring in a fishery to support data collection requirements may be limited by technical constraints and available financial and human resources. At minimum, at-sea monitoring should be adequate to provide a reasonable estimate of bycatch in a fishery to support effective fisheries management, as informed by risk assessment. Among other factors, at sea monitoring should take into consideration observer and deployment effects.

**3.2 Evaluate the impact of fishing on bycatch species, whether they are retained or returned to the water.**

Appropriate analyses should be undertaken to determine how bycatch affects impacted populations and ecosystems, to identify levels of fishing mortality that will support conservation and sustainable use of those populations, to evaluate the effectiveness of bycatch management measures, to improve transparency and to improve DFO's ability to report on the sustainability of the fisheries under its management.

When evaluating the impact of a fishery on a species that is not retained, unless survival rates have been adequately documented according to established processes (such as risk assessments or peer review), it should be assumed that all the non-retained catch dies. Where formal estimates of mortality are not available, plans may need to be developed to acquire the information. Reliable proxies could also be used to evaluate capture and post-release mortality risks for bycatch species, where appropriate.

In addition, when evaluating impact, all removals of the stock from fishing should be taken into account. Where the bycatch species is the target of another fishery, this evaluation will be undertaken according to DFO's Precautionary Approach (PA) framework policy. The PA framework policy applies to all stocks that are the specific and intended targets of a fishery and it requires that all removals of a stock from all types of fishing be taken into account in the assessment (i.e. removals from the target fishery (ies) and removals from fisheries where the stock is a bycatch).

Evaluating impact requires an understanding of species abundance, life history characteristics, and the magnitude of other sources of mortality. For bycatch species that

do not fall under the PA framework policy (i.e. for bycatch species that are not the specific and intended target of a fishery) there generally tends to be less information available on these to support an evaluation. For some bycatch species there may be enough information to assess stock status and develop reference points as is done under the PA framework policy for target species. If so, and depending on the nature of other available data, a variety of approaches could then be used to determine total mortality from fishing and, ultimately, levels of fishing mortality that will support the long-term conservation and sustainable use of the resource (e.g., safe biological limits and/or sustainable bycatch mortality rates).

For other bycatch species, it is recognized that there may be very little information available on their biology, distribution or status because of insufficient data collection and monitoring, and a lack of formal abundance estimates. Where robust and practical methods to assess stock status are lacking, the use of precautionary management strategies for bycatch becomes more important. In addition, and reflecting the information and assessment methods available for the bycatch species in question, further species-specific, semi-quantitative and/or qualitative techniques, approaches and tools may need to be developed for evaluating whether or not bycatch rates and magnitudes are low enough to be sustainable and avoid serious harm to the bycatch species. These may include risk-based or index-based systems. Additional guidance can be found in DFO 2012.

It will also be important to identify gaps in knowledge and, to the extent possible, collect data that will help reduce uncertainty in decision-making. Where there is insufficient information to determine stock status and/or develop reference points, a priority setting exercise to identify gaps and establish priorities should be conducted, based on an evaluation of the risks related to the issue.

### ***3.3 Minimize the capture of bycatch species and specimens that will not be retained, to the extent practicable.***

Sound conservation and economic reasons exist for minimizing the capture of unwanted species and specimens (sizes, sexes, etc.) that are not landed and/or used. Mortality of non-retained species can undermine conservation efforts, and capturing unwanted species and specimens may be a cost to harvesters. The bycatch must be removed from the gear and may need to be sorted from the retained catch before being returned to the water. This activity takes time and may also damage gear. It is rational for a harvester to try to minimize the capture of these unwanted species or specimens where doing so does not unduly affect the profitability of the fishing activity. This includes minimizing the probability of interactions with marine mammals, migratory birds and sea turtles.

When changes to gear selectivity to minimize the capture of non-retained bycatch are contemplated, care should be taken to ensure that the mortality induced by the gear selection process (e.g. passage through trawl meshes) does not exceed the discard mortality under current conditions.



In recreational catch and release fisheries this strategy applies to species and specimens that the harvester is not authorized to direct for but catches incidentally.

