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RESPONSIBLE FISHERIES

14

# UNDERSTANDING AND IMPLEMENTING CATCH DOCUMENTATION SCHEMES

A guide for national authorities





# **UNDERSTANDING AND IMPLEMENTING CATCH DOCUMENTATION SCHEMES**

**A guide for national authorities**

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## PREPARATION OF THIS DOCUMENT

**T**his document is a product of FAO's Global Programme to support the implementation of the Agreement on Port State Measures (PSMA) and complementary international instruments and regional mechanisms to combat illegal, unreported and unregulated (IUU) fishing.

This document has been published in the Technical Guidelines for Responsible Fisheries (CCRF) series, because under Article 11.1.11 of the CCRF, States should ensure the identification of the origin of fish and fishery products. Although not explicitly mentioned in the Article, catch documentation schemes (CDS) are internationally recognized as being one of the tools used to ensure the identification of the origin of fish and fishery products. Through tracking fish from fishing grounds to markets, CDS are designed to determine whether fish originate from catches consistent with applicable national, regional and international conservation and management measures, established in accordance with relevant international obligations.

The document was prepared by the Fisheries Global and Regional Processes Team of FAO's Fisheries and Aquaculture Division, in collaboration with the Value Chain Development Team and FAO's Development Law Service.

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## ABSTRACT

Catch documentation schemes (CDS) are just one in an array of tools designed to combat illegal, unreported and unregulated (IUU) fishing. The schemes provide a means for countries to cooperate in providing information about the legality of fish as it moves through the supply chain, from catch to market.

Many countries are familiar with the specific information requirements on CDS forms; some, however, are less aware of the need for robust national systems to validate and verify that information. This document seeks to align and improve existing national monitoring, control and surveillance (MCS) tools, as well as product tracking systems, in order to support more effective national CDS implementation and strengthen CDS throughout the international supply chain.

The document contains chapters on the legal and policy background to CDS, an introduction to the features and requirements of existing schemes, as well as guidance on how to handle CDS information requirements and identify national key data elements. Finally, it provides a series of exercises for assessing relevant national capabilities and coordination processes, including the management and exchange of information.

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## ABBREVIATIONS AND ACRONYMS

<b>ABNJ</b>	areas beyond national jurisdiction
<b>BBNJ</b>	biodiversity beyond national jurisdiction
<b>CCAMLR</b>	Commission for the Conservation of Antarctic Marine Living Resources
<b>CCS</b>	Catch Certification Scheme for Importation and Exportation of Fishery Products (under the European Union's IUU Regulation)
<b>CCSBT</b>	Commission for the Conservation of Southern Bluefin Tuna
<b>CDP</b>	catch document programme
<b>CDS</b>	catch documentation scheme
<b>CITES</b>	Convention on International Trade in Endangered Species of Wild Fauna and Flora
<b>EEZ</b>	exclusive economic zone
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>FAO Global Record</b>	Global Record of Fishing Vessels, Refrigerated Transport Vessels and Supply Vessels
<b>GDST</b>	Global Dialogue on Seafood Traceability
<b>IATTC</b>	Inter-American Tropical Tuna Commission
<b>ICCAT</b>	International Commission on Conservation of Atlantic Tunas
<b>IGMDSFHS</b>	International Guidelines for the Management of Deep-sea Fisheries in the High Seas
<b>ILO</b>	International Labour Organization
<b>IMO</b>	International Maritime Organization
<b>IOTC</b>	Indian Ocean Tuna Commission
<b>IPOA</b>	International Plan of Action
<b>IRCS</b>	international radio call sign
<b>IUU</b>	illegal, unreported and unregulated (fishing)
<b>KDE</b>	key data element
<b>PSMA</b>	Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing
<b>RFMO</b>	regional fisheries management organization
<b>SDP</b>	statistical document programme
<b>SIMP</b>	Seafood Import Monitoring Program (United States of America)
<b>UN</b>	United Nations
<b>UNCLOS</b>	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
<b>UNFSA</b>	United Nations Fish Stocks Agreement
<b>UVI</b>	unique vessel identifier
<b>VGCDS</b>	Voluntary Guidelines for Catch Documentation Schemes
<b>VGFSF</b>	Voluntary Guidelines for Flag State Performance
<b>WCPFC</b>	Western and Central Pacific Fisheries Commission
<b>WHO</b>	World Health Organization

## BACKGROUND

1. From ancient times, fishing from oceans, seas, lakes and rivers has been a major source of food and a provider of employment and other economic benefits for humanity. Living aquatic resources, an essential part of the aquatic ecosystem, are finite and their use, like that of other renewable natural resources, needs to be properly managed if their contribution to the nutritional, economic and social well-being of the growing world's population is to be sustained.
2. The adoption of the United Nations Convention on the Law of the Sea (UNCLOS) in 1982 was instrumental in the protection of living marine resources in the sea. The legal regime of the oceans gave coastal States rights and responsibilities for the management and use of fishery resources within the areas of their national jurisdiction.
3. After a long period of growth, capture fisheries landings began to level off from the end of the 1980s, due to sustainability issues, including overfishing, marking the end of the continued development paradigm of global fisheries. Overfishing has negative implications for food and nutrition security and for economic development, whilst also reducing social welfare in countries worldwide. This is especially the case for small-scale fishers and fish workers in developing countries who depend upon fish as their main source of essential nutrients, animal protein and income, while other fishers and fish workers employed in the medium and industrial sectors are reliant on these fisheries for income and livelihoods. The exploitation and use of living aquatic resources need to be properly managed and overfished and depleted stocks need to recover, ensuring that they can continue to benefit society.
4. Following rapid development, aquaculture started to play an increasing role in supplying fish for human consumption in the 1990s.
5. The 19th Session of the FAO Committee on Fisheries (COFI), held in March 1991, recommended the development of new approaches to fisheries and aquaculture management, embracing conservation and environment, as well as social and economic considerations. FAO was asked to develop the concept of responsible fisheries and elaborate a code of conduct to disseminate its principles and foster its application.
6. The Declaration of Cancun, endorsed at the International Conference on Responsible Fishing in Cancun in May 1992, and the United Nations Conference on Environment and Development Summit in Rio de Janeiro in June 1992, reinforced the concept of responsible fisheries and supported the preparation of a code of conduct for responsible fisheries. The FAO Technical Consultation on High Seas Fishing held in September 1992 further recommended the elaboration of a code to address the issues regarding high seas fisheries.

7. In November 1992, the FAO Council formally approved the preparation of a draft of this code. The formulation was carried out through a participatory process involving FAO Members and designed so as to be interpreted and applied in conformity with the relevant rules of international law, as reflected in the 10 December 1982 United Nations Convention on the Law of the Sea. It was also formulated in line with the Agreement for the Implementation of the Provisions of the 1995 Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks and, *inter alia*, the 1992 Declaration of Cancun and the 1992 Rio Declaration on Environment and Development, in particular Chapter 17 of Agenda 21.
8. At its 27th Session in November 1993, the FAO Conference adopted the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas, which, as stated within the FAO Conference Resolution 15/93, should form an integral part of the code of conduct for responsible fisheries.
9. The Code of Conduct for Responsible Fisheries (the Code) was adopted on 31 October 1995 during the 28th Session of the FAO Conference through Resolution 4/95. The same Resolution requested FAO *inter alia* to elaborate appropriate technical guidelines in support of the implementation of the Code in collaboration with FAO Members and interested relevant organizations. This document is one of a series produced in response to this request.
10. The Code is voluntary. However, certain parts of it are based on relevant rules of international law, and it also contains provisions that have already been given binding effect by means of other obligatory legal instruments amongst the Parties.
11. On the implementation of the provisions of the Code, the application of the Ecosystem Approach to Fisheries, as reinforced in the Reykjavik Declaration (2001), provide strategies for the actual implementation of the Code, contributing to the further development and management of sustainable capture fisheries in the marine and freshwater environments and of the interaction between capture fisheries and aquaculture for sustainability, thereby supporting the technical, ecological, economic and social sustainability of the sectors.
12. Despite significant progress in places where capture fisheries management is implemented, the continued prevalence of illegal, unreported and unregulated (IUU) fishing and the ongoing use of ineffective management measures, means that the global percentage of fish stocks that are classified as overfished has not declined.
13. Since its adoption in 1995, the Code has been supplemented, within its framework, by other internationally negotiated instruments addressing specific provisions of the Code and other related matters on responsible fisheries and aquaculture, in the form of International Plans of Action, Voluntary Guidelines and Strategies. In addition, in 2009, the 36th Session of the FAO Conference adopted the Agreement on Port State Measures to Prevent, Deter and Eliminate IUU Fishing which later came into force in June 2016.

14. Whilst contributing smaller volumes to the global fish catch than marine fisheries, inland fisheries contributes fundamentally to food and nutrition security, livelihoods and rural economies, especially in many developing countries. The existence of a broad range of interests outside the inland fisheries sector emphasizes the need for States to establish negotiation mechanisms to protect inland fisheries under multi-purpose use regimes. The importance and the challenges of ensuring the sustainable and responsible use of inland fisheries are clearly acknowledged in the Rome Declaration which emerged from the Global Conference on Inland Fisheries in 2015: The ‘Ten Steps to Responsible Inland Fisheries’ emphasize cross-sectoral approaches to sustain livelihoods, food and nutrition security, and aquatic ecosystems.
15. The role of aquaculture in supplying fish for human consumption has continued to increase, reaching approximately 50 percent of global fish available for human consumption in 2018. This has allowed fish to contribute to the transition to more healthy and nutritious diets while not increasing the pressure on capture fisheries. However, aquaculture development, when inadequately managed, has also shown the potential to cause environmentally or socially adverse impacts. The outstanding issue in aquaculture is that, unlike in capture fisheries, the existing applicable principles of international law and treaty provisions provide little guidance on the conduct of aquaculture operations. The importance of sustainable aquaculture development and management for securing food and nutrition security, alleviating poverty and maintaining the integrity and sustainability of aquatic resources and environments was reinforced in the Bangkok declaration (2000) and the Phuket consensus (2010).
16. Elements of the Code and the subsequent framework of international instruments were reinforced through the United Nations Conference on Sustainable Development held in Rio de Janeiro in 2012, which launched a process to develop a set of Sustainable Development Goals (SDGs). The 2030 Agenda for Sustainable Development was adopted with 17 SDGs at the United Nations Sustainable Development Summit in 2015. In particular, SDG 14 “Conserve and sustainably use the oceans, seas and marine resources for sustainable development” includes targets, *inter alia*, for sustainable management of fisheries and aquaculture, ensuring access to resources and markets for small-scale fishers, ending of overfishing, destructive fishing practices, IUU fishing and the implementation of science-based plans to restore fish stocks.
17. FAO produces Technical Guidelines for Responsible Fisheries to assist the international community in taking the necessary practical steps to implement the provisions foreseen in the Code.

## EXECUTIVE SUMMARY

Catch documentation schemes (CDS) are just one in an array of tools designed to combat illegal, unreported and unregulated (IUU) fishing activities. These schemes use catch certificates and trade documents validated by competent authorities to track fish from fishing grounds to markets, and to establish that the products in question have been sourced in compliance with all applicable legal requirements. The Voluntary Guidelines on Catch Documentation Schemes (VGDS; FAO, 2017) were adopted in 2017 to assist national and international organizations by articulating basic principles and functions for new and existing CDS. The purpose of this publication is to provide practical guidance to national authorities when they are supplying and handling data for CDS documents and related processes. Specifically, it seeks to align and improve existing national fishery monitoring, control and surveillance (MCS) tools, as well as product tracking systems, in order to meet internal and external demands for legal provenance documentation such as CDS.

A range of instruments, initiatives, measures and systems operate at the international, regional and subregional/national levels to support and complement CDS. These include international legal and policy instruments for the conservation and sustainable use of living marine resources, as well as for food safety, the protection of endangered species and safety at sea. Further commitments also exist at the regional level through regional fishery bodies, while at the subregional/national level competent authorities provide government assurances by way of systems that facilitate and support international trade. Rather than representing an additional commitment, CDS is better thought of as a tool to organize the information and assurances provided by various parties – and often required under other systems – into a succinct and common format that is easily shared between partners.

As defined by the VGDS, regional fishery bodies (and more specifically regional fisheries management organizations (RFMOs)) first established CDS in the form of trade documentation schemes which were designed to collect information for exported fish. Four of these trade documentation schemes – now referred to as statistical document programmes (SDPs) – still operate for swordfish and bigeye tuna. Three more comprehensive schemes referred to as CDS or catch document programmes, which collect information on both domestically and internationally traded fish, are now in place for Atlantic and southern bluefin tuna and two species of toothfishes. Two subregional/national systems were subsequently established by the European Union and the United States of America to protect their markets from the products of IUU fishing. These nine systems form the basis of the analysis in this publication.

The most fundamental CDS design features are the species or fisheries it covers, and the product flows (domestic and/or international trade) to which it applies. Fishery-based CDS such as those for toothfishes and bluefin tuna provide a comprehensive view of the risk of IUU fishing in each fishery and can cross-check reported catches for use in stock assessments. Market-based CDS on the other hand, which aim to prevent IUU fishing products from entering specific markets (such as the European Union and the United States of America) have the advantage of “ring-fencing” legally certified product flows within the supply chain. However, these could act to drive IUU fish into other markets without legal provenance controls.

Each CDS is designed around points in the supply chain where control of the fish changes hands (critical tracking events or CTEs). These CTEs can be distinguished by the data that need to be captured, the authority responsible for supplying the data, and whether validation by a competent authority is required. The schemes may apply to simple supply chains involving only domestic landings and trade, or to complex supply chains involving multiple countries with different roles. In most existing CDS, fishing vessel flag States validate catch documents and exporting countries validate trade documents. However, authorities in the flag States of transport vessels, countries where farming occurs, port States, countries where processing occurs, and/or countries where end markets exist, may also have a role to play. It is therefore important for validating authorities to maintain the necessary level of oversight in order to confirm that the information provided to the CDS is correct, as there may be penalties for improper validation.

The VGCDs do not define traceability *per se* but stipulate that the required level of traceability for each CDS should be determined by its objectives. A scheme is generally concerned only with the subset of traceability information that is relevant to documenting and tracking the legal provenance of the product. The existing CDS focus on tracking fish at points where materials cross national boundaries in order to form a state-to-state chain of custody, all the way back to the catch event. They therefore rely on national authorities to establish their own systems for domestic traceability to ensure that material *received* under a given catch certificate is the same material *released* under that catch certificate. The greatest traceability challenges arise when catches are split and processed, as this is when fish are most vulnerable to substitution or mixing.

Digitalization of CDS has been under way for the past decade, with some CDS already fully electronic and others with electronic components. Electronic CDS offer numerous potential benefits over their paper counterparts, yet in the short term such systems may remain a challenge for small-scale operators, particularly in developing countries. For the time being, electronic schemes are therefore likely to operate with reduced functionality owing to the continued use of paper-based data formats by some users and/or the maintenance of paper-based functionality (only), in spite of digitalization.

By compiling key data elements (KDEs) such as catch, transshipment and landing at CTEs, CDS establish the supply of fish from the fishing grounds. Several sources, including the VGCDs, have produced lists of KDEs (or information elements) that should be recorded at these points. An analysis of existing CDS data requirements and KDEs recommended by other sources revealed that there is no overall agreement on the ‘best’ set of KDEs. Instead, national authorities who certify, via a CDS, that the activities conducted under their auspices comply with legal requirements need to confirm certain basic points (called “functional requirements”) at each CTE. National authorities should be able to identify and gather whatever data are necessary in the national context (i.e. national KDEs) to support those functional requirements, regardless of the KDEs required by a specific CDS. Once identified, the functional requirements for fishing vessels, catch, transshipment and landing can be easily applied to simple supply chains. Applying functional requirements to more complex seafood supply chains – such as those involving more than one intermediary vessel between fishing and landing, or when fish transit cold stores are imported without first undergoing landing procedures – is also discussed in this publication.



A different approach is required for tracking fish products. If fish are appropriately certified at the point of landing their legal provenance status relative to IUU fishing is confirmed, and the objective of CDS product tracking should be to maintain that legal provenance certification throughout the remainder of the supply chain. However, CDS are not well suited to this objective because they do not closely follow fish within national boundaries and do not operate with sufficient granularity to trace products reliably when catches are split and processed. The present analysis identifies three functional requirements for maintaining the claim of legal provenance through national product-level traceability. Some of the required functionality may be available under national systems maintained by customs or sanitary authorities – and thus accessible via linkage to those systems.

As the effectiveness of CDS will be determined by the traceability of legal provenance throughout the entire supply chain, the information and assurances of individual countries must be joined up to prevent the entry of IUU fish. The CDS itself is a vehicle for compiling these and sharing them throughout the supply chain. Verifications requested by downstream CDS participants to confirm specific points constitute another form of information exchange. The ongoing development of digital systems, notably those cataloguing unique vessel identifiers (UVIs) such as the Global Record of Fishing Vessels, Refrigerated Transport Vessels and Supply Vessels (FAO Global Record), or the implementation of the provisions of the Agreement on Port State Measures (Global Information Exchange System – GIES), is expected to aid verifications by providing relevant information on demand. Another approach, envisaged by the Global Dialogue on Seafood Traceability, would be to create a system with interoperable data standards and protocols to act as a repository of traceability information for all users. Although the harmonization of existing CDS appears unlikely to occur any time soon, this does not prevent national authorities from organizing their national KDEs and systems in ways that can cater for the requirements of both existing CDS and future systems.

This publication closes with practical suggestions for national authorities to benchmark their capacities to support existing CDS requirements, as well as build more robust national systems for legal provenance certification. These include three exercises (on identifying national catch tracking KDEs, evaluating national fish product tracking systems, and assessing verification tools, systems and processes) designed to help identify where there may be residual risks of IUU fish entering the supply chain. National authorities are also encouraged to weigh up the benefits and costs of expanding CDS coverage beyond existing requirements, which could not only strengthen compliance but also promote trade and maximize the value of national fish products. Continuing improvement in legal provenance certification, both in CDS and CDS-like systems, and their implementation at the national level, will serve as a potent deterrent to ongoing IUU fishing activities.



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# 1. INTRODUCTION

## 1.1 Context and scope

The past two decades have seen an ever-expanding range of tools and technologies brought to bear by flag and coastal States to eliminate the threats posed by illegal, unreported and unregulated (IUU) fishing (FAO, 2020). This period has also seen a broader range of port States working toward deterring IUU fishing through developments such as the adoption and entry into force of the Agreement on Port State Measures (PSMA). During this time catch documentation schemes (CDS) have been established that certify the legal provenance of seafood through catch certificates, which track fish from fishing grounds to markets. These CDS provide mechanisms for countries where landing, processing and consumption takes place to join forces with flag and port States in identifying and stamping out IUU fishing. The Voluntary Guidelines on Catch Documentation Schemes (VGCDS) were adopted in 2017 to assist in developing or implementing new CDS, or harmonizing or reviewing existing CDS. In support of the VGCDS, this publication seeks to provide practical guidance to national authorities when supplying data for, and handling, CDS documents and related processes.