***3.4 Where capture of bycatch species and specimens that will not be retained is unavoidable, maximize the potential for live release and post-release survival.***

As mentioned in strategy 3.3 above, mortality of non-retained catch can undermine conservation efforts. While it is generally best to avoid capture of unwanted species in the first instance, where their capture is unavoidable, efforts should be made to maximize survival and minimize post-release mortality. To achieve this, methods to increase the survival rates of species should be explored, especially for severely depleted species, to the extent practicable.

***3.5 Manage the catch of retained bycatch so as not to exceed established harvest levels for the species.***

An overall objective of this policy is to minimize the risk of fisheries causing serious or irreversible harm to bycatch species (retained and non-retained). For a bycatch species that a harvester is authorized to retain, the objective will be met by properly managing the harvest of the species so as not to exceed the established harvest levels. Harvest levels and appropriate management measures should be developed based on an evaluation of the fishery impacts on the bycatch species outlined in Strategy 3.2. The harvest level and measures should take into account the total mortality on the species from fishing, across all gear types and fisheries that harvest or intercept the species.

In managing the catch of bycatch species, special attention will need to be given to the cumulative fishing mortality across fisheries, so that all removals from all types of fishing are considered. This reinforces the importance of the second overall objective of the policy, which is to account for total fishing mortality, including both retained and non-retained bycatch.

***3.6 Develop appropriate measures to manage bycatch and regularly evaluate their effectiveness.***

Management measures should be developed based on the evaluation of the impact of fisheries on bycatch species (retained and non-retained) referred to in strategy 3.2, and supported by the other strategies. When selecting the appropriate management measure, the full range of measures available should be considered based on the specific nature and extent of the problem (refer to Annex 1 for a toolbox of management measures for examples). Decisions on management measures should be made in collaboration with relevant fishery interests, taking into account socio-economic and conservation considerations. Management measures should be tailored to the characteristics of each

fishery and evaluated and reviewed periodically to determine if they are meeting established objectives.

In managing the catch of bycatch species, whether retained or not, special attention will need to be given to the cumulative fishing mortality across fisheries, so that all removals from all types of fishing are considered.

## **4. Steps for Incorporating Bycatch Considerations into Management Plans**

### **4.1 Understanding Management Plans**

The primary goal of an Integrated Management Plan is to provide a planning framework for the conservation and sustainable use of fisheries resources and the process by which a given fishery will be managed for a period of time. “Conservation and sustainable use” applies not only to the species that are the target of the fishery but also to species that are caught incidentally in the course of fishing operations. Consequently, it is expected that Integrated Management Plans will summarize the occurrence of bycatch and significant incidental mortality in a fishery and that they will document the manner in which interactions with bycatch species are being managed.

For wild-capture fisheries, the Department’s planning framework is the Integrated Fisheries Management Plan (IFMP). Under the British Columbia Aquaculture Regulatory Program, aquaculture is managed through Integrated Aquaculture Management Plans (IMAPs). IMAPs are modeled on IFMPs, adapted for the *Pacific Aquaculture Regulations* context. In this document, the term *Integrated Management Plan* is used to designate both IFMPs and IMAPs.

The guidance provided in this section is intended to complement the more general departmental guidance on the development of Integrated Management Plans. For wild-capture fisheries this guidance is found in the document *Preparing an Integrated Fisheries Management Plan*. For fisheries that do not currently have an IFMP in place, the guidance can be used and integrated in the fishing plan.

### **4.2 Cross-referencing**

The Integrated Management Plan should cross-reference and be consistent with management or rebuilding plans supported by the Department that may already exist for certain bycatch species. Examples include recovery strategies, action plans, and management plans developed under the *Species at Risk Act*, national or regional plans of action on bycatch to address such classes of species as sea birds, sharks and turtles, and Precautionary Approach Framework Policy Rebuilding Plans. Integrated Management

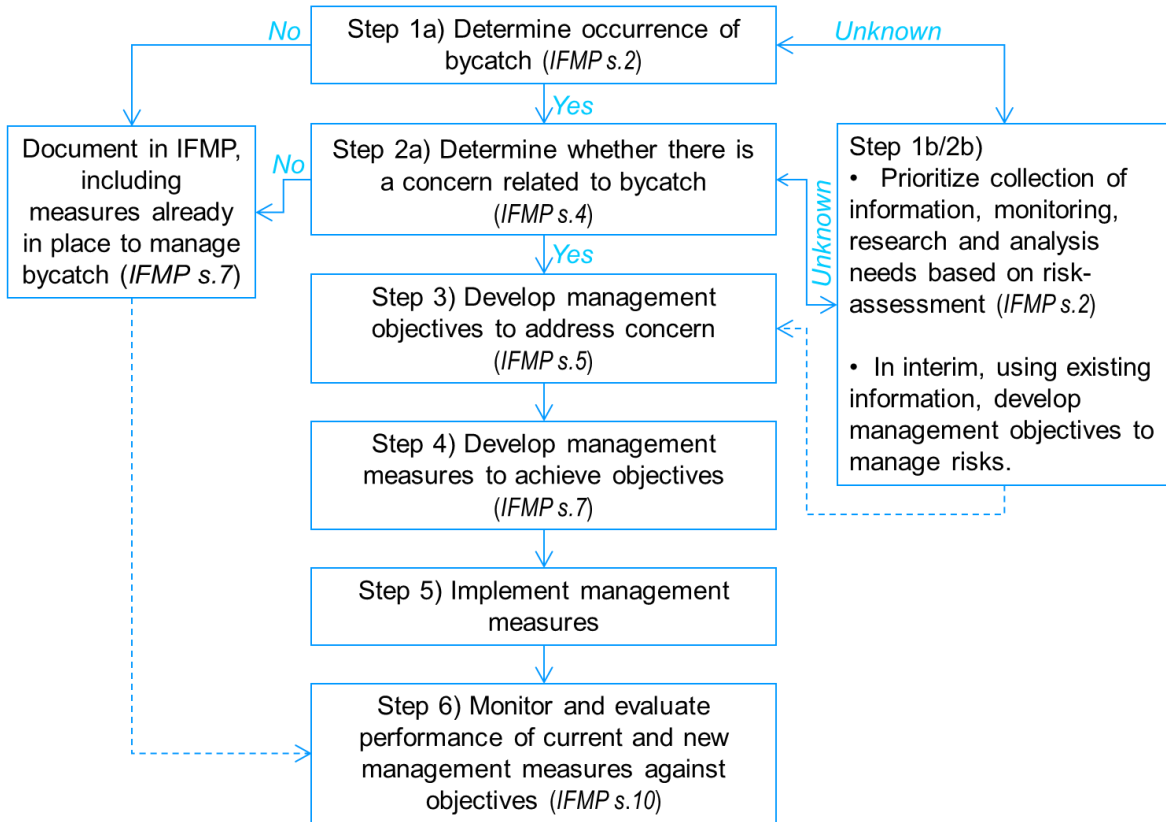
Plans should also reference scientific studies on bycatch species – population dynamics, mortality rates of non-retained catch, effectiveness of mitigation measures, etc. – that are relevant to the management objectives and measures adopted for the fishery.

Because a species might be the target of one fishery and intercepted as bycatch in others, Integrated Management Plans may also need to cross-reference one-another. The aim of cross-referencing should be to acknowledge cumulative impacts and to ensure that management strategies are sufficiently complementary and comprehensive. In some cases it may be appropriate to develop detailed action plans to address specific bycatch issues. These could be appended to an Integrated Management Plan or developed as separate, complementary documents (as with the plans of action on sea birds, sharks and turtles referred to above). Detailed action plans may prove helpful, for example, where many fisheries are implicated and where there is a need to manage carefully the cumulative impact of fishing activity on sensitive species.

There may be significant variation across fisheries in terms of the information available about the occurrence of bycatch and the impacts on these species. There may also be variation in how bycatch is being managed. At a minimum, all Integrated Management Plans should describe the state of knowledge on bycatch in each fishery, where the key gaps in knowledge and management action are (or are estimated to be), what steps are being taken to address these gaps, and how risks and uncertainty are being managed in the interim.