Specifically, this publication seeks to align and improve existing national fisheries' monitoring, control and surveillance (MCS) tools, as well as product traceability systems, in order to meet internal and external demands for legal provenance documentation such as CDS. In doing so it adheres to the framework established in the VGCDS in several ways. First, it applies only to wild capture fish caught for commercial purposes in marine or inland areas, whether processed or not (FAO, 2017, §1.1). Second, like the VGCDS, this publication elaborates guidance designed to complement existing the instruments and initiatives described in Section 2; and countries may choose to apply some of the information and recommendations contained here to strengthen their national systems (FAO, 2017, §1.1 and 1.2). Third, as CDS are only applicable to managed fisheries, the guidance provided here will not help reduce the extent of IUU fishing in unregulated fisheries; such issues will need to be addressed through other mechanisms. Fourth, the VGCDS encourages states and organizations to establish multilateral or regional CDS (FAO, 2017, §5.1) that are compatible with existing schemes and equivalent in outcome, if not necessarily in form (FAO, 2017, §4.3). Consistent with this approach, this publication provides advice at the national level to promote effective and efficient compliance with existing schemes and anticipate evolving requirements – not to establish new CDS. Finally, the VGCDS acknowledge that each CDS will have its own strengths and weaknesses in proportion to the risks it addresses and the costs of operation (FAO, 2017, §4.4 and 5.1). Recognizing that performance will vary in accordance with these factors, this publication is not designed to review or otherwise comment on the utility and effectiveness of the various CDS currently in operation. Readers are instead referred to reviews conducted by the organizations that operate those CDS (CCAMLR, 2019; ICCAT, 2020; CCSBT, 2019a; Joint Tuna RFMOs, 2009, 2010), and to independent analyses (Clarke, 2010; Clarke and Hosch, 2013; Hosch, 2016, 2018, 2019; Hosch and Blaha, 2017).

## 1.2 How to use this document

This publication is intended as a handbook for national authorities to understand CDS principles at a conceptual level, as well as to apply CDS requirements on a practical basis. Topics are arranged in order from the legal and policy background to CDS (Section 2) to an introduction of the existing CDS (Section 3), before progressing to more operative subjects, including how to handle CDS information requirements (Section 4), and exercises for assessing national capabilities and identifying priorities for future work (Section 5). Technical sub-sections are summarized in text boxes for those readers who wish to grasp the key points quickly.

National authorities who are primarily interested in developing robust responses to a variety of CDS (both existing and potential) can skip to those sections related to the specific role(s) their State takes in CDS. For example, fishing and transport vessel flag States should focus on catch tracking information in Sections 4.1.1–4.1.3. Port States will find pertinent discussions of landings information and dealing with complex sea-based supply chains in Sections 4.1.5–4.1.6. Issues of interest to States which store, process and/or export fish covered by CDS are covered in Section 4.2. Relevant assessment and prioritization exercises for all types of States can be found in Section 5.

Alternatively, those States interested in benchmarking their capabilities against the specific requirements of existing CDS can check [Table 1](#) (p. 12) for specific document types, [Table 2](#) (p.17) for validation/declaration roles for national authorities under each CDS, and Appendixes 1–5 for an analysis of key data elements in each scheme.<sup>1</sup> These States will also benefit from the assessment and prioritization exercises in Section 5, which can strengthen their performance under existing CDS.

Catch documentation schemes cover a wide variety of supply chains and contain a diverse array of data requirements. As this document aims to provide a concise and practical introduction, readers in search of more detailed information are referred to the references for more information, in particular Hosch and Blaha (2017).

## 1.3 Definitions

In the following list of terms, the definitions marked with an asterisk (\*) are taken from the VGCDs (FAO, 2017, §2).

**Batch integrity:** uniquely identifying a specific unit of a food material or product and ensuring that it is not mixed, substituted or otherwise adulterated with material that does not share the assigned identifiers.<sup>2</sup>

**Catch certificate\*:** an official document accompanying a consignment and validated by the competent authority, allowing accurate and verifiable information concerning fish passing through the supply chain. The catch certificate is the primary document that attests to the legal provenance of the catch within a CDS.<sup>3</sup>

**Catch document:** a general term for a document that provides information about the at-sea handling (including catch) and characteristics of fish catches up to and including the point of

<sup>1</sup> Please note that as procedures and interpretations may change over time, current requirements for the existing CDS should be confirmed directly with the organization responsible for each CDS.

<sup>2</sup> See Food Standards Agency (2021) for more information about traceability units and identifiers.

<sup>3</sup> The second sentence of this definition has been added to clarify the relationship between the catch certificate and the concept of legal provenance.

landing (compare with “Trade document” below). If a catch document is validated it can be referred to as a catch certificate (see above).

**Catch Documentation Scheme<sup>4\*</sup>**: a system with the primary purpose of helping determine throughout the supply chain whether fish originate from catches taken consistent with applicable national, regional and international conservation and management measures, established in accordance with relevant international obligations.

**Chain of custody**: the supply chain actors that take legal ownership, or exercise physical control, over fish raw materials or products throughout the entire supply chain or a portion thereof (e.g. within national borders, in the case of domestic chain of custody).

**Consignment<sup>\*</sup>**: fish, which are either sent simultaneously from one exporter to one consignee or covered by a single transport document covering their shipment from the exporter to the consignee.

**Critical tracking event**: a point along the supply chain where information must be recorded for the effective tracing of product; for example, when the product changes hands from one supply chain participant to another, is moved between premises, or is transformed (GS1 US 2013).

**Declaration**: a statement conveying information that is affirmed to be valid and correct (compare to “Validation” below).

**Fish<sup>\*</sup>**: all species of wild capture living aquatic resources, whether processed or not.

**Fishing vessel<sup>\*</sup>**: any vessel of any size used for, equipped for use for, or intended for use for the purposes of fishing or fishing-related activities, including support vessels, fish-processing vessels, vessels engaged in transshipment and carrier vessels equipped for the transportation of fishery products, except container vessels.

**Illegal, unreported and unregulated fishing<sup>\*</sup>**: the activities set out in paragraph 3 of the 2001 FAO International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing.

**Key data elements**: the types of data required to trace a product successfully through all relevant critical tracking events in the supply chain (Hosch and Blaha, 2017).

**Landing<sup>\*</sup>**: the initial movement of fish from a vessel to dockside in a port or free-trade zone, even if subsequently transferred to another vessel. The offload or transfer in port of fish from a vessel to a container is a landing. In this publication use of the term landing includes, in addition to physical contact with any port facility or land as implied in the VGCDs, that the fish have been subjected to administrative or legal procedures or requirements for approving the entry, transfer or movement of fish in port or onshore in accordance with relevant international and/or national law.<sup>5</sup>

**Legal provenance**: the state of being legally sourced, in conformance with requirements specified in law, and documented through a chronology of ownership, custody and/or location.

**Mass balance**: the balance of volumes of a discrete lot of fisheries products, obtained by subtracting the volume *leaving* a supply chain segment from the volume that has *entered* the same segment, accounting for applicable yield factors (Hosch, 2016).

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<sup>4</sup> Catch documentation schemes (CDS) are sometimes referred to as catch document programmes (CDP), for example the ICCAT Bluefin Tuna Catch Document Programme (ICCAT, 2018a).

<sup>5</sup> The third sentence of this definition has been added to the VGCDs definition for clarity.

**Regional fisheries management organization\*:** an intergovernmental fisheries organization or arrangement, as appropriate, that has the competence to establish fishery conservation and management measures.

**Statistical document programme:** a programme that may resemble a catch documentation scheme in many respects but only applies to the collection of information at export, for fish entering international trade.<sup>6</sup>

**Supply chain\*:** a sequence of processes involved in the production and distribution of fish from catch to the point of import in the end market, including events such as landing, transshipment, re-export, processing, and transport.

**Traceability:** the ability to trace the history, application or location of an entity by means of recorded identifications (Blaha and Katafono, 2020).

**Traceback:** an audit in which the movement, form and/or custody of a material or product is tracked back to its origin.

**Trade document:** a general term for a document that provides information about the handling of fish catches from the point of export onward, including any re-exports (compare with “Catch document” above).

**Transshipment\*:** the transfer of fish that have not previously been landed, from one vessel directly to another, at sea or in port.

**Unloading:** a general term for the movement of fish off a fishing vessel, which could occur by landing, transshipment, the transfer of live fish (to a farm, for example), or other means (Hosch, 2016). Note that all landings are considered unloadings, but not all unloadings to land will be landings (see “landing” definition above).

**Validation:** the placing of a signature and/or stamp (seal) on a catch or trade document by a designated authority using physical or electronic means, thereby affirming official approval (Hosch, 2016).

**Verification:** a process of requesting and receiving confirmation of specific points of submitted information. Verification may occur domestically by national authorities prior to validation or between two States after validation.

**Vessel monitoring system:** a satellite-based monitoring system which at regular intervals provides data to fisheries authorities on the location, course and speed of vessels.

**Yield:** the weight of fish remaining after processing expressed as a percentage of the original volume.

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<sup>6</sup> Statistical document programmes are sometimes also referred to as trade documentation schemes (Joint Tuna RFMOs, 2007).

## 2. INTERNATIONAL LEGAL AND POLICY FRAMEWORK RELATING TO CATCH DOCUMENTATION SCHEMES

The international legal and policy framework for CDS is multilayered. At the global level there are international instruments that provide tools relating specifically to IUU fishing. There are also a number of other global, multilateral initiatives aimed at other issues such as food safety, the protection of endangered species and safety at sea, which can also help support the eradication of IUU fishing. Many States worldwide have already committed to implementing the provisions of these international global agreements. At the same time, at the regional level, these and other States cooperate through RFMOs to conserve and manage fisheries resources. These RFMO-specific agreements – in the form of conservation and management measures – represent additional commitments to programmes and systems that stem IUU fishing activities. Finally, at the subregional/national level, States establish and operate their own unilateral systems for inspecting goods and certifying their conformity to national standards. As will be described below, these systems can also support efforts to deter IUU fishing.

### 2.1 International fisheries instruments and the role of States in eliminating illegal, unreported and unregulated fishing

A framework of international instruments has been emerging in recent decades that lays out the requirements and responsibilities of States, RFMOs and other relevant stakeholders to ensure the conservation and sustainable use of living marine resources, including preventing, deterring and eliminating IUU fishing. These instruments are all based on the 1982 United Nations Convention on the Law of the Sea (**UNCLOS**) and include:

1. the 1993 Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas (**Compliance Agreement**);
2. 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 (**UN Fish Stocks Agreement – UNFSA**);
3. the 1995 **Code of Conduct for Responsible Fisheries**;
4. the 2001 International Plan of Action to Prevent, Deter and Eliminate IUU Fishing (**IPOA-IUU**);
5. the 2008 International Guidelines for the Management of Deep-sea Fisheries in the High Seas (**IGMDSFHS**);
6. the 2009 FAO Agreement on Port State Measures to Prevent, Deter and Eliminate IUU Fishing (**PSMA**);
7. the 2014 FAO Voluntary Guidelines for Flag State Performance (**VGFSP**); and
8. the 2017 FAO Voluntary Guidelines for Catch Documentation Schemes (**VGCDs**).<sup>7</sup>

<sup>7</sup> For a detailed overview of the main duties and responsibilities of coastal, flag and port States, as well as internationally agreed market-related measures, please refer to Volume I in the series Checklists and technical guidelines to combat illegal, unreported and unregulated (IUU) fishing (FAO, 2021).

The concept of market-related measures to reduce or eliminate trade in the fish and fish products derived from IUU fishing was first introduced in the International Plan of Action-IUU. This plan clearly calls on States to cooperate, notably through relevant global and regional fisheries management organizations, and to adopt appropriate, multilaterally agreed trade-related measures (FAO, 2001, para. 68), including multilateral catch documentation and certification requirements (FAO, 2001, para. 69). Furthermore, the IPOA-IUU specifically calls on States to adopt and implement such measures that prevent IUU fishing products from being traded or imported into their territories (FAO, 2001, para. 66) and to take steps to improve the transparency of their markets to allow the traceability of fish or fish products (FAO, 2001, para. 71). Such measures would also facilitate the identification of vessels operating in contravention of applicable conservation and management measures – as per paragraph 60(i) of the IGMDSFHS (FAO, 2009).

The VGCDS, developed through a consultative process and adopted by the FAO Conference in July 2017, aim to contribute to eliminating IUU fishing by providing assistance to States, RFMOs and other organizations when developing and implementing new CDS, or harmonizing or reviewing existing CDS. The Voluntary Guidelines are based on the principle that CDS should: conform to the provisions of relevant international law; not create unnecessary barriers to trade; recognize equivalence; be risk-based; be reliable, simple, clear and transparent; and be electronic, if possible (FAO, 2017, §3.1-3.6). Furthermore, the VGCDS recommend that CDS should build on the primary responsibility of the flag State to prevent, deter and eliminate IUU fishing (FAO, 2017, §1.2), that CDS should be implemented within the context of an effective fisheries management regime (FAO, 2017, §4.4), and that the different roles of relevant States to authorize, monitor, and control fishing operations and verify catch, landing, and trade should be fully recognized during the CDS validation process, consistent with relevant national and international law, multilateral measures, instruments and obligations (FAO, 2017, §6.3). Finally, the Guidelines recognize that CDS are most effective when all states involved cooperate in the schemes (FAO, 2017, §5.1).

The role of **flag States** in curtailing IUU fishing is outlined in detail in several international instruments (Compliance Agreement, UNFSA, IPOA-IUU, PSMA, VGFSP), which call for States to exercise effective jurisdiction over their vessels engaged in fishing or fishing-related activities, and to ensure that fishing vessels entitled to fly their flag do not engage in or support IUU fishing. Importantly, flag States are responsible for requiring the recording and timely reporting of information on fishing activities, including vessel position, catch, fishing effort, as well as other relevant fisheries data in accordance with subregional, regional and global standards e.g. Article 217.1 of UNCLOS (UN, 1982) and Article III.7 of the Compliance Agreement (FAO, 1995a). Similarly, flag States must undertake verification of catch through observer programmes, inspection schemes, unloading reports, supervision of transshipment and monitoring of landed catches and market statistics; and the MCS of fishing activities as per Article 18.3 of the UNFSA (UN, 1995).

The UNCLOS tasks **coastal States** with the responsibility to conserve the living resources in their exclusive economic zones (UN, 1982, art. 61.2), which may involve the implementation of a range of measures to eliminate IUU fishing including, among others, effective MCS and maintaining a record of fishing authorizations (FAO, 2001, para. 51). For the conservation and management of living resources in the high seas, States must cooperate and establish subregional or regional fisheries organizations (UN, 1982, art. 118) with a view to establishing measures to curtail IUU fishing, as outlined in Section 2.3.



Finally, the specific role of port States in eliminating IUU fishing is outlined in detail in the PSMA. Port States must deny entry into port, and the use of port, to any vessel that has been engaged in IUU fishing activities (FAO, 2016, Part 2 and Part 3).

## 2.2 Other relevant instruments

The international instruments relating to IUU fishing described above are supplemented by a variety of other relevant instruments on topics ranging from food safety to endangered species, and from ocean governance to labour conditions. Although these additional instruments are not currently related to fisheries management and its efforts to curtail IUU fishing by law, some may in future be referenced in conservation and management measures adopted by RFMOs and would thus join the body of international fisheries instruments described above.

The **Convention on International Trade in Endangered Species of Wild Fauna and Flora** (CITES) is an international agreement, currently involving 183 parties, designed to ensure that the international trade in wild animals and plants does not threaten their survival. Its nexus with fisheries control systems is made clear by the reference to CITES in the PSMA.<sup>8</sup> The main tool available to CITES is a permitting system for international trade transactions, including movements of CITES-listed species into a State from the high seas (referred to as “introduction from the sea”).<sup>9</sup> Listing on CITES Appendix I prohibits trade under all but exceptional circumstances (e.g. specimens for scientific or educational purposes), whereas listing on CITES Appendix II requires that all exports, including landings in non-flag-State ports, be accompanied by a permit issued by the flag State’s designated CITES Management Authority. For the authority to issue an export permit it must be determined that the proposed export is not detrimental to the survival of the species and that the specimen was not obtained in contravention of the laws of that State for the protection of fauna and flora. Equivalent requirements apply to specimens introduced from the sea. Several species which are commercially fished for food have been listed either on CITES Appendix I or II; these include wrasses, sharks, sturgeons and sea cucumbers. This system of export permitting is in many ways similar to catch certification under CDS, but it currently has less capacity than some CDS for independent verification and monitoring of traded quantities.<sup>10</sup> It does however have the ability to sanction non-compliant signatories by temporarily suspending their trade in CITES-listed species.

The **Codex Alimentarius** is a collection of internationally adopted food standards and related texts designed to protect the health of consumers and ensure fair practices in the food trade. Although it is focused on food safety, quality and fairness, the principles of the Codex Alimentarius Food Import and Export Inspection Certification Systems are similar and directly relevant to the principles underlying the legal provenance of seafood, and therefore CDS. These principles include:

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<sup>8</sup> See Article 13 and Annex B of the PSMA.

<sup>9</sup> The phrase is used both in CITES Article I (e) and Resolution Conf. 14.6 (Rev. CoP16) on Introduction from the Sea.

<sup>10</sup> CITES currently relies on Member States to report traded quantities annually and these reports are tabulated and held in a public database by an external organization. Unlike some CDS, the CITES annual report data are not examined in real time (in part due to the annual reporting cycle) and there are difficulties in matching annual tallies reported by exporters and importers independently (Robinson and Sinovas, 2018). By contrast, most CDS documents represent a single shipment, require inputs from both exporters and importers on each document, and are subject to verification by those receiving the information at the time of shipment.

- fit for purpose – effective in providing an acceptable level of protection;
- risk-based – science-based, with inspections proportionate to risk;
- non-discriminatory – avoid arbitrary or unjustifiable distinctions;
- efficient – show an awareness of costs and do not restrict trade unnecessarily;
- harmonized – promote cooperation around internationally agreed standards;
- equivalence – recognize functional equivalencies between different systems;
- transparent – respond to consumer demands while protecting confidential data;
- special requirements – recognize the special requirements of developing States;
- control and inspection procedures – limit to what is necessary to establish compliance with requirements; and
- validation and verification – establish procedures in importing and exporting countries to confirm their assurances.

The Codex Alimentarius Commission, organized by FAO and the World Health Organization (WHO) currently has 188 Member Countries and 1 Member Organization (the European Union), and in many cases its standards serve as the basis for national legislation governing international trade in food products.

Since 2017 negotiations have been underway via the United Nations to establish an international legally binding instrument (Biodiversity Beyond National Jurisdiction – BBNJ) under the UNCLOS that centres on the conservation and sustainable use of marine biodiversity of areas beyond national jurisdiction (ABNJ). Despite the common misperception that ABNJ are largely unregulated, most fishing in these areas is managed by states cooperating through regional fisheries management organizations. The BBNJ negotiations concurred at an early stage that the new instrument should promote coherence, complementarity, and synergies with other frameworks and bodies. Since existing CDS already provide systems for documenting the legal provenance of fish regardless of whether they are caught within national waters or in the ABNJ, it is likely that the eventual BBNJ agreement will reinforce existing CDS and encourage the development of new ones.