### **4.3 Analytical Steps**

Figure 1 summarizes the analytical steps for addressing bycatch within the Integrated Management Plan process. This is followed by a description of each of the steps. For each step, a *DFO Lead Sector* is also identified. While it is anticipated that the lead sector will be responsible for gathering and consolidating the information necessary for the completion of the step, it is also recognized that the work under each step may require collaboration from more than one sector.



**Figure 1:** Summary of Analytical Steps for Addressing Bycatch within the Fisheries Management Process. Where applicable, relevant sections of the IFMP are included in brackets.

*Step 1a: Determine the occurrence of bycatch in the fishery and the effectiveness of bycatch-related measures that may already form part of the management framework*

Lead sector: Ecosystems and Fisheries Management  
Supporting sector: Ecosystems and Oceans Science

The first step in the analysis is to determine the occurrence of bycatch in the fishery and how bycatch is currently managed. To accomplish this, all existing sources of information on bycatch should be reviewed. At this stage, principal sources of information may include observer reports, fishing logs, research documents, and those with expert knowledge of the fishery – such as the resource and science advisors, the fish harvesters themselves and others with particular knowledge of the fishery – stock assessments, and historical management plans. Other sources of information could include licence conditions, fishery checklists, science and industry survey data, and estimates of illegal and unreported bycatch, where applicable. Documentation associated with species-at-risk, such as recovery strategies and recovery potential assessments, are also important sources of information, as they typically describe potential or known threats to the species in question, such as bycatch in fisheries.

Information on occurrence should include, to the extent that it is available, information on species, specimens (e.g., size, sex, condition), quantities, and other related aspects that may be useful in assessing the impact of bycatch mortality (Step 2), such as rates of capture and post-release mortality among the non-retained catch.

In this first step it will be important to understand and document in the Integrated Management Plan not only the occurrence of bycatch in the fishery, but also the requirements in licence conditions and management plans pertaining to the disposition of the bycatch (i.e. what they require or permit with respect to retention and non-retention of target and non-target bycatch). Related to this, it is also important at this stage to document any measures that currently exist in the fishery for managing bycatch and to explain how these measures are intended to operate.

**BOX 2**

*A study from Gavaris et. al (2010) used existing information, to characterize the non-retained catch from Canadian commercial fisheries in NAFO Divisions 4V, 4W, 4X, 5Y and 5Z during 2002 to 2006 in order to identify gaps in monitoring and to provide the basis for evaluating potential conservation concerns associated with higher levels of non-retention. This study serves as an example of the analysis that could help under step 1.*

The potential outcomes of this first step of the analysis are the following:

- there is no bycatch in the fishery
- there is bycatch in the fishery
- there is insufficient information available to determine whether or not there is bycatch.

If there is no bycatch in the fishery, this should be documented in the Integrated Management Plan. If the reason for which there is no bycatch is that there are effective management measures in place already (e.g., closure, gear restriction), then these reasons should be documented too, and the only further analysis required would be the continued monitoring of the effectiveness of the measures (Step 6).

If there is bycatch in the fishery, then an analysis of whether the bycatch presents a concern should be carried out (Step 2).

If there is insufficient information available to determine whether there is bycatch, then an analysis is needed of the extent to which additional information and research on occurrence is warranted (Step 1b/2b).

*Step 2a: Determine whether there are bycatch-related concerns in the fishery*

Lead Sector: Ecosystems and Oceans Science

In fisheries where bycatch occurs it will be necessary to assess whether the impact on bycatch presents a conservation problem. Strategy 3.2 describes the factors to consider for such an evaluation.

The priority for such evaluations should be given to fisheries where there is bycatch of depleted species, including SARA listed species.

Assessments of risks to conservation should consider the following:

- the extent to which fisheries exercise a pressure on bycatch populations (i.e. the accumulation of retained mortality plus non-retained mortality); and
- the amount of fishing-related mortality that the bycatch population can sustain (as one of the components of all potential human induced mortality).

In some fisheries, and for some species of bycatch, there may be sufficiently robust estimates for both of the above steps to determine whether the fishery presents a conservation concern or not. Where there is not a conservation concern, there should be continued monitoring of the pressure exercised by the directed fishery, the effect of the pressure, and the effectiveness of any mitigation measures that might already be in use (Step 6). Where there is a conservation concern, management objectives and mitigation measures need to be developed (Step 3). Where there is insufficient information to determine whether there is a conservation concern or not, additional research may be warranted (Step 2b), as well as interim, precautionary measures.

Of note, the collection and assessment of bycatch data will support the implementation of other Sustainable Fisheries Framework (SFF) policies, including the Precautionary Approach Policy Framework, which applies to key harvested stocks (i.e. to stocks that are the specific and intended targets of a fishery).

The Precautionary Approach Policy Framework requires that the stock assessment, for a key harvested stock, account for all sources of fishing-related mortality, including retained catch, mortality where the target species is returned to the water, and mortality of the stock from bycatch in other fisheries. One of the aims of the policy on managing bycatch is to ensure that where fisheries have bycatch, including bycatch of species targeted in another fishery, their contribution to the conservation risks to those species are managed. The bycatch policy and the precautionary approach policy framework thus complement one another.

*Step 1b/2b: Prioritize collection of information, monitoring, and research needs related to the occurrence of bycatch, based on an assessment of risk*

Lead sector: Ecosystems and Fisheries Management

Supporting sector: Ecosystems and Oceans Science

Where there is insufficient information available to determine whether bycatch occurs in a fishery, or whether there is a bycatch problem, a priority setting exercise should be conducted based on an assessment of the risks related to the issue. The assessment will help determine the need for and design of research plans and/or data collection programs to fill the gaps in information. Moreover, the priority setting will help ensure that the limited resources available are used first to address the issues that pose the highest risks. The assessment of risk may consider a number of factors, including the vulnerability of a species to fishing pressure, its susceptibility to being caught by specific gear, or the catch size relative to known total abundance.

Research plans and data collection programs should be cost effective and appropriate to the scale and type of the fishery. In addition, attention will need to be paid to ongoing data collection and monitoring requirements, including the need ultimately to account for, and report on, the cumulative impacts of fishing-related mortality across fisheries. There will therefore need to be a certain level of reliability, consistency, and structure with regards to data collection and management processes within and, for some fisheries, across regions. Strategy 3.1 includes considerations on data collection and monitoring systems.

In the interim, precautionary management measures may need to be developed and implemented to reduce the risk of harm to productivity and biodiversity in the fisheries under consideration (see Steps 3 to 5). Both the interim measures and the research plan should be summarized in the Integrated Management Plan.

*Step 3: Develop management objectives to address concerns related to bycatch*

Lead Sector: Ecosystems and Fisheries Management

Supporting sector: Ecosystems and Oceans Science

When conservation concerns are identified in Step 2, management objectives will need to be developed for the fishery. Fisheries managers should prioritize the management issues based on the level of risk of each of the issues, in order to address highest-risk concerns first. Management objectives to address bycatch issues should be developed in collaboration with relevant DFO sectors, as well as with fishery participants and co-management bodies under land claims agreements. Part of the planning should include reviewing the socio-economic context and drivers associated with the bycatch problem.

As part of the Integrated Management Plan process (section 5 of the IFMP), long-term objectives addressing bycatch issues, stock conservation, ecosystems, socio-economics, compliance, etc. are developed. Those are supported by short-term objectives that drive the development of the management measures (Step 4).

*Step 4: Develop management measures to implement objectives*

Lead Sector: Ecosystems and Fisheries Management

Supporting sector: Ecosystems and Oceans Science

Consistent with strategy 3.6 of this policy, bycatch management measures should be developed where a bycatch concern has been identified.

Management measures should be developed during the Integrated Management Plan process (Section 7 of the IFMP provides stock conservation and ecosystem management measures to meet the objectives), and include, among other things, measures to control and monitor the removals of both target and bycatch species, as well as special requirements for severely depleted species.

Fisheries managers should develop implementation options that are practical and effective to achieve the objectives of the policy and address the specific problems identified in the management issues. All measures available and best practices for using them should be considered (Strategies 3.3, 3.4 and 3.5 include considerations on bycatch management measures, and Annex 2 presents a toolbox of bycatch management measures). The management measures should be appropriate for the level of risk from the fishery on the bycatch species. The biological and economic implications of the various options should also be considered. Solutions should be developed in collaboration with fishery participants and co-management bodies under land claims agreements and should be tailored to the characteristics of each fishery.