The legal provenance of seafood is usually defined in terms of compliance with all applicable fishing regulations, and upholding minimum labour and safety standards is increasingly viewed as an integral component of legal fishing practices. The **2012 Cape Town Agreement** is currently open for ratification; once it enters into force it will set minimum safety standards and inspection procedures for fishing vessels > 24 m by updating and amending the Torremolinos Protocol of 1993, which is not yet in force (and relates to the Torremolinos International Convention for the Safety of Fishing Vessels of 1977). The welfare and treatment of crew on board fishing vessels is also coming into greater focus as the **International Labour Organization (ILO) Work in Fishing Convention (C188)** minimum requirements are starting to be incorporated into coastal State fishing license conditions. Labour and safety conditions may therefore soon be subject to compliance inspections and/or flag State certifications. This is clearly an emerging area of discussion among flag, coastal and port States, who are already cooperating on legal provenance documentation.

## 2.3 Regional fishery bodies: programmes and systems

Regional fishery bodies, and specifically regional fisheries management organizations (RFMOs), were the first to establish CDS as one of many tools to eliminate IUU fishing. The concept was initially implemented in the form of trade documentation schemes which were designed to collect information at the time of export on quantities of specific tuna and billfish species entering international trade. Such schemes were eventually established in four of the five tuna RFMOs (the International Commission on the Conservation of Atlantic Tunas (ICCAT); the Commission for the Conservation of Southern Bluefin Tuna (CCSBT); the Indian Ocean Tuna Commission (IOTC); and the Inter-American Tropical Tuna Commission (IATTC)). Four of these trade documentation schemes, now referred to as **statistical document programmes** (SDPs), still operate for swordfish (ICCAT, 2001a) and bigeye tuna (IATTC, 2003; ICCAT, 2001b; and IOTC, 2001, 2003).

Although the trade documentation schemes were not specifically designed to detect the products of IUU fishing, they unexpectedly identified a large number of unauthorized vessels catching managed species which later entered international trade. It was therefore decided to expand the functionality of some schemes to include both domestic and international trade so that they could be used as a more effective MCS tool (Joint Tuna RFMOs, 2007; Hosch, 2016). These more expansive schemes, called **catch documentation schemes (CDS) or catch document programmes (CDP)** are now in place in ICCAT for bluefin tuna (ICCAT, 2018a, 2018b) and in CCSBT for southern bluefin tuna (CCSBT, 2019b). Outside of tuna fisheries, the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) developed a CDS for toothfish (CCAMLR, 2018) without initially using a trade documentation scheme; it was the first RFMO to require catch documentation for both domestically and internationally traded fish (Clarke, 2010). Both RFMO members and cooperating non-members comply with the requirements of these schemes under binding or voluntary arrangements.

Regional fisheries management organizations also maintain a number of programmes and systems that generate data which support their catch or trade documentation schemes. While the details vary between RFMOs, most maintain authorized **vessel lists** (as well as lists of IUU vessels), require **vessel monitoring systems (VMS)**, impose **transshipment monitoring** requirements, and operate **high seas boarding and inspection** programmes. These MCS systems are complemented by **catch reporting requirements** and **observer programmes** that provide details of species and quantities caught. Some RFMO members and cooperating non-members participating in these programmes and systems use these data to populate catch certificates they issue or to check catch certificates they handle. As a result, CDS is already one component of an integrated set of MCS tools in some RFMO-managed fisheries.

## 2.4 Subregional and national systems supporting international trade requirements

International trade has expanded and liberalized tremendously in recent decades, and this change has been accompanied by the development of increasingly complex trade procedures and standards. Many products, particularly animal-based food products such as seafood, require **government assurances** from competent authorities in the exporting country before they will be accepted for import. Exporting countries therefore maintain a variety of systems for inspecting goods and certifying their conformity to applicable standards. Importing countries may also maintain eligible country and approved product lists and accept only listed products from listed sources.

Seafood exporters may therefore need to obtain pre-approval prior to establishing trading relationships by supplying information on what will be traded, where it is sourced from, and how it is processed. In addition to government assurance systems designed to address food safety issues, most countries will operate border control systems for biosecurity and tariff purposes. For fish catches these will often take the form of **landings authorizations and port inspections**. Where the trading relationships are significant, countries may negotiate **bilateral or multilateral free trade agreements**, which may contain additional specifications governing fish production and trade.

While government systems supporting seafood trade through sanitary and customs checks are not new, in recent years some additional subregional and national systems have been established to protect their domestic markets from the products of IUU fishing. Two such systems are the **Catch Certification Scheme for Importation and Exportation of Fishery Products (under the European Union's IUU Regulation) - CCS** (European Union, 2008, Chapter III) and the **Seafood Import Monitoring Program of the United States of America – SIMP** (Government of the United States of America, 2016). With the European Union receiving imports from nearly 150 countries around the world (Holland, 2019), and the United States of America close behind at 120 countries (Pramod *et al.*, 2014), it is likely that most seafood-producing countries have already had to comply with one or both schemes.

Many of these national systems are either CDS themselves (under the VGCDS definition) or require the same kind of information-gathering and validation processes as CDS (in the case of sanitary or customs systems). Whether already realized or not, there is therefore great potential for these systems to reinforce each other through efficient integration and cross-checking. Furthermore, national systems currently at work in many countries around the world are already shouldering much of the information burden posed by CDS. In many cases the incremental effort in documenting legal provenance can therefore be small, providing existing systems can be made to work together efficiently.

#### Summary Box 1

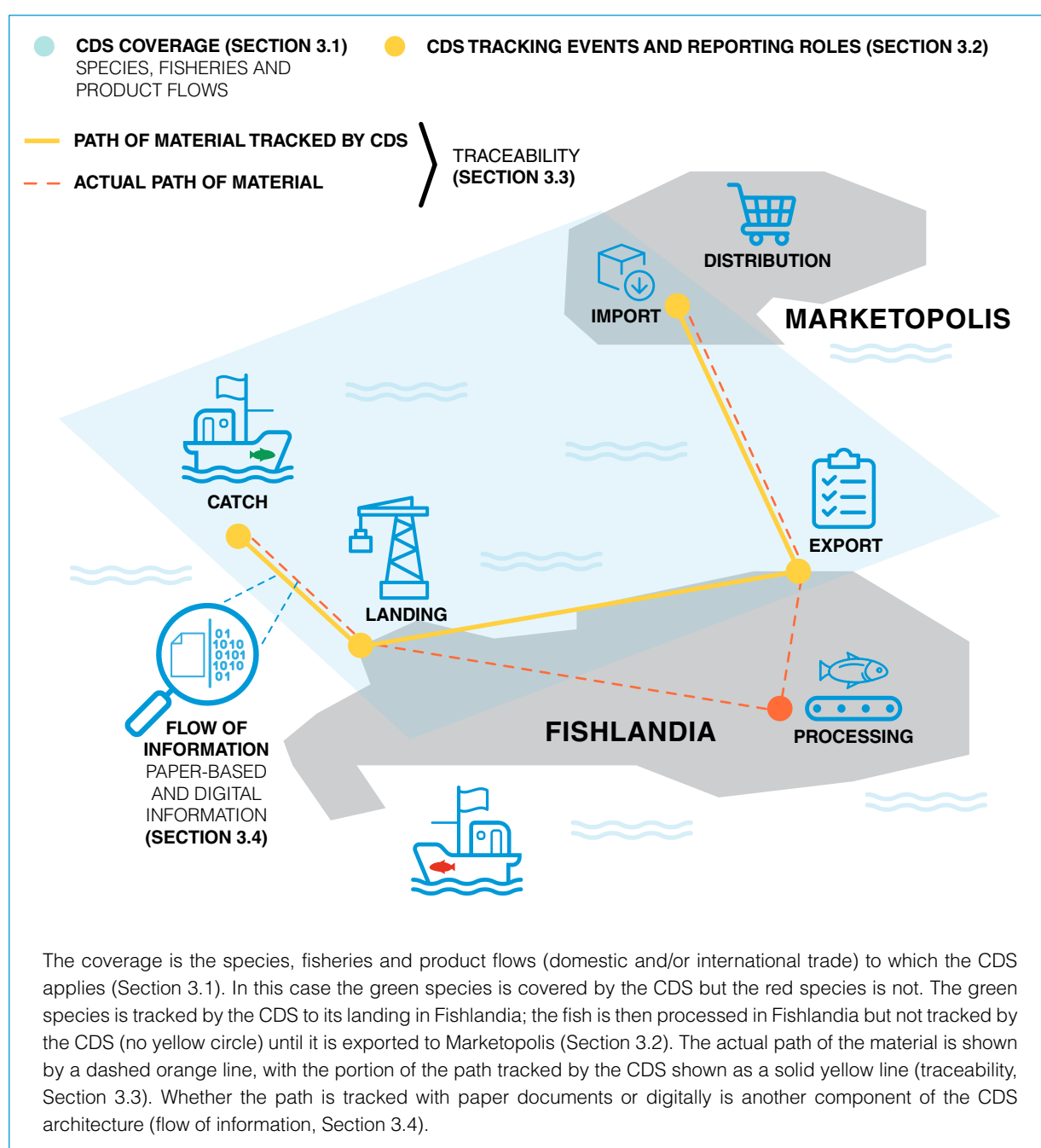
##### International legal and policy framework relating to CDS

- Existing international and national instruments, initiatives, measures and systems represent a substantial commitment towards combatting IUU fishing.
- Rather than representing an additional commitment, CDS is better thought of as a tool to compile information and assurances provided by various parties – which are often required under other systems – into a succinct and standardized format.
- CDS can promote the sharing of information pertaining to legal provenance between partners, strengthening related systems in the process.
- CDS can also serve as a platform to extend the commitments described above throughout the entire supply chain, from the point of catch to the point of consumption.

### 3. UNDERSTANDING THE ARCHITECTURE OF CATCH DOCUMENTATION SCHEMES

The VGCDS sets out principles, functions, standards and information elements for CDS; however, it also recognizes the need for schemes to differ in proportion to risk, while minimizing burdens on users and allowing all relevant States to participate. In short, within the broad parameters it paints, the VGCDS offers CDS considerable design flexibility. This section analyses four aspects of existing CDS to illustrate this flexibility: coverage (Section 3.1), documentation and validation roles (Section 3.2), traceability (Section 3.3) and digitalization (Section 3.4).

**Figure 1.** Diagram of a notional CDS showing some, though not necessarily all, pathways and events



Analysing this basic architecture (Figure 1) can assist those States currently working with one or more existing CDS, or who anticipate that they will, to examine how their national systems can better respond to the current information demands, as well as anticipate future requirements.

Before embarking on this analysis, it is important to note that the definition of CDS in the VGCDs is slightly different to that used by RFMOs. As explained in Section 2.3, in RFMO schemes there is an important distinction between statistical document programmes (SDP) which only apply to fish that are internationally traded, and catch documentation schemes (CDS or CDP) which are designed to apply to both domestic and international trade (Joint Tuna RFMOs 2007). Under the VGCDs definition, both types of RFMO schemes are considered CDS and thus both types of schemes are included in the following discussion of CDS. Outside of the RFMO framework, national schemes which meet the VGCDs definition are also included, i.e. the CCS and the SIMP. With regard to other terminology, the definitions of CDS entities and events used in this document conform to those in the VGCDs unless otherwise indicated (see Section 1.3). It should be noted that there may be variations in how these and similar terms are applied by individual CDS in different contexts.

The CDS discussed in this publication are shown in Table 1 (left column). Schemes that have been superseded (as discussed in Clarke, 2010) and schemes that are under development or otherwise being considered or trialed for possible future implementation,<sup>11</sup> are not considered in this review.

Table 1. Catch documentation schemes and their catch and trade documents		
CDS and species	Catch documents	Trade documents
CCAMLR <i>Dissostichus</i> spp.	<i>Dissostichus</i> catch document (DCD)	<i>Dissostichus</i> export document (DED)
	Specially validated <i>Dissostichus</i> catch document (SVDCD)	<i>Dissostichus</i> re-export document (DRED)
ICCAT bluefin tuna	Bluefin tuna catch document (BCD)	Bluefin tuna re-export certificate (BFTRC)
CCSBT Southern bluefin tuna	Farm stocking form (FSF)	Re-export/export after landing domestic product Form (REEF)
	Farm transfer form (FTF)	
	Catch monitoring form (CMF)	
	Catch tagging form (CTF)	
ICCAT, IOTC and IATTC SDPs for bigeye tuna and swordfish	Bigeye tuna (BET) statistical document (SD)	BET Re-export certificate (RC)
	Swordfish (SWO) statistical document (SD)	SWO Re-export certificate (RC)
CCS	European Union catch certificate	Processing statement
	European Union simplified catch certificate	Re-export certificate
SIMP	(no specific document formats)	(no specific document formats)

Source: sensu Hosch, 2016

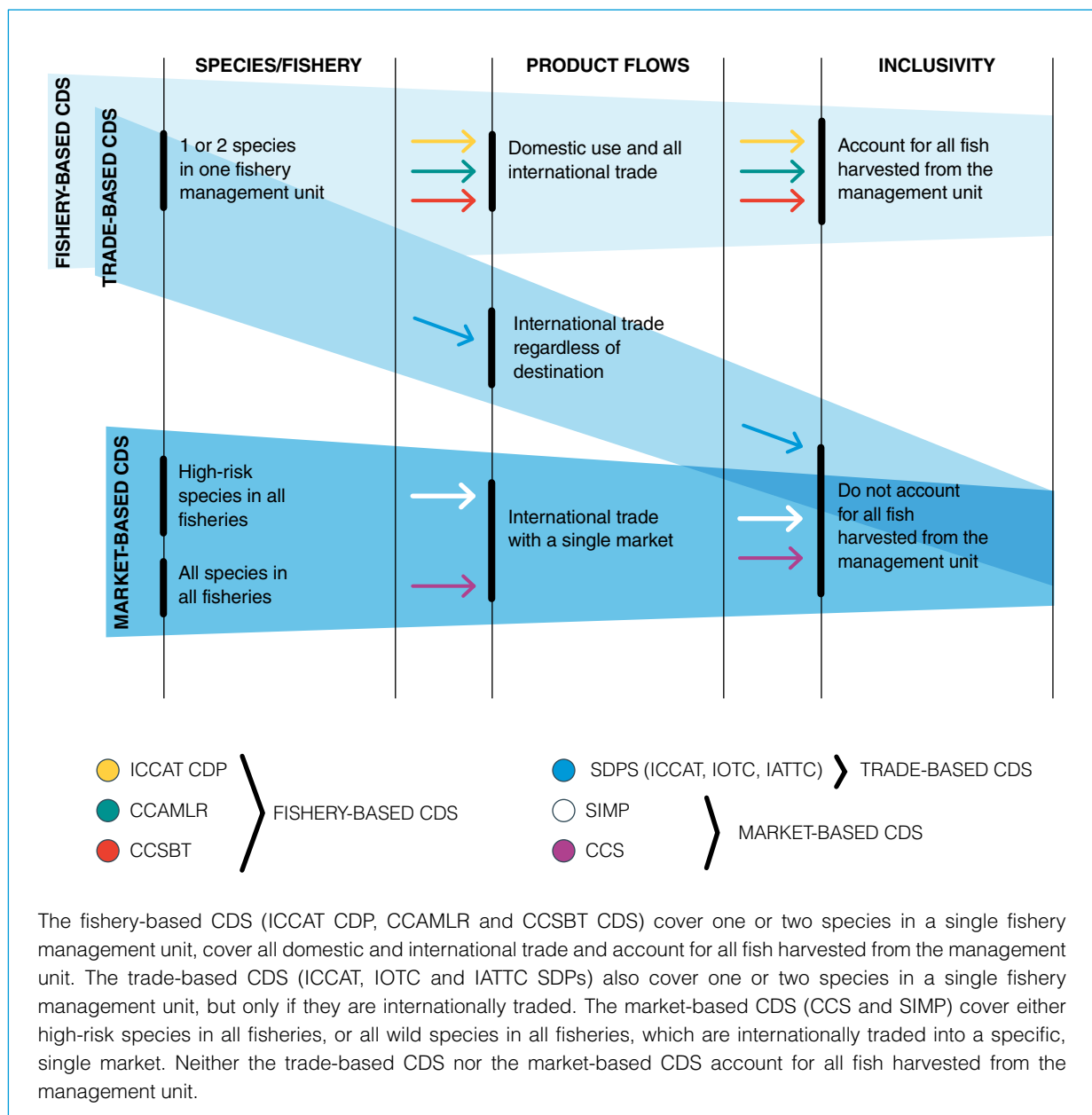
<sup>11</sup> Such schemes include, *inter alia*, the GFCM pilot CDS for red coral (GFCM, 2019) and a CDS for Pacific Bluefin Tuna (WCPFC, 2020).

### 3.1 Coverage of catch documentation schemes: species, fishery, product flows and inclusivity

The most fundamental design feature of a CDS is its coverage. Each of the existing CDS (Table 1) can be defined in terms of which species or fishery it covers and to which product flows it applies, whether international trade only, or both domestic and international trade (Figure 1, blue polygon). The VGCDS offers flexibility on all of these points, stating only that CDS design should take into account the risk that IUU fishing poses to the stocks.

Existing CDS designs have taken very different approaches to species and fishery coverage (Figure 2, species/fishery panel). Each of the RFMO schemes is focused on one or two high-value species taken from the fisheries under their competence: bluefin tuna (ICCAT CDP), southern bluefin tuna (CCSBT CDS), Patagonian and Antarctic toothfish, i.e. *Dissostichus* spp. (CCAMLR CDS),

Figure 2. Differences in the existing CDS by species/fishery, product flows and inclusivity



bigeye tuna (ICCAT SDP, IOTC SDP and IATTC SDP) or swordfish (ICCAT SDP). At the other end of the design spectrum the CCS requires documentation for all wild-caught marine fish, other than shellfish and ornamentals, regardless of the fishery from which they are sourced. Another national scheme, the SIMP, applies to 13 types of seafood which have been identified as being particularly high risk with regard to IUU fishing or seafood fraud: abalone, Atlantic cod, blue crab (Atlantic), dolphinfish (mahi mahi), grouper, king crab (red), Pacific cod, red snapper, sea cucumber, sharks, shrimp, swordfish, and tunas (albacore, bigeye, skipjack, yellowfin, and bluefin). Like the CCS, the SIMP applies irrespective of the source fishery.

The product flows covered by each CDS are also very different (Figure 2, product flows panel). The RFMO schemes established most recently are intended to cover not only those fish which enter international trade but also those which enter domestic markets. In this way these CDS are designed to apply to all fish of the species of interest regardless of how they are transported or traded from catch to market (i.e. fishery-based CDS). In contrast, the RFMO statistical document programmes only apply to those fish which enter international trade (i.e. trade-based CDS), while the CCS and SIMP only apply to fish which enter their respective markets (i.e. market-based CDS).

The distinction between fishery-, trade- or market-based CDS has important implications for the ability of the schemes to account for all fish harvested from the managed stock; this is referred to as the “inclusivity” of the scheme (Figure 2, inclusivity panel). In particular, the market-based CDS are designed to provide assurances that a certain quantity of traded fish do not contain the products of IUU fishing (i.e. “ring-fencing”; see Figure 1 in Hosch and Blaha, 2017). However, in a worst-case scenario, market-based CDS could, in theory, simply drive all IUU fish into other markets without legal provenance controls. Neither market-based nor trade-based CDS can identify the extent to which IUU fishing may be occurring in the source fisheries as a whole or help to curtail that residual IUU fishing. In addition, these types of CDS are not designed to provide a cross-check on reported catches for use in stock assessment. ICCAT has noted some of these issues as it considers proposals from an independent review panel and its own members to expand its two trade-based CDS (BET SDP and SWO SDP) to more closely resemble its more comprehensive bluefin tuna scheme (ICCAT, 2020). As these considerations indicate, there are several important advantages associated with a fishery-based CDS.

### Summary Box 2

#### CDS Coverage (species/fishery, product flows and inclusivity)

- The **fishery-based** CDS aim to cover one or two species regardless of their end-market destination and curtail IUU fishing at the species/fishery level (e.g. CCAMLR CDS, ICCAT CDP and CCSBT CDS).
- The **trade-based** CDS also aim to cover one or two species in the context of specific fisheries, but they only apply if the fish are internationally traded to any market (e.g. ICCAT, IOTC and IATTC SDPs).
- The **market-based** CDS aim to cover many species destined for a given single market only and prevent the products of IUU fishing from entering that market (e.g. CCS and SIMP).



## CONTINUING SUMMARY BOX 2

- The market-based CDS attempt to “ring-fence” all, or a large portion, of the domestic supply chain to prevent entry of IUU fish, but they could act to drive IUU fish into other markets without legal provenance controls.
- The fishery-based CDS have several important advantages including the possibility of quantifying the full extent of IUU fishing in the source fishery, identifying where and how it may be occurring, and providing a cross-check on the estimate of removals for stock assessment purposes.

### 3.2 Documentation and validation roles

Most CDS track two distinct parts of the supply chain: catch and trade. Catch documents (Table 1, middle column (p. 12)) usually include information not only on the act of catching itself but also transshipment, transfer to farms and even the first export in the supply chain (especially if this is a landing). Trade documents (Table 1, right column (p. 12)) generally handle the first export after landing and any subsequent re-exports. At each point in the chain the custodian of the material records information and a notified government authority may be required to validate that information.<sup>12</sup>

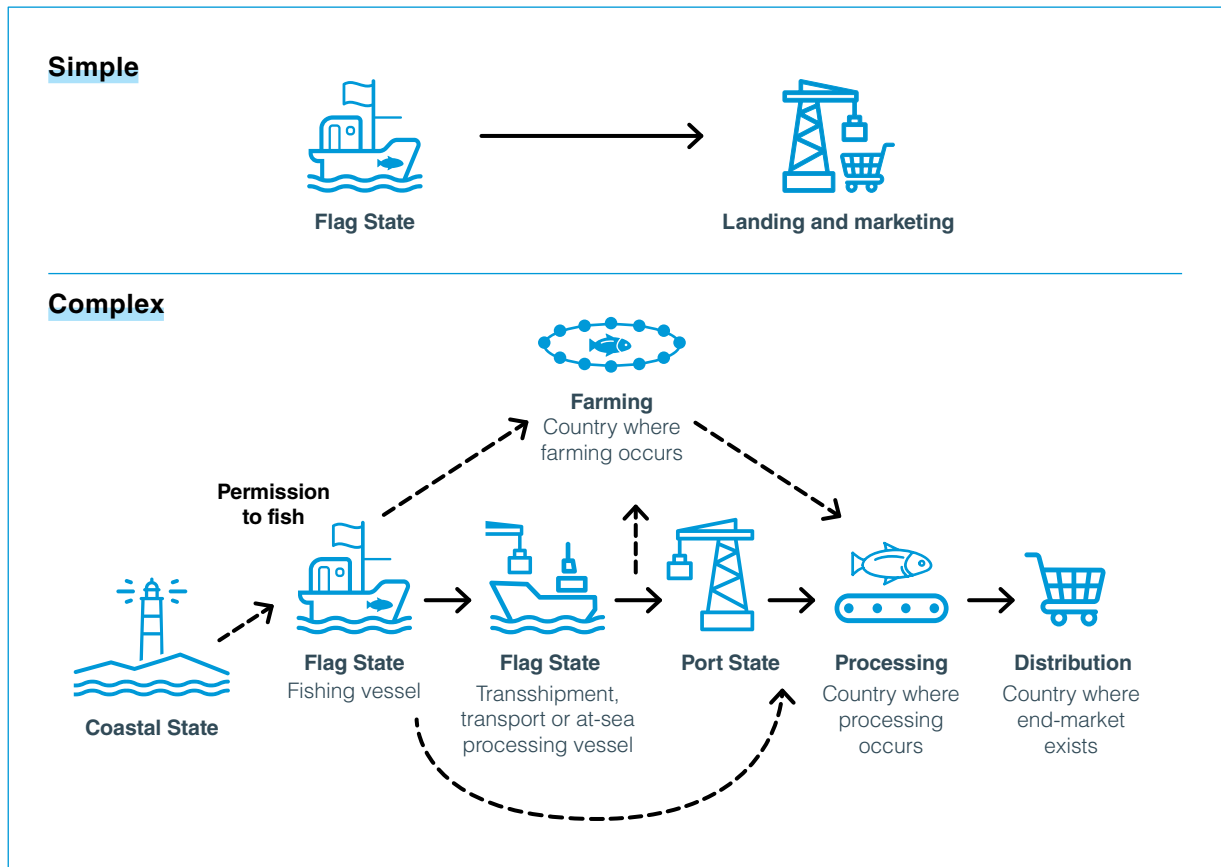
This section discusses the existing CDS in terms of what documents are used to record information and who provides the validations.

The VGCDS does not provide guidance on the events that are to be tracked, nor the types of documents that a CDS should use, though it does anticipate that catch certificates and some form of re-export or processing statement will be necessary (FAO, 2017, Annex). While offering considerable flexibility on what should be tracked, the VGCDS does outline conditions that should be met by the notified validating authority for its documents to be accepted, namely: i) appropriate national control of fishing activities; ii) competency to attest and verify catch certificate information; and iii) contact points in case verification is requested (FAO, 2017, §5.3). The VGCDS also specifies that States which are not validating documents but are nevertheless involved in the supply chain should “designate a competent authority to ensure availability of accurate and verifiable information” (FAO, 2017, §5.3).

In order to uphold their responsibilities under existing and future CDS, national authorities need to first understand what roles they might play within them. This in turn depends on the complexity of the supply chain from catch to market (Figure 3). At its simplest, a supply chain consists of a fishing vessel catching and landing product into its own flag State, where it is then marketed. This kind of simple supply chain is captured by fishery-based CDS (e.g. the CCAMLR CDS and the CCSBT CDS), though not by the trade- or market-based CDS.

Other supply chains may be considerably more complex (Figure 3). For example, after catch by a fishing vessel the fish may be partially processed, transported dead by a transshipment vessel (possibly of another flag State) or/and landed in a (foreign) port State; or transported live to a farm by a transfer vessel (possibly of another flag State) potentially being exported in the process (if the farm is in another country). From the point of landing, or the farm, the fish could be sent to another country for (further) processing and potentially shipped to yet another country for marketing.

<sup>12</sup> The SIMP takes a different approach by requiring the importer to acquire and enter key information into an online system at the time of import; the importer is also required maintain chain of custody records extending back to the point of harvest for two years from the date of import. Unlike the other CDS, the SIMP originated as a paperless system and has never had documents *per se*. It is the only scheme described in this publication that does not require any form of government validation.



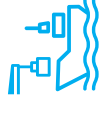

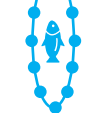

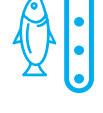



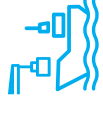

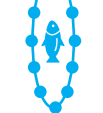

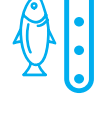



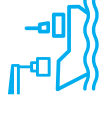

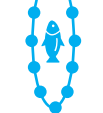

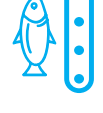



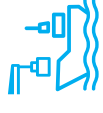

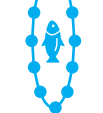

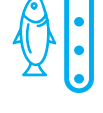

**Figure 3.** Simple and complex supply chains for wild-caught fish

Some or all of these steps may be included in the CDS; some or all may require validation by a notified authority, declaration by a non-notified authority or simply the provision of information.





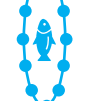

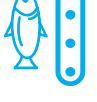

Table 2 identifies which roles and actions support each CDS, noting that countries often play multiple roles in each supply chain. The bottom row of the table also provides a summary of the role each type of actor is likely to play in any future CDS. Across all existing schemes the primary responsibilities for validating catch documents (Table 1, middle column) lie with the **flag State of the fishing vessel** – unless the fishing vessel is chartered, in which case some CDS allow catch documents to be validated by officials of countries other than the flag State (Table 2). **Flag States of transport vessels** do not usually have validation responsibilities. In CDS covering major farming operations (i.e. Atlantic and Southern bluefin tunas), some validation responsibilities fall to the **country in which the farm is located**. The role of **coastal States** that license foreign fishing vessels to fish in their waters is not explicitly covered by any of the existing CDS, but the VGCDS makes clear that the roles of all relevant States in authorizing, monitoring and controlling fishing operations should be recognized (FAO, 2017, §6.3). How the role of coastal States should be reflected in CDS is likely to be an important topic of ongoing discussion.

Responsibilities for validating trade documents (Table 1, right column (p. 12)) usually fall to those States which are exporting or re-exporting (Table 2). These may be **port States, countries where processing is occurring**, or some combination of the two. Where the material is substantially altered through processing, there are sometimes additional reporting requirements to link the processed material to its original catch document – as in the Processing Statement attached to the European Union CCS, for example. In most cases, **countries where end markets exist** only provide declarations that they have received materials.<sup>13</sup>

<sup>13</sup> One exception is the SIMP, in which the importer is responsible for providing all the requested information from catch to import.

Table 2. Roles for national authorities under existing CDS								
CDS/Species	If your country is the:							
	Flag State	Country of the chartering entity	Flag State of transport vessel	Coastal State	Country where farming occurs	Port State	Country where processing occurs	Country where end markets exist
<b>CCAMLR/ toothfish</b>	<p> <b>Flag State</b></p> <ul style="list-style-type: none"> <li>■ Initiate the DCD with information about the fishing vessel, catch and any transshipment.</li> </ul>	<p> <b>Country of the chartering entity</b></p> <ul style="list-style-type: none"> <li>■ No specific requirements under this CDS.</li> </ul>	<p> <b>Flag State of transport vessel</b></p> <ul style="list-style-type: none"> <li>■ No specific requirements under this CDS.</li> </ul>	<p> <b>Coastal State</b></p> <ul style="list-style-type: none"> <li>■ No specific requirements under this CDS.</li> </ul>	<p> <b>Country where farming occurs</b></p> <ul style="list-style-type: none"> <li>■</li> </ul>	<p> <b>Port State</b></p> <ul style="list-style-type: none"> <li>■ Validate any transshipment in port; verify DCD information provided by fishing vessel flag State and validate landing details when landing; issue and validate DED/ DRED if exporting; verify DED/ DRED if importing.</li> </ul>	<p> <b>Country where processing occurs</b></p> <ul style="list-style-type: none"> <li>■ Verify DED/DRED if importing; issue and validate DED/DRED if exporting.</li> </ul>	<p> <b>Country where end markets exist</b></p> <ul style="list-style-type: none"> <li>■ Verify DED/DRED if importing.</li> </ul>
<b>CCSBT/ southern bluefin tuna</b>	<p> <b>Flag State</b></p> <ul style="list-style-type: none"> <li>■ Validate CMF catch data unless exporting via transshipment at sea. If exporting (not via transshipment at sea), validate the CMF export section. Declarations required for CTF and if transshipping at sea, exporting via landing or receiving domestic product.</li> </ul>	<p> <b>Country of the chartering entity</b></p> <ul style="list-style-type: none"> <li>■ (If the vessel is chartered the chartering State becomes the flag State.)</li> </ul>	<p> <b>Flag State of transport vessel</b></p> <ul style="list-style-type: none"> <li>■ Declaration by transshipment observer and master of receiving vessel.</li> </ul>	<p> <b>Coastal State</b></p> <ul style="list-style-type: none"> <li>■ No specific requirements under this CDS.</li> </ul>	<p> <b>Country where farming occurs</b></p> <ul style="list-style-type: none"> <li>■ Validate FSF and CMF (harvest section), and provide declaration for FSF, FTF and CTF documents. If exporting, validate the CMF/REEF export section.</li> </ul>	<p> <b>Port State</b></p> <ul style="list-style-type: none"> <li>■ When exporting or re-exporting, validate either the CMF or the REEF.</li> </ul>	<p> <b>Country where processing occurs</b></p> <ul style="list-style-type: none"> <li>■ When exporting or re-exporting, validate either the CMF or the REEF.</li> </ul>	<p> <b>Country where end markets exist</b></p> <ul style="list-style-type: none"> <li>■ Provide declaration upon import.</li> </ul>
<b>ICCAT/ bluefin tuna</b>	<p> <b>Flag State</b></p> <ul style="list-style-type: none"> <li>■ Validation of BCD catch information.</li> </ul>	<p> <b>Country of the chartering entity</b></p> <ul style="list-style-type: none"> <li>■ Chartering prohibited in the East Atlantic and Mediterranean bluefin tuna fishery under ICCAT Recommendation 19-04, para. 11.</li> </ul>	<p> <b>Flag State of transport vessel</b></p> <ul style="list-style-type: none"> <li>■ Validation of BCD transshipment information for dead fish.</li> </ul>	<p> <b>Coastal State</b></p> <ul style="list-style-type: none"> <li>■ No specific requirements under this CDS.</li> </ul>	<p> <b>Country where farming occurs</b></p> <ul style="list-style-type: none"> <li>■ If live fish are exported, BCD validation by exporter. BCD validation when placed in, and harvested out of, farms.</li> </ul>	<p> <b>Port State</b></p> <ul style="list-style-type: none"> <li>■ No requirements for landing <i>per se</i>. If exporting validate the BCD export information.</li> </ul>	<p> <b>Country where processing occurs</b></p> <ul style="list-style-type: none"> <li>■ If exporting, validate the BCD export information. If re-exporting validate the BFTRC.</li> </ul>	<p> <b>Country where end markets exist</b></p> <ul style="list-style-type: none"> <li>■ BCD or BFTRC declaration if importing.</li> </ul>
<b>ICCAT/ Swordfish and ICCAT, IOTC, IATTC/ bigeye tuna SDPs</b>	<p> <b>Flag State</b></p> <ul style="list-style-type: none"> <li>■ Validation of SD upon first export, unless chartered.</li> </ul>	<p> <b>Country of the chartering entity</b></p> <ul style="list-style-type: none"> <li>■ If the fishing vessel is chartered the validation responsibility passes to the exporting State.</li> </ul>	<p> <b>Flag State of transport vessel</b></p> <ul style="list-style-type: none"> <li>■ No specific requirements under this CDS.</li> </ul>	<p> <b>Coastal State</b></p> <ul style="list-style-type: none"> <li>■ No specific requirements under this CDS.</li> </ul>	<p> <b>Country where farming occurs</b></p> <ul style="list-style-type: none"> <li>■</li> </ul>	<p> <b>Port State</b></p> <ul style="list-style-type: none"> <li>■ SD declaration if importing, and RC validation if re-exporting.</li> </ul>	<p> <b>Country where processing occurs</b></p> <ul style="list-style-type: none"> <li>■ SD or RC declaration if importing and RC validation if re-exporting.</li> </ul>	<p> <b>Country where end markets exist</b></p> <ul style="list-style-type: none"> <li>■ SD or RC declaration if importing.</li> </ul>

CONTINUING SUMMARY TABLE 2

		If your country is the:							
		Flag State	Country of the chartering entity	Flag State of transport vessel	Coastal State	Country where farming occurs	Port State	Country where processing occurs	Country where end markets exist
<b>CDS/Species</b>									
<b>CCS / all fish species (except shellfish and ornamentals) imported to the European Union</b>		<p>■ Validate the catch certificate at or before the time of landing in European Union; fishing vessel master provides declarations on catch, transshipment and weight to be landed.</p>	<p>■ No specific requirements under this CDS.</p>	<p>■ Provide declaration for catch certificate (if receiving fish at sea or in port).</p>	<p>■ No specific requirements under this CDS.</p>	<p>■ No specific requirements under this CDS.</p>	<p>■ If material is transiting, declare that the fish was not processed and details attached to the catch certificate. If material is received and then exported, provide export declaration on catch certificate (or validate re-export certificate if European Union).</p>	<p>■ Provide declaration in the form of a processing statement to link products to catch certificate when exporting. If fish pass directly from sea to processing, provide an export declaration on catch certificate when exporting.</p>	<p>■ European Union Competent Authorities check and verify catch certificates on import; European Union re-exports are validated by European Union Competent Authorities.</p>
<b>SIMP/ 13 types of fish imported to the United States of America (see Section 3.1 for the list of fish types)</b>		<p>■ No specific requirements under this CDS.</p>	<p>■ No specific requirements under this CDS.</p>	<p>■ No specific requirements under this CDS.</p>	<p>■ No specific requirements under this CDS.</p>	<p>■ No specific requirements under this CDS.</p>	<p>■ No specific requirements under this CDS.</p>	<p>■ No specific requirements under this CDS.</p>	<p>■ United States of America importer collects data from fishing vessel, transport vessels, farms, port officials and/or processors, submits data online, and maintains chain of custody documents.</p>
<b>Summary</b>		In most cases flag States have responsibility for validating catch certificates including catch, transfer, landing and export information.	Charter States usually, but not always, take on the validation responsibilities of the flag State when they flag a vessel under charter.	Flag States of transport vessels usually do not have validation responsibilities but may have to provide declarations.	Coastal States are offered a role under VGCDS § 6.3, but at present no CDS mentions coastal States.	Countries where farming occurs have validation responsibilities under fishery-based CDS with major farming operations but have no specific responsibilities under market-based CDS.	Aside from CCAML, port States do not have validation responsibilities for landing, only for exports.	Countries where processing occurs must validate export and re-export certificates, or provide declarations linking exports to catch certificates (e.g. processing statements).	In most CDS, importers only provide declarations that they have received materials. However, in the SIMP all information is provided by the importer's declaration.

**Note:** this table is for illustration only; all current requirements should be confirmed directly with the organization responsible for each CDS. See Table 1 for document name acronyms under each CDS. "Validation" (represented by a red square) refers to certification by a notified government authority or designee of a notified government authority. "Declaration" (represented by a pink square) refers to certification by a supply chain participant other than a validating authority. Grey squares indicate no specific requirements under the CDS; black squares indicate non-applicable scenarios.

Many CDS agree on which States must validate the catch and trade documents (Table 2), but there are often subtle differences in which *authority* within that State may validate. For example, the CCS (European Union, 2008, art.12, para. 4) and the CCAMLR CDS require validation of the catch certificate by an authority of the flag State, without exception. The ICCAT bluefin Bluefin tuna catch document (BCD) requires validation by “an authorized government official, or other authorized individual or institution”, and the bigeye and swordfish SDPs allow “a recognized institution” such as a national Chamber of Commerce to validate (ICCAT, 2001a, para. 2; ICCAT, 1993, para. A). The CCSBT CDS allows delegation of validation authority to an authorized person by an official of the relevant State/fishing entity (CCSBT, 2019, para. 5.2).