*Step 5: Implement the management measures*

Lead Sector: Ecosystems and Fisheries Management

Management measures to address bycatch concerns should be implemented through the use of appropriate tools, including licence conditions, conservation harvesting plans, procedures and protocols, monitoring programs (dockside and at-sea<sup>5</sup>), and harvester education. The nature of the management measure to address bycatch problems will determine the implementation tools required.

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<sup>5</sup> Can be understood to mean observation where fishing occurs.



*Step 6: Monitor and evaluate the performance of current and new management measures against objectives*

Lead Sector: Ecosystems and Fisheries Management

Supporting sector: Ecosystems and Oceans Science

Consistent with strategy 3.6, bycatch management measures should be reviewed periodically (through the Integrated Management Plan review process) to assess and measure the effectiveness of the measures in achieving the management objectives. Where progress is not satisfactory, management measures and/or objectives should be adjusted. Evaluations should be based on the best information available.

## **Annex 1 – Categories of Catch**

As mentioned in section 2 (Categories of Catch Subject to the Policy), “Total catch” can be divided into retained catch, which is the portion of the catch that is retained for use, and non-retained catch, which is the portion of the catch that is returned to the water. The retained catch includes landed catch as well as catch that is used in some way but not landed, such as catch that is used for bait. Non-retained catch includes catch released from the gear before being hauled on board the vessel, such as catch slipped from a purse seine, and catch that becomes visibly entangled in the fishing gear, such as entangled whales, birds and sea turtles.

The diagram below illustrates how each of the categories can be further sub-divided, based on categories of incidental catch in regulations, licence conditions and management plans. In the diagram, “directed” refers to the species that the harvester is licensed to direct for, and “non-directed” refers to the other species or specimens that the harvester is not licensed to direct for. Furthermore, “permitted” refers to cases where the harvester may retain, or in some cases may not retain, fish, and “required” refers to situations where the harvester must retain, or must not retain, fish.

As a general rule, the policy applies to every sub-category of the total catch in the diagram, except for the grey box titled “directed”, which covers retained species that the harvester is licensed to direct for, or in other words, the target species of the fishery.

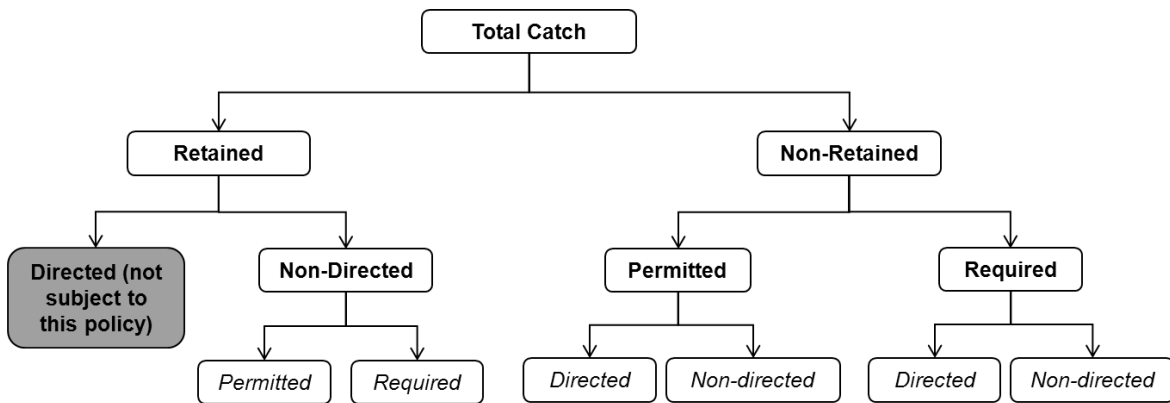


Figure 1: Illustration of the different categories of catch.

## **Annex 2 – Toolbox of Bycatch Management Measures**

This annex contains a list of general tools and measures that can be used to manage bycatch issues and problems. The primary source of information for this section is the FAO International Guidelines for Bycatch Management and Reduction of Discards (FAO 2010).