As explained above, the VGCDS establishes the principle that the validator should have the necessary level of oversight to affirm that the information is correct. Consequences for improper validation can be severe, as in the case of the CCS, which provides for identification of non-cooperating third countries on the basis of, *inter alia*, CDS documents or other catch and trade information (European Union, 2008, art. 31); countries identified are then prohibited from importing fishery products into the European Union (European Union, 2008, art. 38). The RMFO schemes also have compliance monitoring systems designed to ensure that scheme requirements are upheld.

### Summary Box 3

#### CDS documentation and validation

- CDS are constructed around: which events in the supply chain are documented, who has responsibility for the documentation, and whether the information requires validation by a notified government authority.
- Most CDS are composed of both catch and trade documents (Table 1), but there are variations in which information requires validation (or a declaration) and by whom.
- Even the simplest supply chains may be covered by CDS; complex supply chains may involve multiple countries each with a specific role to provide CDS information (Figure 3).
- In most existing CDS, flag States validate catch documents and exporting countries validate trade documents; however, authorities of transport vessel flag States, countries where farming occurs, port States, countries where processing occurs, and countries where end markets exist, may also have roles.
- As per the VGCDS, when countries validate CDS documents they are expected to have the necessary level of oversight to affirm that the information is correct (FAO, 2017, §5.3); improper validation can lead to trade sanctions or other penalties.

### 3.3 Traceability and catch documentation schemes

In the context of CDS, traceability is simply the ability to trace the origin and chain of custody of fish, whether whole or processed. The VGCDS does not define traceability *per se* but stipulates that the required level of traceability for each CDS should be determined by its objectives. Many would consider that traceability is achieved when a consumer scans a barcode on the label of a seafood product and receives information about the fishing vessel and location of catch, yet CDS do not provide this type of traceability. This is not only because CDS do not provide consumer-facing labels, but most importantly because they are not designed to provide product-level tracking.

Primarily, CDS operate by assembling a series of validations (or other declarations) at national borders.<sup>14</sup> This state-to-state chain of custody is designed to prevent the products of IUU fishing from entering each national market in the first place. Given that they focus on documenting when fish cross a national border, CDS rely on each national authority to establish its own system for tracking what goes on within its jurisdiction. More specifically, national authorities are expected to ensure that the material received under a given catch certificate is the same material released under that catch certificate (as indicated by the dashed line between landing and export [Figure 1](#) (p. 11)). Maintaining this link requires going beyond CDS documentation requirements – which typically establish only a rudimentary link between CDS catch documents ([Table 1](#), middle column) and CDS trade documents ([Table 2](#), right column (p. 17)) – by implementing a domestic traceability system to document legal provenance.

While in theory legal fish may be substituted or mixed with the products of IUU fishing at any stage, countries where the splitting and processing of catch takes place face the greatest challenge in maintaining the integrity of the link between CDS catch certificates and processed products ([Figure 1](#); [Hosch and Blaha, 2017](#)). The robustness of domestic traceability standards in such countries (as applied to domestic buyers, cold stores, processors and exporters), will determine how much risk the country faces when validating CDS documents, as well as the effectiveness of the CDS as a whole. More information on maintaining traceability within national borders specifically for the purposes of CDS is provided in [Section 4.2](#).

#### Summary Box 4

##### CDS and traceability

- CDS focus on tracking fish at points where materials cross national borders in order to form a state-to-state chain of custody back to the catch event.
- CDS therefore rely on national authorities to establish systems for tracking what goes on within its jurisdiction to ensure that the material received under a given catch certificate is the same material released under that catch certificate.
- States responsible for splitting catches and processing fish face the greatest challenge when maintaining the integrity of CDS catch certificates: it is during these activities that fish are most vulnerable to substitution or mixing.
- CDS are not prescriptive about how the traceability of fish products is maintained within national borders, but such domestic traceability systems will determine the amount of risk the country faces when validating CDS documents, as well as the effectiveness of the CDS as a whole.

<sup>14</sup> One exception to this is the SIMP in which the importer, who must be a citizen of the United States of America, has responsibility for the entire supply chain from the point of harvest to the point of entry into the country's commerce.

### 3.4 Paper versus digital catch documentation schemes

Digitalization of CDS has been under way for the past decade, with paper forms already redundant in some cases. The all-electronic format of the CCAMLR toothfish CDS became mandatory in 2010, and the electronic ICCAT CDP was fully implemented in 2016 (with paper forms used only under special circumstances). Since January 2018, the SIMP requires the use of an electronic portal to log key information while allowing other records to be kept in paper format. The European Union announced the launch of an electronic system for catch certificates received by the European Union's CATCH system in May 2019; it will operate on a voluntary basis until such time as it is made mandatory (Pramod, 2019). For the remaining CDS and their components it is not so much a question of whether they will become digital but when. Moreover, the development of new technologies continues to expand the possibilities for CDS functionality (Topic Box 1).

Digital CDS clearly offer numerous benefits over their paper counterparts (Pramod, 2019; GDST, 2020a; Hosch, 2016, 2018; Hosch and Blaha, 2017; EU IUU Fishing Coalition, 2020). Digitalization allows immediate linkages between voluminous supply chain records that might otherwise be prohibitively time-consuming to cross-check, thereby aiding in the prompt detection of fraud. It also enables data entry error-checking, built-in alerts or alarms when mass balance or yield calculations appear anomalous, and automated analysis and summarization functions to reduce reporting burdens. These functions can help those trading and processing fish to better manage their internal and business-to-business operations, as well as assist those managing the CDS with real-time analysis and oversight.

#### Topic Box 1

##### Blockchain and CDS

Among those already embracing digital traceability systems there is growing interest in using blockchain technology to boost capabilities for secure data sharing (Probst, 2020). While this technology offers powerful advantages, it is one of several options for implementing a centralized online platform for registering and sharing legal provenance and supply chain data. In the case of CDS, a centralized ledger is critical, but this can be managed by national or inter-governmental agencies, whereas blockchain's distributed ledger functions are particularly useful when there is no single, trusted management entity. As with the adoption of any new technology, it is essential to consider the enhanced functionality against the costs and drawbacks. In the case of blockchain, it would be important to determine whether aspects such as development and transaction costs, restrictions associated with the immutability of data once entered, and the access requirements for all users, are appropriate for the CDS or national traceability system in question (Blaha and Katafono, 2020).

While many in the seafood industry already rely on digital systems as standard operating practice, there are small-scale operators which have yet to make the transition away from paper-based systems, particularly in developing countries (GDST, 2020a). Ancillary issues such as internet coverage, cost and reliability cannot be taken for granted when operating in low-technology or remote environments. While the VGCDs highlights several of the functions that electronic CDS should offer to reduce the risk of falsification (FAO, 2017, §4.6), it also reiterates the importance of avoiding the creation of unnecessary barriers to trade, and states that CDS should "be electronic, if possible" (FAO, 2017, §3.2 and §3.6). A recent industry initiative to develop

standards for the sharing of traceability data across seafood supply chains recognizes that full-scale digitization remains a challenge for a significant number of industry participants (GDST, 2020a). Acknowledging that some businesses and facilities will continue to use paper-based systems for their internal operations, the initiative requires only that the data necessary for verification of supply chain traceability be exchanged in digital format (GDST, 2020a).

For the time being CDS and related traceability systems are likely to continue to operate as hybrid, digital–paper systems to cater for all users. As argued by Hosch (2019), a paper-based scheme cannot function in the same way as an electronic scheme, and expectations for the kind of checks and balances that can be provided by a paper-based scheme need to be lowered. However, data capture of key elements of paper records so as to integrate them with other fully electronic data can mitigate this to some extent. Even so, unless and until the electronic schemes take full advantage of their format to provide more robust, automated monitoring and flagging functions (Hosch, 2019), acquiring more data in digital format will only represent a partial improvement.

#### Summary Box 5

##### Paper versus digital CDS

- Digitalization of CDS has been under way for the past decade, with some CDS already fully electronic and others with electronic components.
- Electronic CDS offer many benefits over their paper counterparts including automated data entry and reporting functions, real-time mass balance and yield monitoring alerts to detect fraud in particular consignments, as well as an enhanced ability for stakeholders throughout the supply chain to discern patterns and trends to assess and respond to system-wide risks.
- Many CDS and traceability initiatives have acknowledged that while digitalization is accelerating it remains a challenge for small-scale operators, particularly in developing countries.
- For the time being, electronic systems are likely to operate with reduced functionality due to the ongoing use of paper-based data formats by some users, as well as the absence of comprehensive, automated monitoring and flagging routines for electronic data.



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## 4. KEY DATA ELEMENTS (KDEs) AND UNDERLYING FUNCTIONAL REQUIREMENTS

The preceding sections have introduced CDS design elements, while drawing on the VGCDs and existing schemes as reference points. Understanding these concepts is a fundamental first step to effective participation in CDS. However, on a day-to-day basis, CDS operate on a more practical level, which involves the provision of specific types of information by national stakeholders at various points along the supply chain. The types of information required to trace a product successfully throughout all relevant critical tracking events (CTEs) are referred to as key data elements (KDEs; Hosch and Blaha, 2017). In the context of a CDS, KDEs can be thought of as the collective data demands of CDS across all the individual CTEs managed by CDS participants.

For national authorities participating in CDS the most immediate need is to understand where to source or verify the required KDEs. However, beyond simply filling in or checking boxes on a form, national authorities are certifying, via a CDS, that activities conducted under their supervision conform to legal requirements. As will be shown in this section, the specific KDEs required by each CDS vary quite substantially, both in terms of the data types required and the format or granularity of the data. Nevertheless, the basic points to be confirmed regarding fishing vessels, catch, transshipment, landing and product tracking – the functional requirements, as per Topic Box 2 – are consistent across schemes. Therefore, as well as supplying the KDEs requested on the CDS forms, national authorities should be able to gather whatever data are necessary in the national context to support these functional requirements, regardless of whether the CDS records all of those KDEs. If a country can satisfy the functional requirements at each supply chain stop it manages, it should be able to respond robustly to the information demands of any CDS – both now and in the future.

In order to elucidate these functional requirements, the following sections attempt to compile a master list of KDEs for each stop along the supply chain. As a starting point, a “basic” set of KDEs that are used in at least two of the existing CDS is identified. This is supplemented with KDEs (or information elements) used in at least one of the existing CDS (“enhanced” set) and KDEs proposed by other sources but not currently contained in any of the existing CDS (“advanced” set; EU IUU Fishing Coalition, 2020; Blaha and Katafono, 2020; GDST, 2020c; FAO, 2016, 2017).

This exercise illustrates that there is no overall agreement between sources on the ‘best’ set of KDEs. However, the goal is not to encourage national authorities to track all possible KDEs but rather to identify the minimum essential data types necessary to support the functional requirements within the activities they manage – and thus assure they can certify legal provenance. By establishing their own set of national KDEs to satisfy functional requirements, national authorities can prioritize those data types and verification processes that are most critical to effective CDS for the CTEs they manage.

### Topic Box 2

#### What are functional requirements?

Within a CDS, functional requirements are the underlying assurances that each participating country provides at each critical tracking event (CTE) using specific key data elements (KDEs). For example, while sources may disagree on whether a KDE such as an international radio call sign (IRCS) is necessary to include on a CDS form, national authorities need to provide this KDE when the CDS specifies it. But the functional requirement is for national authorities to establish the identity of the fishing vessel unequivocally, prior to validating a catch certificate. Thus, in addition to filling in the IRCS on the CDS form (if required), authorities should identify which KDEs are essential to establishing fishing vessel identity under their national systems. For an individual country the IRCS may or may not be necessary as the availability of vessel identifiers will vary. The country may choose to focus on confirming the national vessel registration number, the RFMO-authorized vessel number, or the international unique vessel identifier (UVI), even if those KDEs are not required by the CDS. The point is for each country to confirm the vessel identity – i.e. the functional requirement – using the identifiers (KDEs) most relevant for their national system. This will ensure that the underlying CDS certification is robust even if some of the nationally relevant KDEs are not required by every CDS.

When considering KDEs it is also important to bear in mind that a CDS provides the vehicle for accumulating information and assurances about legal provenance as the fish pass through the supply chain. This vehicle takes the form of the catch certificate, which covers the point of catch to the point of landing. The legal provenance claim provided by the catch certificate cascades down the supply chain chronologically, such that it does not make sense to discuss legally obtained catch from an illegal vessel, nor a legal transshipment of illegal catch. In other words, if any step along the supply chain represents IUU fishing, then legal provenance cannot be assured at any subsequent step regardless of whether the proper procedures were followed at that step. The linkage of assurances within a CDS further emphasizes the responsibility of national authorities to monitor and verify the KDEs necessary to support validation at each step (i.e. the functional requirements), even if those KDEs are not recorded on the CDS forms; this is because weaknesses at any given point in the chain affect the integrity of the legal provenance claim as a whole.

The remainder of this section covers the following areas:

- KDEs and functional requirements for tracking fish as catch to the point where they touch land (Section 4.1); this is typically covered by the CDS catch documents (see Table 1, middle column);
- Functional requirements for tracking fish as they become products and are distributed to markets (Section 4.2); this is typically covered by the CDS trade documents (see Table 1, right column); and
- Interoperability and data exchange (Section 4.3), showing ways in which the assurances of individual countries can be joined up to prevent the entry of the products of IUU fishing into the supply chain as a whole.

Having introduced specific, technical CDS elements in Section 4, and presented a new way of identifying a robust basis for certifying legal providence at the national level, Section 5 builds on this material by outlining exercises that can help national authorities put these concepts into practice.

## 4.1 Key data elements and functional requirements for tracking fish as catch

### 4.1.1 Fishing vessel key data elements and functional requirements

Fishing vessel KDEs pertain to the characteristics, authorizations and activities of fishing vessels (Appendix 1), without regard to the contents of their catch. A “basic” set of fishing vessel KDEs is defined as those KDEs specified in two or more of the existing CDS, namely:

- vessel name;
- vessel flag;
- vessel registration number (national);
- vessel ‘authorization to fish’ number (RFMO number);
- fishing vessel license number;
- home port; and
- international radio call sign (IRCS).

These basic fishing vessel KDEs, as well as the others compiled in Appendix 1, suggest that the purpose of fishing vessel data collection within a CDS framework is to:

- I. establish the identity of the fishing vessel (**functional requirement V1**); and
- II. confirm that the fishing vessel had all of the necessary authorizations to produce the fish (**functional requirement V2**).

The functional requirement to establish the identity of the fishing vessel (**V1**) at the time documented on the catch certificate could require a varying number of KDEs, depending on whether a UVI or similar vessel identification number is available. A UVI provides a verified, permanent, and non-transferable number for each vessel, and constitutes the foundation of the FAO Global Record. Although UVIs are critically important tools in combatting IUU fishing, they remain optional in CDS for the time being because some fishing vessels still lack UVIs (ISSF, 2020). Nevertheless, national authorities may consider using UVIs to fulfill functional requirement V1 in lieu of checking a more expansive set of KDEs, including the basic KDEs listed above as well as others (Topic Box 3).

#### Topic Box 3

#### Streamlining KDEs

Fishing vessel KDEs provide a good example of the need to think carefully about the number of national KDEs required to address each functional requirement. As a case in point, if a UVI can be provided, and a UVI database such as the FAO Global Record can be accessed, it may not be necessary to verify many of the other fishing vessel KDEs (e.g. vessel name, vessel flag, home port, IRCS, vessel dimensions) to establish the identity of the fishing vessel (**functional requirement V1**). The reason for this is that additional KDEs would be automatically linked and confirmed through the UVI, effectively streamlining the verification process. Similarly, and in the absence of a UVI, national vessel registration or RFMO “authorization to fish” databases are likely to contain much of the other information in the basic fishing vessel KDEs. Therefore, providing these numbers and an accessible link to a database could also allow functional requirement V1 to be met with a considerably smaller number of KDEs than provided in the basic set above. National authorities can consider these and other cross-linked KDEs for all functional requirements to simplify and strengthen verification.

The KDEs necessary to fulfill the second **functional requirement (V2)** – i.e. whether the vessel had all of the proper authorizations to fish – are more difficult to specify in advance, as the forms of authorization can vary between fisheries and countries. If operating within the context of an RFMO with an authorized vessel list it may be possible to simply use the vessel’s “authorization to fish” number KDE to establish that the vessel was authorized to fish (V2).<sup>15</sup> When operating outside of an RFMO framework, it might be necessary to require other KDEs pertaining to fishing license numbers, whether there is an assigned quota and/or sanitary license numbers. There could also be other relevant nationally assigned authorizations (e.g. special licenses), or VMS and observer coverage requirements, which are also important to specify for some fisheries (see Appendix 1).

### Summary Box 6

#### KDEs and functional requirements for fishing vessels

- The functional requirements underlying CDS fishing vessel KDEs are to: i) establish the identity of the fishing vessel (V1); and ii) confirm that it had all of the proper authorizations to produce the fish shown on the catch certificate (V2).
- The number of KDEs necessary to establish the identity of the fishing vessel (V1) will vary based on whether a UVI or similar vessel identification number is available. Linking to such a number could considerably streamline verification of vessel identity.
- Similarly, a fishing vessel’s authorization status (V2) could in some cases be verified using a single authorization number (e.g. RFMO authorized vessel lists). Circumstances requiring multiple or special authorizations will tend to require national authorities to verify a larger set of KDEs to assure legal provenance.

#### 4.1.2 Catch key data elements and functional requirements

Catch KDEs are concerned with what, how much, where, when and how fish are caught (Appendix 2). The basic set of catch KDEs (i.e. specified in two or more of the existing CDS) consists of:

- species;
- estimated weight of fish to be landed;
- product type (e.g. gilled and gutted);
- catch area;
- catch month and/or date;
- number of fish; and
- gear.

This set of basic catch KDEs, in conjunction with those used less frequently in existing CDS and recommended by other studies (“enhanced” and “advanced”; see Appendix 2), outline two basic functions of catch KDEs:

- I. establish the identity and quantity of the fish (**functional requirement C1**); and
- II. confirm whether its timing, location and method of capture was legal (**functional requirement C2**).

<sup>15</sup> The numbers in these databases are different from the UVI assigned by IMO and they do not necessarily remain attached to the vessel when it changes flag, ownership or name. Nevertheless, for the purposes of establishing the identity of the vessel at the time represented on the catch document, they may be sufficient (assuming they are kept up-to-date).

**Functional requirement C1** addresses the need to prevent mixing and/or substitution of certified with uncertified fish by establishing the unique identity of the material at the earliest possible stage, i.e. on board the fishing vessel. Some CDS require (or allow) rigorous identification through tagging of individual fish.<sup>16</sup> Tagging provides a unique identifier which can streamline catch KDEs but is not likely to be practical in many cases, particularly in high-volume fisheries.<sup>17</sup> Most CDS rely on recording an estimate of weight (which can later be verified at landing) and noting the product form (to allow the application of whole-weight-to-product-weight conversion factors). National authorities will need to consider options for balancing precision and practicality when specifying KDEs to describe species, size, product form and quantity under **functional requirement C1**.<sup>18</sup>

The second catch-related **functional requirement (C2)** is not about the fish themselves but rather about the act of catching them, i.e. the area of catch, time of catch, and gear characteristics. KDEs describing how fish are caught are required because it is possible for a fishing vessel to be fully authorized and yet still fish in an illegal manner. Some examples of this could include setting in restricted areas, fishing outside permitted times, or using a prohibited gear type. The ability to address **functional requirement C2** robustly will depend, in large part, on the precision of the KDEs. Requiring the exact location of catch to be recorded would provide the most useful information for determining legal provenance, but national data confidentiality rules may prevent this information from being released into the public domain. As a result, some of the existing CDS require only the ocean basin to be recorded, while others use RFMO statistical areas, each of which represents thousands of square nautical miles. Recording a broad-scale area (e.g. the Atlantic Ocean) as the catch location KDE is unlikely to be meaningful in terms of identifying whether the catch location was legal. Therefore, it is important to ensure that the catch location is confirmed with the greatest precision allowed by law: if the exact location cannot be provided then one alternative might be a  $1^{\circ} \times 1^{\circ}$  or  $5^{\circ} \times 5^{\circ}$  map grid square. It might also be useful to confirm that the validating official has access to the exact catch coordinates (see Appendix 2). Moreover, in fisheries where the legality of the catch may depend on its timing or the gear type used, additional KDEs may be required to support **functional requirement C2**.

#### Topic Box 4

##### Linkages between functional requirements

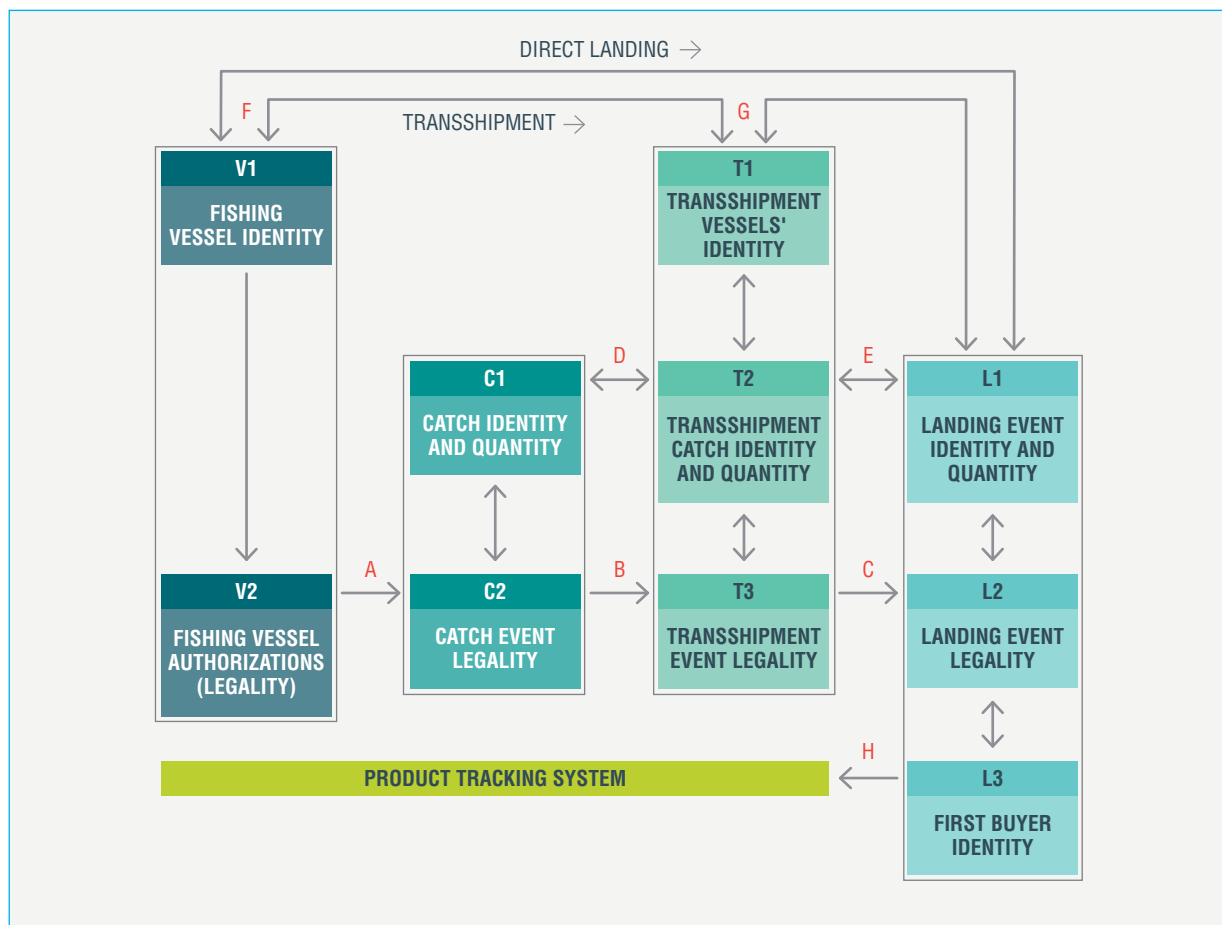
There is a fundamental linkage between the authorization status (legality) of the fishing vessel and the legality of its catch (A): the legality of both is a pre-requisite for legal transshipment (B) and landing (C). Similarly, establishing the identity and quantity of catch is critical to verifying its identity and quantity at transshipment (D) and landing (E). Catch quantity and identity, together with the fishing vessel (F) and transshipment vessel (G) identities, determine the landing event identity (E). Finally, the identification of the first buyer at landing (H) initiates product-level tracking (see Section 4.2) and links the sea-based portion of the supply chain with downstream processing and trade. Understanding these linkages underscores the importance of selecting the appropriate KDEs to support the functional requirements at each point, in order to avoid creating weak links in the documentation of legal provenance.

<sup>16</sup> Under the CCSBT CDS all fish must be tagged. Under the ICCAT bluefin tuna CDP fish may be tagged, and usually are by some members. If so, the catch certificate does not need to be validated and it is not submitted to the secretariat.

<sup>17</sup> Cost implications of tagging have not been estimated but are likely to be high, particularly in cases of potential degradation in product quality due to additional time on deck. Furthermore, tagging may not be operationally feasible in high-volume fisheries (Hosch, 2016).

<sup>18</sup> The potential for strengthening the catch KDEs that are related to establishing the identity and quantity of the catch on board the fishing vessel (C1) will vary by fishery and country; however, it could include recording estimates of average size or weight of fish (Annex 2), linking to observer records, photographic documentation or other means.

## CONTINUING TOPIC BOX 4



## Summary Box 7

## KDEs and functional requirements for catch

- Functional requirements underlying CDS catch KDEs are to: i) establish the identity and quantity of the fish (C1); and ii) confirm whether the timing, location and method of capture was legal (C2).
- Short of tagging each fish to verify its relationship to a particular catch certificate (C1) – a requirement in some existing CDS but impractical in high-volume fisheries – it may be necessary to rely on estimates of numbers or weights by species and product form.
- The functional requirement regarding the legality of the catch event (C2) can be addressed through KDEs specifying the catch area, time and gear. However, the utility of these KDEs will depend on the precision with which they are recorded: for example, catch coordinates would provide the most useful information for determining legal provenance but may be protected under national data confidentiality rules. In order to certify the legality of the catch, national authorities should record and verify information as precisely as national legislation allows.
- Where there are other critical compliance issues in certain fisheries, national authorities may need to identify additional KDEs to be verified, including those not recorded on CDS forms.

### 4.1.3 Transshipment key data elements and functional requirements

As fish move from the point of capture to the point where they first touch land, their pathway may involve transshipment either at sea or in port. Existing CDS have very different requirements for recording transshipment information – including not recording it at all (Appendix 3).

The basic set of transshipment KDEs (i.e. specified in two or more of the existing CDS) consists of:

- receiving vessel name;
- receiving vessel’s International Radio Call Sign (IRCS);
- receiving vessel flag;
- receiving vessel master’s name;
- transshipment location;
- transshipment date;
- transshipment supervising authority (if in port);
- estimated transshipped weight; and
- fishing vessel master’s name.

Examining these basic transshipment KDEs, as well as those used less frequently in existing CDS and recommended by other studies (“enhanced” and “advanced”; see Appendix 3), reveals that there are three functional requirements:

- I. establish the identity of the transport vessel receiving the fish (**functional requirement T1**);
- II. confirm the identity and quantity of the fish received in the transshipment (**functional requirement T2**); and
- III. document the transfer event and establish whether it was compliant with any applicable rules (**functional requirement T3**).

As explained in Topic Box 4, within the context of a CDS functional requirements at different stops along the supply chain are linked, such that legal provenance at any one stop is dependent on legality in all previous stops. This allows the functional requirements relating to transshipment to focus on transshipment-specific issues and refer to fishing vessel and catch information recorded elsewhere on the same form.

Establishing the identity of the receiving vessel (**functional requirement T1**) is likely to require the same KDEs as establishing the identity of the fishing vessel (functional requirement V1). Many of the same considerations would therefore also apply to transshipment, such as the potential to use vessel identifiers like UVIs to usefully link to other KDEs including vessel name, flag, IRCS and master’s name (see Section 4.1.1).

Confirming the identity of the fish received in the transshipment (**functional requirement T2**) is similarly related to how the identity of the fish was established under functional requirement C1 (see Topic Box 4 and footnote 18). Unless fish are tagged, transshipment can provide an opportunity for mixing certified and uncertified fish through either transshipment of only a portion of the original catch or transshipment of processed catch, both of which could provide an opportunity to augment certified fish with uncertified fish to match the weight shown on the catch certificate. For these reasons, in addition to recording the transshipped weight as a basic KDE, it is imperative for national authorities to clarify whether any weight change is due to processing, partial transshipment (catch splits), or both. Even if the transshipped weight is consistent with the catch certificate weight there should be a means of verifying the identity of the fish to prevent swapping.

The final **functional requirement (T3)** relates to documenting the transfer event and its compliance with any applicable rules. The basic set of transshipment KDEs aims to establish this through the location, date and supervising authority (if the transshipment occurs in port), as well as identifying the master of the fishing vessel (recalling that the other characteristics of the fishing vessel are usually recorded elsewhere on the CDS form). If there is a formal mechanism for reporting transshipment – under an RFMO, for example (WCPFC, 2009) or in port (Blaha and Katafona 2020) – national authorities can create a KDE based on the unique document identifier of the transshipment declaration, observer report or transshipment authorization code, thereby streamlining the number of KDEs to verify. As these systems are expected to strengthen over time, transshipment KDEs may need to evolve to track this progress. Other fishery-specific issues and/or systems for permitting transshipment may also need to be specified as KDEs under functional requirement **T3**.

#### Summary Box 8

##### KDEs and functional requirements for transshipment

- Underlying CDS transshipment KDEs are three basic functional requirements: i) establish the identity of the transport vessel receiving the fish (**T1**); ii) confirm the identity and quantity of the fish received in the transshipment (**T2**); and iii) document the transfer event and its compliance with any applicable rules (**T3**).
- Given the potential for mixing certified and uncertified fish during transshipment, it is imperative for national authorities to maintain a strong link between catch and transshipment KDEs pertaining to the identity and quantity of the fish (functional requirements **C1** and **T2**; Figure 4), particularly in terms of documenting catch splits and changes in recorded weights.
- Other transshipment functional requirements (**T1** and **T3**) can be informed, in some cases, by KDEs available through existing systems (e.g. UVIs, transshipment declarations/authorizations, and/or observer programmes). Moreover, as these systems expand the procedures for verifying the legality of transshipment operations can be strengthened and streamlined.

#### 4.1.4 Farming key data elements and functional requirements: a special case

Fattening wild-caught fish in farms adds considerable complexity to tracking legal provenance. First, moving wild fish to farms usually requires a change of custody when live individuals are transferred to a towing vessel which transports them to the farm. Furthermore, transfer to a farm can be an export if a national boundary is crossed by a non-national vessel. Finally, not only does farming entail additional steps in the chain of custody, uncertainties about the number of fish stocked and their growth rates while in the farm have fueled controversies about the potential use of farming to launder the products of IUU fishing activities.

Some of the existing CDS with large fish farming components (ICCAT CDP and CCSBT CDS) have developed KDEs designed to address the potential risks of laundering the products of IUU fishing through farming activities. Of these, the ICCAT CDP KDEs are the most comprehensive, reflecting the diversity of farming arrangements that occur under that RFMO. In contrast, the majority of the other existing CDS and proposed KDEs either do not apply to farmed species (e.g. CCAMLR, the SDPs) or otherwise make no mention of KDEs that are specific to wild-caught fish farming (e.g. European Union, 2008; Government of the United States of America, 2016; FAO, 2017; FAO, 2016; or Blaha and Katafona, 2020). In recognition of the specialized nature of such farming activities and the relatively low volume of wild fish fattened in farms as a proportion of the global seafood supply, further analysis of farming KDEs is provided in Appendix 4 only.



#### 4.1.5 Landing key data elements and functional requirements

Landings are the point at which fish first make contact with the terrestrial supply chain (see definition in Section 1.3). This section describes KDEs that should apply to all landings, irrespective of whether they take place in the flag State of the fishing vessel.<sup>19,20</sup> The basic set of landing KDEs (i.e. specified in two or more of the existing CDS) consists of:

- verified landed weight by product type;
- name and contact details of the buyer/receiver of the landed fish;
- landing location;
- landing date; and
- name of the master of the fishing vessel.

These basic landing KDEs, complemented by those used less frequently in existing CDS and those recommended by other sources (Appendix 5), indicate that the function of landing KDEs is to:

- I. establish the details (who, what, when and where) of the landing event (**functional requirement L1**);
- II. confirm that the landing complied with all applicable regulations (**functional requirement L2**); and
- III. identify the first, usually land-based, buyer/receiver of the catch (**functional requirement L3**).

**Functional requirement L1** pertains to both the details of the landing event and the fish being landed. The landing event is most commonly identified by its location and date (i.e. the basic set of KDEs above), though national authorities might find it necessary to include port entry date, the nationality of the fishing vessel master, the port and date of last port call, or other KDEs (“enhanced” and “advanced” sets; see Appendix 5) to verify the legality of landings. Regarding the identity of the fish, it is important to substantiate the link between the catch recorded elsewhere on the CDS form and the catch that is being landed (e.g. links ‘D’ and ‘E’ in Topic Box 4). This is critical to reducing – or at least identifying – the opportunities for mixing certified and uncertified fish. Although the basic set of landing KDEs relies on verifying the catch weight and fishing vessel master’s name, other more robust means of establishing fish identity should be explored (see footnote 18).

For any landing to be legal it must comply with all applicable regulations (**functional requirement L2**). None of the KDEs in the basic set identified above pertain to this issue. However, as measures adopted under the PSMA strengthen, national authorities may wish to verify other KDEs such as landing authority name, unloading authorization number, sanitary authorization of port, or additional KDEs suggested by other sources (e.g. “enhanced” and “advanced” sets; see Appendix 5) to support the underlying assurance of legal landings. As for the UVI, if there is the unloading authorization number within a landings authorization system, this could link to a number of other fields and enable substantial streamlining of the landings KDEs (e.g. location, date, transferred catch weight, etc.).

<sup>19</sup> See Section 4.1.6 for a discussion of scenarios in which fish first contact land without undergoing landing procedures.

<sup>20</sup> If a CDS does not record landings events *per se* it allows fish to “disappear” when they are domestically landed and sold into the local market (Hosch, 2019). This gap is mitigated if the unrecorded landing is followed by an export because this would, in theory, be tracked as an export event under the CDS. Nevertheless, it still represents a substantial gap in the chain of custody as well as an opportunity for substitution or mixing, given that there could be points at which the fish are held or transferred that are not exports (e.g. landed into bonded warehouses) and are thus not recorded (Clarke, 2007; Clarke and Hosch, 2013). In addition, it potentially undermines the essential role of port states in the effective curtailment of IUU fishing by allowing export checks to substitute for landing checks.

**Functional requirement L3** requires the identification of the first, usually land-based, supply chain participant to take possession of the catch. The first buyer/receiver of the landed fish may be the fishing company (e.g. in the event that the company does its own processing), a processor, or a trading company that seeks to sell the fish for processing or export. This KDE is critical to establishing the link in the chain of custody between the fishing or transshipment vessel and the remainder of the supply chain, where fish are transformed from catches into products (see Section 4.2).

#### Summary Box 9

##### KDEs and functional requirements for landing

- Landing KDEs are necessary to fulfill three functional requirements: i) establish the details of the landing event (**L1**); ii) confirm that the landing complied with all applicable regulations (**L2**); and iii) identify the first, usually land-based, buyer of the catch (**L3**).
- In addition to confirming the details of the landing itself, it is important to substantiate the link between the catch being landed and the catch recorded elsewhere on the CDS form, so as to prevent mixing of certified and uncertified fish (**L1**).
- Landing KDEs rarely document landing authorization procedures but these are critical to ensuring the legality of landings and are expected to strengthen over time (**L2**).
- Recording the first buyer/receiver of the catch (**L3**) links the chain of custody from sea-based KDEs, which track catches to land-based operations where fish are transformed into products.

#### 4.1.6 Key data elements for complex supply chains

It is relatively easy to apply KDEs to simple supply chains that involve fishing vessels landing and selling their catch into a domestic market. However, when the vessel that caught the fish does not land it directly new actors are introduced into the chain of custody and documenting legal provenance becomes more complex. The most common example of this is the transshipment operations that have become an economically essential component of some fisheries (Mosteiro Cabanelas *et al.*, 2020). Recognizing this, most of the existing CDS – and all the other sources of KDEs analysed in this publication – provide KDEs for transshipment (Section 4.1.3 and Appendix 3). In most cases it is assumed that the donor vessel is the fishing vessel, and the receiving vessel is a carrier which will then land the fish. This section describes three scenarios in which the basic supply chain of fishing vessel → transshipment vessel → landing can be complicated by the addition or omission of supply chain stops. While further development of the procedures specific to these scenarios is anticipated, provisional guidance on how such situations can be handled in terms of KDEs and functional requirements is provided below.

One form of complication is the involvement of **more than one intermediary vessel** between the fishing vessel and the point of landing (see definition in Section 1.3). Examples of this could include catch transiting two carriers before landing, or catch entering a port (or anchorage) on a carrier and being transferred to another vessel for onward transport. Supply chains that involve such multiple transfers should apply the transshipment KDEs and functional requirements *separately* for each transfer.

Another complication arises when fish are placed in a **cold storage facility**. Cold storage facilities are often within bonded (duty-free) zones which can hold, sort and/or re-pack goods without those goods being imported to the customs territory of the country. Cold stores are usually land-based

but Mosteiro Cabanelas *et al.* (2020) report two cases of anchored reefers or barges being used as floating cold stores. Loading catch into a land-based refrigerated container could also be considered a form of cold storage. While it is expected that there would be some form of authorization required for a fishing vessel or carrier to unload into a cold store, depending on the country and facility (e.g. public/private wharf, anchorage, barge, warehouse, refrigerated container), these authorizations may fall short of the information and validation requirements for a landing. The essential point for legal provenance certification is that the KDEs and functional requirements should capture each supply chain stop (custody transfer) including cold stores. If the cold stores are upstream of the point of first sale – i.e. before product tracking applies (Section 4.2) – either the transshipment or landing KDEs should be applied (whichever is most appropriate), notwithstanding the fact that placement in a cold store may, in other respects, not constitute either a transshipment nor a landing.