When designing management measures to address bycatch problems in a fishery, resource managers should ensure that the measures are:

- Binding and enforceable
- Clear and direct
- Measurable
- Science-based
- Ecosystem-based
- Ecologically, socially, and economically effective
- Practical and safe
- Collaboratively developed with fishing participants and others with an interest, and
- Fully implemented.

### **Tools and approaches to manage bycatch:**

#### ○ **Input and output controls, including limits and/or quotas on bycatch:**

Specific measures to control the fishing capacity and effort can be considered.

Output control measures, such as individual or fleet-wide quotas, and/or limits on allowable bycatch can be developed and implemented within the IFMPs. A limit on the amount of bycatch – retained or not retained – can be put in place (e.g. percentages of catch, caps, TACs, or quotas set aside for catch and release mortality).

Transferability of limits and/or quotas, where individuals or fleets can make transfers to cover bycatch, has proven particularly effective. Transferability between fleets and fleet sectors can also be explored.

To ensure that total fishing mortality is considered, including bycatch mortality, quotas for target species or allocations of a quota among fleets or fisheries can be adjusted, based on estimated incidental mortality associated with catches of the target species.

#### ○ **Improvement of the design and use of fishing gear and bycatch mitigation devices**

Technological measures to improve the selectivity of the fishing gear and post-release survival can be used, such as:

- (i) changing the design, rigging and deployment of fishing gear (e.g. mesh size, hook size, aimed trawling);
- (ii) installing bycatch reduction devices (e.g. turtle excluder devices, sorting grids, square mesh panels, tori lines on longlines);
- (iii) using operational techniques during fishing to reduce encounters with bycatch (e.g. the backdown manoeuvre during purse-seining);
- (iv) using equipment, practices, and handling techniques that increase the probability of survival of catch returned to the water;
- (v) using an alternative fishing gear that results in lower bycatch; and
- (vi) the appropriate use of integrated vessel and fishing gear position monitoring and habitat mapping systems.

- **Spatial and temporal measures**

This includes measures to reduce interactions with bycatch through identifying and establishing areas or times where the use of all or a certain type of gear is limited or prohibited.

- **“Individual Accountability”**

Individual fishers, as opposed to fleets or sectors, are responsible for accounting for their catch, both directed and non-directed (retained and non-retained). A vessel’s catch is calculated by adding both landed weight and the estimated mortality of all catch either utilized at-sea or returned to the water. This approach has proven particularly effective in the integrated groundfish fishery in the Pacific Region.

- **At-sea monitoring**

An increase in at-sea monitoring can encourage responsible fishing while providing accurate catch information to support effective management of fisheries.

- **Allow landing of non-directed catch**

Subject to all management measures in place to avoid bycatch (time, area, gear closures, etc.), fishers can be permitted to land bycatch, provided that all catch is accounted for. This measure has also proven effective in the integrated groundfish fishery in the Pacific Region.

- **Bans on returning catch to the water, where applicable, providing that the catch cannot be returned alive**

- **Catch-quota balancing measures**

In multi-species fisheries, it is almost inevitable that individual fishers' species mix of catch will not match exactly their quota allocations. Catch-quota balancing measures are management systems that allow for "retrospective balancing". Examples include:

- Individual Transferable Quotas;
- Quota reconciliation or carry-forward mechanisms: the ability to "borrow" quota from next year, or to "bank" unfished quota for next year;
- Species-equivalent units: The ability to convert quotas of one species into quotas of another at a pre-determined conversion ratio;
- Deemed value system: Fee charged to fishers who land catch in excess of their quota allocations.

○ **Education, awareness and communication**

Raising the level of awareness of bycatch problems, including measures needed to address them among fishing participants and others with an interest is an important component of effective bycatch management.

○ **Incentives for harvesters to comply with measures to manage bycatch**

Harvesters are more likely to comply with management measures and adopt fishing techniques that are designed to manage bycatch if such measures improve their revenue, the quality of the catch, their operational efficiency and/or safety at sea.

### **Annex 3 –References**

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