A final type of complication involves cases in which fish are **imported without having first been landed**. Under current practice, especially in scenarios involving containerization (Mosteiro Cabanelas *et al.*, 2020), some fish first make contact with land without having been subject to legal procedures for approving the transfer of fish to land under relevant international law. This in effect omits the landing stop in the supply chain and runs the risk of failing to conclude catch tracking processes at a point where reasonable control can be exerted.<sup>21</sup> To ensure full traceability of legal provenance it is always advisable to conduct landing procedures at the earliest opportunity. In cases of containerization without landing, countries should document the containerization using transshipment KDEs and functional requirements to maintain the chain of custody. Countries receiving fish that have not undergone landing procedures should document receipt using landing KDEs and functional requirements to identify the first land-based custodian of the catch (Section 4.1.5, functional requirement L3), together with the details and legality of the acquisition (Section 4.1.5, functional requirements L1 and L2).

#### Summary Box 10

##### KDEs and functional requirements for complex supply chains

- Relatively simple supply chains involving a single transshipment followed by landing can be easily accommodated by the KDEs and functional requirements described in Section 4.1.
- Supply chains involving more than one intermediary vessel between the fishing vessel and the point of landing should be addressed through applying transshipment KDEs separately for each transfer.
- Unloading into a cold storage facility should be recorded using either transshipment or landing KDEs, whichever is most appropriate, regardless of whether the unloading into the cold store represents either a transshipment or landing in other respects.
- To ensure full traceability of legal provenance it is always advisable to conduct landing procedures at the earliest opportunity. However, in cases where landings procedures are bypassed and fish are imported as products, landings KDEs and functional requirements should still be documented to complete catch tracking procedures.
- These examples of complex supply chains illustrate the importance of recording all supply chain stops with KDEs supporting the functional requirements for the documentation of legal provenance at each step.

<sup>21</sup> In theory, it may be possible to exercise some catch tracking control at the point of import, but this is not recommended as there is arguably less chance of detecting IUU fishing issues due to greater distance from the fishing grounds and a longer chain of custody to verify.

## 4.2 Functional requirements for tracking fish products

The preceding section has discussed functional requirements and national KDEs to be verified by national authorities up to the point of landing. At this point in the supply chain, the fish have either been sourced through IUU fishing or not. In other words, if fish are appropriately certified at the point of landing, they may subsequently become illegal products in other ways (if they are smuggled or not labelled properly, for example) but their legal provenance status relative to IUU fishing remains unchanged. Therefore, as fish catches continue through the supply chain after landing, the function of the CDS is no longer to establish legal provenance but rather to track and maintain it.

However, maintaining legal provenance certification as fish catches become fish products requires a more granular type of tracking than that applied thus far. The responsibility for this kind of tracking falls to national authorities (see Section 3.3) and is not particularly informed by the KDEs included on CDS trade documents (Table 1, right column). For this reason, the following section does not analyse the KDEs used by existing CDS – such as processing plant registration number, bill of lading or import/export authorization number. Instead, the functional requirements for fish product tracking for the purposes of CDS are defined by how national authorities need to maintain the relationship between CDS catch certificates and the products they certify at export. Specifically, three functional requirements for maintaining the claim of legal provenance through national product-level traceability are identified and explained in the following sections:

- I. prevent overuse of catch certificates (**functional requirement P1**; Section 4.2.1);
- II. prevent substitution/mixing of certified with uncertified material (**functional requirement P2**; Section 4.2.2); and
- III. maintain an auditable domestic chain of custody (**functional requirement P3**; Section 4.2.3).

Just as each national authorities' legal provenance KDEs for certifying fishing vessel, catch, transshipment and landing are not necessarily shown on the CDS catch documents, the information underlying each functional requirement for product tracking is not necessarily recorded on CDS trade documents (Table 1, right column). Rather, this information underpins the legal provenance assurance required of each supply chain participant (i.e. the processor, exporter or importer certifications) and the CDS trade document provides the link between participants. Opportunities for interoperability and data exchange between participants, beyond simply sharing the information contained in CDS forms, are discussed in Section 4.3.

### 4.2.1 Prevent overuse of catch certificates

The first functional requirement for product tracking is to prevent the overuse of catch certificates (**functional requirement P1**). Overuse occurs when a catch certificate is misused to establish legal provenance for a quantity of fish material larger than that actually present in the certified catch. Overuse of catch certificates is a major issue for CDS which do not utilize a central repository for reconciling mass balance. A CDS with an electronic central repository is particularly useful in assisting with mass balance checks because it can be designed to track, as does the CCAMLR CDS, the remaining “available to sell” quantity in the catch certificate, as it is split and distributed.<sup>22</sup> Paper-based CDS can also provide the required functionality and cope with the demands of mass balance reconciliation if the traded volumes of fish are relatively small, for example in the case of the CCSBT CDS. The remaining paper-based CDS do not provide mass balance oversight and thus implicitly rely on national authorities to establish mechanisms to monitor the relationship between the quantities of incoming and outgoing materials and ensure that catch certificates are not overused.

One common way that overuse can arise in paper-based CDS is when catch certificates are photocopied at the time the catch is split between different buyers and the amount distributed under each catch certificate is not recorded in a central repository. This creates an opportunity for each catch certificate receiver to augment the certified quantity of fish with uncertified fish to match the quantity shown on the catch certificate (Figure 4). Another way that catch certificates can be overused involves exaggerating processing yields. This problem is not limited to paper-based CDS which allow photocopying. Under any CDS the processor might acquire 10 tonnes of certified material and produce 5 tonnes of finished product (‘true’ yield = 50 percent), but could add 2 tonnes of uncertified product to the 5 tonnes of certified product and report a yield of 70 percent. This form of overuse of certified quantities can only be detected when ‘true’ product yields are well understood.<sup>23</sup> Yields can be difficult to monitor as they will not only vary by species and product type but also in terms of the skill and experience of the processing crew. Some CDS, as well as some national authorities, maintain databases of fish product yields and may establish expected yield ranges (or tolerances) for use in evaluating the relationship between catch certificate and export quantities. In addition to compiling yield factors from submitted documents, ongoing monitoring or periodic inspection of processing factories may also be warranted.

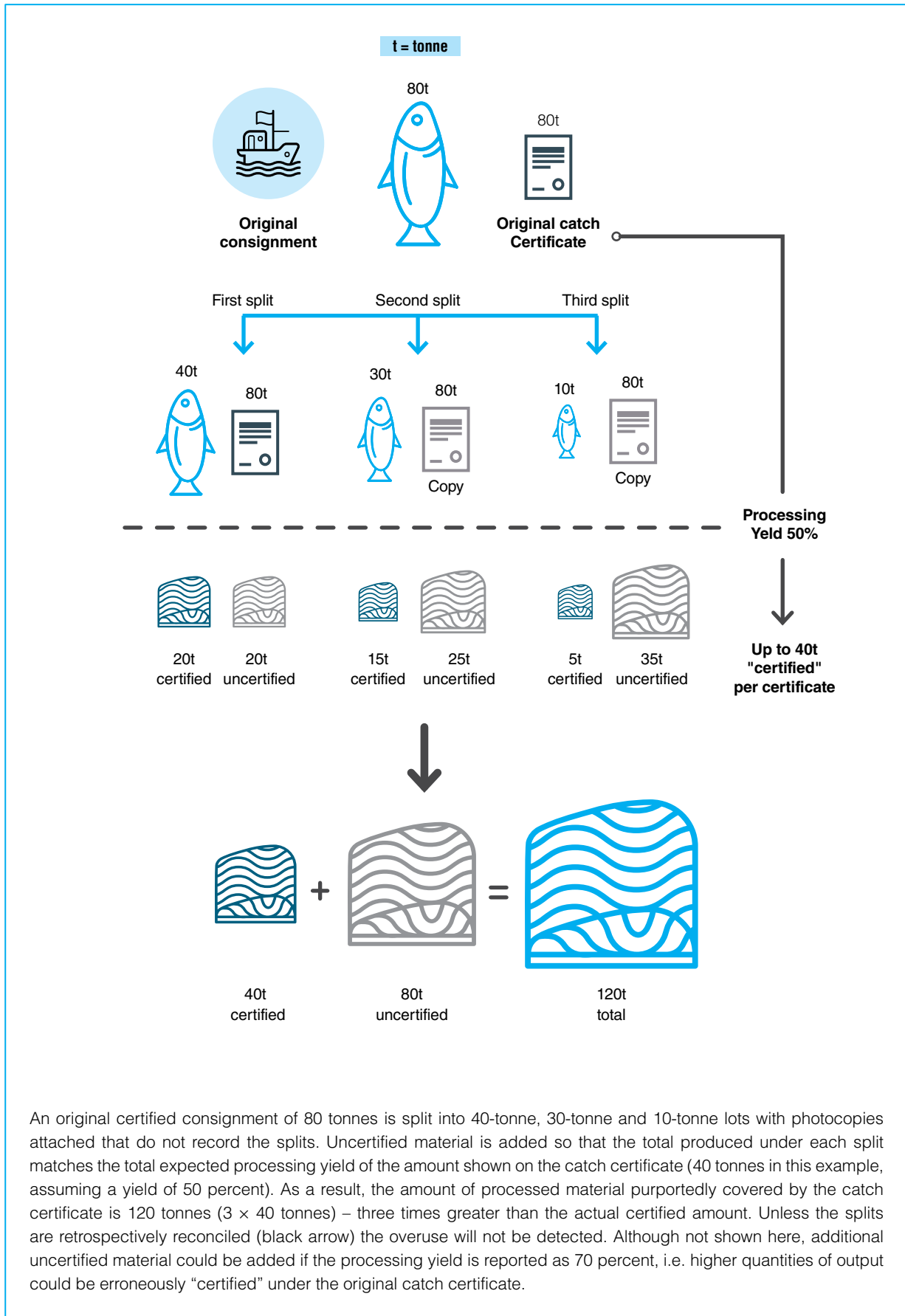
Although several CDS do not explicitly track mass balances and most do not monitor yields, it is expected that many national systems already have oversight abilities for both issues. This is because this information is important for customs authorities when determining duties (i.e. monitoring whether all material imported for processing – on a duty-free basis – is re-exported), and for country of origin labelling.<sup>24</sup> In such cases linking CDS to existing national systems could be a cost-efficient way to prevent overuse of catch certificates.

<sup>22</sup> ICCAT acknowledged issues associated with catch certificate splits in its bluefin tuna BCD in a working paper in 2016 (ICCAT, 2016).

<sup>23</sup> See previous footnote; in the same paper ICCAT also considered the need to monitor product yields (conversion factors).

<sup>24</sup> A useful example of such a system is available from China, one of the world’s largest fish processing countries. The China Customs Authority allows fish raw materials to be imported for the purpose of processing and re-export without the payment of duty; import duties (tariffs) vary by species, form and the country of origin, but can be as high as 10–25 percent (Harkell, 2019). Processing yields are closely monitored using “trade processing manuals” to ensure that none of the processed material is hidden from custom officials and sold on the domestic market. The amounts and types of materials entered into a single trade processing manual are restricted to facilitate auditing, and customs officials will visit factories and also check shipments at export against standard processing yields for various species and product forms. More information is available in Clarke (2009).

Figure 4. An example of overuse of catch certificates



An original certified consignment of 80 tonnes is split into 40-tonne, 30-tonne and 10-tonne lots with photocopies attached that do not record the splits. Uncertified material is added so that the total produced under each split matches the total expected processing yield of the amount shown on the catch certificate (40 tonnes in this example, assuming a yield of 50 percent). As a result, the amount of processed material purportedly covered by the catch certificate is 120 tonnes (3 × 40 tonnes) – three times greater than the actual certified amount. Unless the splits are retrospectively reconciled (black arrow) the overuse will not be detected. Although not shown here, additional uncertified material could be added if the processing yield is reported as 70 percent, i.e. higher quantities of output could be erroneously “certified” under the original catch certificate.

#### 4.2.2 Prevent substitution/mixing of certified with uncertified material

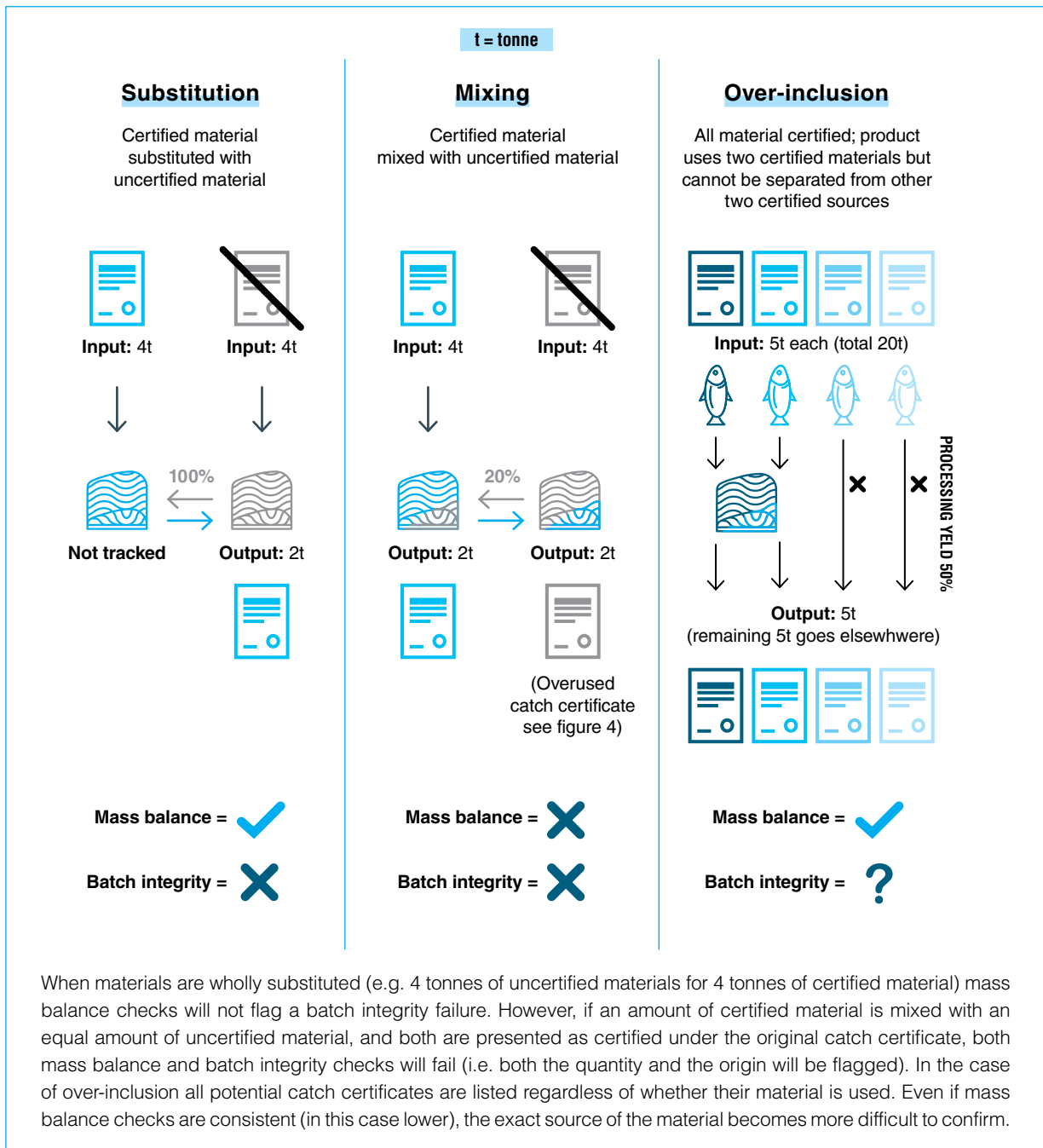
Monitoring the potential overuse of catch certificates through mass balance reconciliation and yield ratios can identify cases in which there is a larger quantity of certified fish output than would be expected given the certified fish input. This may be sufficient grounds for prohibiting export of the products. However, if a given amount of certified material is swapped for the same amount of uncertified material, mass balance and yield monitoring will not detect it (Figure 5). Monitoring the overuse of catch certificates must therefore be applied in combination with a batch integrity monitoring system that can ensure the segregation of certified and non-certified fish throughout the supply chain. This is essential to maintaining the assurance of legal provenance by guarding against substitution or mixing with the products of IUU fishing (**functional requirement P2**).

Batch integrity monitoring is relatively straightforward when dealing with a single source of material, but it becomes more complicated when there is a commingling of certified material from different sources, for example when a batch contains more than one catch certificate. In practice it is acceptable to show the provenance as being from all catch certificates which might have contributed to the processed product, even if some of the catch certificates cover material that is not actually included in the product (GDST, 2020a). This issue, known as “over-inclusion”, does not in itself increase the risk of IUU fish laundering but it does erode the utility of mass balance calculations because the input quantity may become unclear, and yields may therefore become more difficult to check. Over-inclusion can also create problems in the event of a traceback audit: for example, if an issue is detected with a catch certificate upon import to the end market, all products which link to that catch certificate (whether or not they contain that material) could be affected.

Defining and maintaining an appropriate level of traceability is a complex and evolving field of endeavour (Borit and Olsen, 2020). As none of the existing CDS operate at the level of granularity required for product-level tracking (see Section 3.3), it follows that none of the existing CDS make provisions for batch integrity monitoring. This in turn implies that it becomes the responsibility of national authorities to ensure batch integrity when assuring the legal provenance of products produced from certified materials. Fortunately, batch integrity is already required by national health and sanitary control systems. For many national authorities responsible for CDS these systems are already located within the same branch of government and can be readily harnessed to provide assurances for CDS. In other cases, new collaborations between fisheries and health authorities could result in strengthening both functions (Clarke and Hosch, 2013; Hosch and Blaha, 2017). In either case, batch integrity monitoring for CDS should be possible through linking to existing national systems rather than constructing new ones.

#### 4.2.3 Maintain an auditable domestic chain of custody

As described above, the functional requirements for preventing the overuse of catch certificate quantities (**P1**) and maintaining batch integrity (**P2**) imply an ability to trace backwards from a product to a catch certificate from any point in the domestic supply chain. However, beyond those requirements it is also necessary for national authorities to ascertain which parties had legal ownership of, or physical control over, certified fish at each step by establishing the chain of custody. All parties in the chain of custody are responsible for maintaining the functional requirements P1 and P2; it should therefore be possible to audit against these standards at any point in the supply chain that might represent an entry point for the products of IUU fishing (**functional requirement P3**).

**Figure 5.** The relationship between mass balance and batch integrity tracking when assessing traceability

In keeping with the focus of CDS on state-to-state assurances, CDS trade documents ([Table 1](#), right column (p. 12)) contain KDEs that are mainly focused on establishing a chain of custody between countries. These KDEs focus on information about the exporter and importer, a description of products (species, type, weight) and transport details (e.g. container or flight number, bill of lading, etc.). With the exception of the CCS, which requires a processing statement relating the weight of processed products to original catch certificates, the existing CDS do not provide other information relevant to the domestic chain of custody.

This is yet another example of how national authorities need to not only supply the KDEs specified on the CDS forms but also to consider what information they require to support the



assurances they provide when validating CDS export or re-export certificates. In particular, national traceability systems need to cover the entire domestic supply chain including cold stores and processing plants, not merely the points of import and export shown on the CDS forms.

Some countries have established national traceability systems for fisheries products with record-keeping or reporting requirements at all steps in the supply chain. In other countries traceability systems are maintained by customs and/or sanitary authorities for a wide range of food and other products, and it may be possible to link to these systems rather than creating new traceability systems for legal provenance. National authorities participating in CDS but without an existing national traceability system can also consider building on industry traceability practices to maintain the claim of legal provenance (Topic Box 5). Regardless of what type of system is used, the objective is not to monitor every transaction at every node in the supply chain but rather to have the ability to document and audit the chain of custody as and when the need for verification arises.

#### Topic Box 5

### An example of a seafood traceability system for ensuring legal origin



## GLOBAL DIALOGUE on Seafood Traceability

The Global Dialogue on Seafood Traceability (GDST) is an industry-led, consensus-based initiative designed to “enable traceability and access to verifiable information as a means to ensure the legal origin of seafood products and support responsible sourcing” (GDST, 2020a; GDST, 2020b; GDST, 2020c; GDST, 2020d). The initiative aims to increase interoperability and predictability, creating a level playing field for companies facing increasing commercial and regulatory demands for traceability.

In February 2020, the GDST released the first-ever global standards for interoperable seafood traceability entitled GDST Standards and Guidelines for Interoperable Seafood Traceability Systems, Version 1.0 (GDST 1.0). GDST 1.0 includes a Basic Universal List of KDEs designed to establish the legal origin of seafood products. At the heart of the GDST 1.0 standards are a unique identifier (such as an item or SKU number) and a linking identifier (such as a lot number) assigned to specify the product and batch of raw material, respectively. These identifiers are associated with 33 other KDEs to trace legal provenance from first sale to retail. Most of the KDEs included in the GDST 1.0 standards can be populated from the fishing vessel, catch, transshipment, and landing KDEs included in existing CDS. In conjunction with the objective of the GDST 1.0 standards to allow sharing of legal provenance data amongst supply chain partners, this makes it a useful model for other systems which need to maintain legal provenance information within, and potentially beyond, national borders.

The GDST continues to work to expand uptake of its traceability norms within both the private sector and government, and to establish digital and interoperable data exchange of legal provenance information as a fundamental, standard operating practice within the seafood industry.

### Summary Box 11

#### Functional requirements for tracking fish products

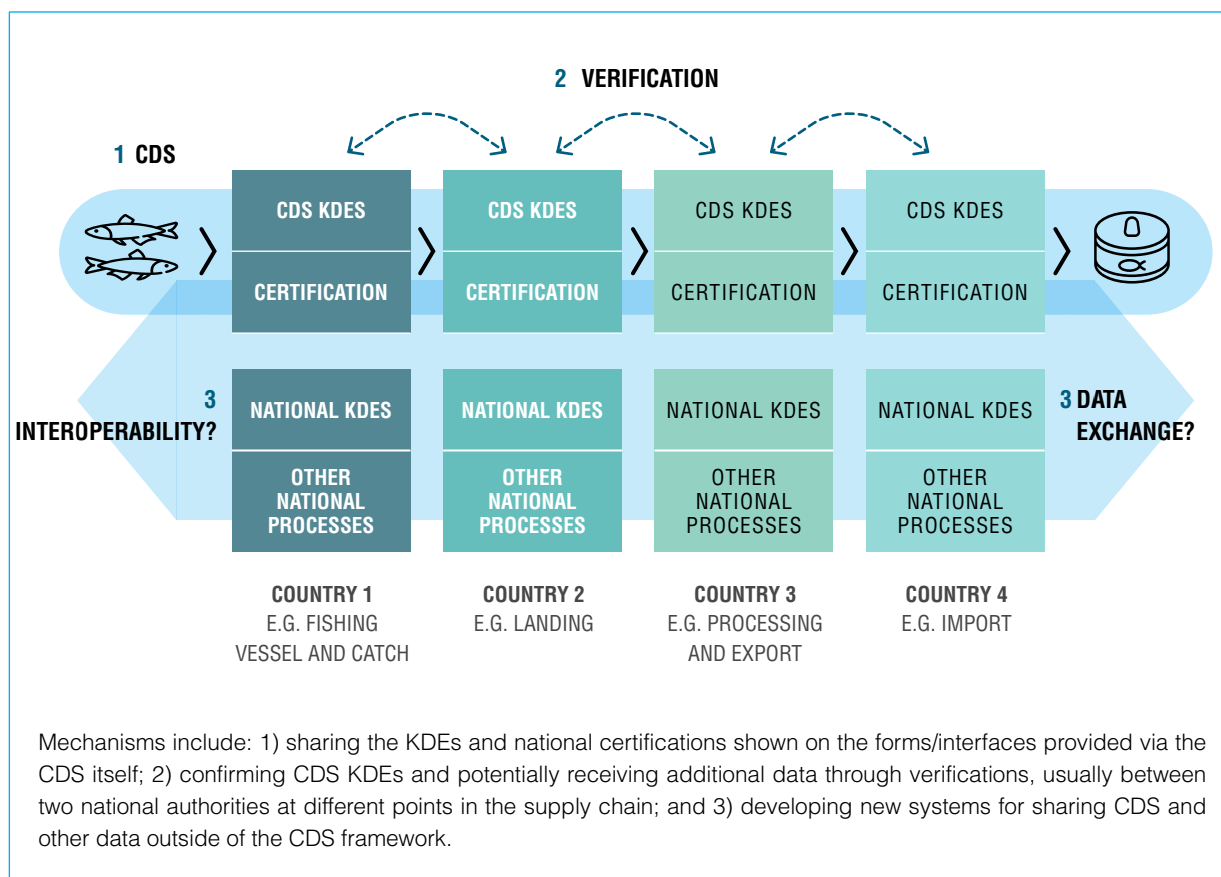
- If fish are appropriately certified at the point of landing their legal provenance status relative to IUU fishing is confirmed; the objective of CDS should be to maintain that legal provenance certification throughout the remainder of the supply chain.
- CDS are not well suited to this objective because they do not closely follow fish within national boundaries and do not operate with sufficient granularity to trace products reliably when catches are split and processed. Therefore, CDS implicitly place a heavy reliance on national systems to maintain traceability for legal provenance.
- The functional requirements for maintaining the claim of legal provenance throughout national, product-level traceability were identified as: i) prevent overuse of catch certificates (P1); ii) prevent substitution/mixing of certified and uncertified material (P2); and iii) ensure an auditable domestic chain of custody (P3).
- Overuse of catch certificates can occur through photocopying and/or exaggerating processing yields. A central repository or other means for reconciling mass balances should be implemented within a CDS to reduce this risk.
- Batch integrity monitoring should be used in conjunction with mass balance reconciliation to guard against the substitution and mixing of certified and uncertified (potentially IUU) fish.
- Overuse and batch integrity checks must be able to be applied – on demand – to audit the entire national chain of custody from the point of import to the point of export.
- It may be possible to link to traceability systems maintained by national customs and/or sanitary authorities rather than creating new traceability systems for legal provenance within national boundaries. Seafood industry initiatives such as the GDST 1.0 standards can also serve as a model for national traceability systems.

### 4.3 Interoperability and data exchange

The focus of this publication is on providing practical guidance to national authorities when supplying data for, and handling, CDS documents and related processes. The preceding sections have encouraged countries to identify and verify KDEs at the national level that underpin the CDS certifications required at specific points in the supply chain (e.g. functional requirements for fishing vessels or landings). Nevertheless, the overall effectiveness of CDS is determined by the traceability of legal provenance throughout the supply chain as a whole.

In the context of CDS, there are three ways in which the assurances of individual countries within the supply chain can be joined up to prevent the entry of the products of IUU fishing (Figure 6). The first is **the CDS itself**. Whether in paper or digital format, a CDS is a vehicle for compiling information and certifications provided by various participants into a succinct and standardized format that can be passed on through the supply chain. Under normal circumstances, shareable data are limited to those contained in the CDS forms or interfaces, and in some cases there may be further restrictions on which CDS participants may access which data.

The second means of data exchange is **verification**, in which downstream CDS participants may request confirmation of information provided by CDS participants earlier in the supply

**Figure 6.** Sharing of legal provenance data between different national supply chain participants

chain. Verification may pertain to information already provided in the CDS, or involve the provision of related and/or more specific information held by national authorities. The ongoing development of digital systems such as those cataloguing UVIs such as the FAO Global Record, or implementation of the provisions of the PSMA (Global Information Exchange System – GIES), are expected to both aid verifications by providing information on demand, and promote more formalized interoperability for the data types they contain. Regional or subregional resources such as RFMO authorized vessel or transshipment databases, and stand-alone national landings databases, could also serve as verification resources either through public portals or authorized query channels.

The third way of sharing legal provenance information throughout the supply chain is to create a **system with interoperable data standards and protocols for data exchange**. Such systems do not appear to have been implemented yet, although the GDST (see Topic Box 5) anticipates their eventual development among like-minded industry actors.<sup>25</sup> The system would be capable of sharing KDEs – including, but also beyond, those contained in CDS – throughout the supply chain regardless of national borders.

<sup>25</sup> Other initiatives designed to facilitate fisheries data exchange may also have a role to play (UNECE, 2018), such as the European Union's Fisheries Language for Universal eXchange (FLUX; UNECE, 2018). FLUX aims to create a network for exchanging information between all relevant fishery management parties including vessels, licenses, catch and sales. It is based on the UN/CEFACT standards designed to improve worldwide coordination and cooperation in the areas of trade facilitation and electronic business.

As the GDST has acknowledged, interoperability allows information to pass between multiple users but it does not require this, nor specify how it would occur. Data exchange options range from simple accumulation (each subsequent user can view all upstream data), a common repository with access controlled by an objective gatekeeper, or decentralized data holdings accessed through authorized queries (GDST, 2020a).

In addition to these three ways of sharing data between CDS parties, there are also current initiatives aiming to develop new, harmonized CDS and promote the sharing of information between the existing CDS (e.g. EU IUU Fishing Coalition, 2020). This is based on widespread recognition that the reach of each individual CDS, while potentially broad (especially in the case of the CCS and the SIMP) is nonetheless limited, and as a result there is the potential for IUU fishing and its products to be driven toward fisheries and markets outside its scope. At the same time, the existing CDS embody a number of important differences (see Section 2 and Appendixes 1-5), have evolved slowly through independent, multilateral processes, and appear unlikely to be harmonized any time soon. This does not, however, prevent national authorities from organizing their information and systems in ways that can cater for the requirements of different CDS, both existing and future.<sup>26</sup> The following section introduces exercises that can be conducted at the national level to assess capabilities and improve performance against existing and future CDS requirements.

#### Summary Box 12

##### Interoperability and data exchange

- Legal provenance data can be shared between national CDS participants via the CDS itself, through verifications between CDS participants (potentially also making use of external databases) or through systems designed specifically for data exchange (e.g. GDST).
- Harmonization of existing CDS KDEs and requirements appears unlikely to occur any time soon, but national authorities can organize their information and systems in ways that can cater for the requirements of both existing and future CDS.

<sup>26</sup> Hosch and Blaha (2017, Section 3.3.4) provide more information and an example of a national electronic traceability platform pertaining to fish products.

## 5. OPPORTUNITIES FOR IMPLEMENTING THE PRINCIPLES OF CATCH DOCUMENTATION SCHEMES AT THE NATIONAL LEVEL

This section presents some specific, practical exercises (Section 5.1) that national authorities can use to explore and test their capacities to support the CDS requirements discussed in preceding sections. Beyond meeting immediate compliance obligations, countries may also find opportunities to anticipate future domestic and international requirements by building more robust national systems for certifying legal provenance (Section 5.2).

### 5.1 Exercises for strengthening catch documentation scheme validations

The following exercises are designed to help identify where there may be residual risks of IUU fishing products entering the supply chain. Fishing vessel flag States, transshipment vessel flag States and port States should consider Exercise 1 (catch tracking functional requirements) and Exercise 3 (verification); importing, exporting and processing countries should consider Exercise 2 (product tracking functional requirements) and Exercise 3 (verification). For many States, all three exercises will be relevant.

#### 5.1.1 Exercise 1: Identifying national catch tracking key data elements

When participating in a CDS, flag and port State authorities should be able to gather and verify whatever KDEs are necessary in the national context in order to support the functional requirements underlying the legal provenance certifications they provide. In some cases, these KDEs may be different from, or additional to, the KDEs required to be recorded on the CDS forms. As the set of potential KDEs for each stop along the supply chain is large, it is important to identify those essential national KDEs for which verification is critical. Where possible KDEs can also be streamlined – without any loss of information content – when unique identifiers or cross-referencing links are available. This exercise explores the relationship between the KDEs required by existing CDS and the KDEs necessary in specific national circumstances so as to prioritize verification activities.<sup>27</sup>

Worksheet 1 provides a framework for identifying national catch tracking KDEs in seven steps:

1. Determine what role the country plays in CDS based on the validations it is required to provide. For example: fishing vessel flag States will be responsible for fulfilling functional requirements relating to the fishing vessel, the catch and possibly the transshipment and landing; transshipment vessel flag States may be responsible for fulfilling transshipment functional requirements; and port States may need to ensure landing functional requirements. In addition, with regard to their obligations under UNCLOS and related instruments, coastal States should consider emulating the responsibilities of fishing vessel flag States for foreign fishing vessels fishing in coastal State waters, and port States should consider verifying at-sea KDEs and functional requirements when a catch certificate is not available at landing (see Worksheet 1). Check all roles that apply in the top row, then check the functional requirement rows that apply.
2. In the second row, circle all CDS in which the country participates (or is likely to participate).

<sup>27</sup> In the context of CDS, the term verification is often used to refer to a request from a country receiving a CDS certificate (i.e. one that has been validated by another country's notified authority) for confirmation of some of the information shown on the certificate (see Section 4.3). Here, verification refers to confirmation by national authorities of the information shown on a catch certification before validation.

3. In column A, list the KDEs relevant to each applicable functional requirement from the CDS circled in the second row (see Appendixes 1–5).
4. In column B, list any KDEs not shown in column A that are useful in the national context. These could include KDEs from other schemes or those recommended by other sources (Appendixes 1–5) or national identifiers, license requirements or other key compliance issues. Be sure to identify the KDE (i.e. specific data type) not simply the source of the information.
5. In column C, choose the KDEs from columns A and B that should be prioritized for verification within the national context. Consider whether it is possible to verify multiple KDEs with a single identifier (i.e. streamlining; see Topic Box 3).
6. In column D, consider the list of KDEs in column C against the functional requirement in the first column. Is each functional requirement confirmed beyond any doubt or is there some residual risk of the products of IUU fishing entering the supply chain?
7. In column E list any ideas for improvements such as adding new national KDEs to verify, changing the format of a KDE (e.g. conversions between catch coordinates and fishery management areas), streamlining KDEs (e.g. linking verifications of multiple KDEs through a single identifier), or setting up protocols to create an identifier that can be used as a KDE (e.g. creating a unique identifier for transshipment reports).

#### Summary Box 13

#### Identifying national catch tracking KDEs

- National authorities should identify those KDEs that are essential to verify before certifying legal provenance: these may be different from, or additional to, the KDEs required to be recorded on the CDS forms.
- It may be possible to streamline the set of KDEs to be verified by using unique identifiers or cross-referencing linked datasets.
- Actions should be taken to address any residual risk identified when comparing the data available as KDEs to the functional requirements which underlie the legal provenance certifications required by CDS.

### 5.1.2 Exercise 2: Evaluating national fish product tracking systems

If properly applied, the catch tracking KDEs and functional requirements in Section 5.1.1 should deliver appropriate legal provenance certification at the point of landing. It is then necessary to apply traceability principles to ensure that processing and exporting countries attach legal provenance certification only to those products originating from fish which were landed or imported in association with a valid catch certificate. However, national authorities will not be able to rely on the KDEs included on CDS trade documents to provide this kind of product-level tracking (see Section 4.2): they will need to confirm independently that their domestic traceability systems are capable of maintaining this link. The worksheet presented below is designed to facilitate the assessment of national product tracking systems against the three functional requirements which underpin the validation of a CDS trade document.

Worksheet 2 provides a framework for evaluating national fish product tracking systems in six steps, including exploring potential linkages between existing systems:

Worksheet 1. Identifying national catch tracking KDEs					
National role(s): (check all that apply)	Fishing vessel flag State* (fill in rows V1 and V2, C1 and C2)**		Transshipment vessel flag State (fill in rows T1, T2 and T3)		Port State for landings*** (fill in rows L1, L2 and L3)
	CCAMLR CDS A	ICCAT CDP B	SDPs	CCSBT CDS C	
<b>Relevant CDS:</b> (circle one or more)  <b>Corresponding functional requirements</b> (check those that apply): ↓↓↓↓↓↓	List KDEs required by the CDS circled above for the checked rows below (choose appropriate KDEs from Appendices)	List any other KDEs necessary to confirm the functional requirements checked below (see Appendices and consider special national circumstances)	Which of the KDEs in columns A & B are critical to verify in order to confirm the functional requirement in the first column?	If the KDEs in column C are verified, is the functional requirement in the first column confirmed beyond any doubt?	SIMP E What could be improved and how?
<input type="checkbox"/> V1 Establish the identity of the fishing vessel				<input type="checkbox"/> Yes <input type="checkbox"/> No	
<input type="checkbox"/> V2 Confirm that the fishing vessel had all of the necessary authorizations to produce the fish				<input type="checkbox"/> Yes <input type="checkbox"/> No	
<input type="checkbox"/> C1 Establish the identity and quantity of the fish				<input type="checkbox"/> Yes <input type="checkbox"/> No	
<input type="checkbox"/> C2 Confirm whether the timing, location and method of capture was legal				<input type="checkbox"/> Yes <input type="checkbox"/> No	
<input type="checkbox"/> T1 Establish the identity of the transport vessel receiving the fish				<input type="checkbox"/> Yes <input type="checkbox"/> No	
<input type="checkbox"/> T2 Confirm the identity and quantity of the fish received in the transshipment				<input type="checkbox"/> Yes <input type="checkbox"/> No	
<input type="checkbox"/> T3 Document the transfer event and establish whether it was compliant with any applicable rules				<input type="checkbox"/> Yes <input type="checkbox"/> No	
<input type="checkbox"/> L1 Establish the details (who, what, when and where) of the landing event				<input type="checkbox"/> Yes <input type="checkbox"/> No	
<input type="checkbox"/> L2 Confirm that the landing complied with all applicable regulations				<input type="checkbox"/> Yes <input type="checkbox"/> No	
<input type="checkbox"/> L3 Identify the first, usually land-based, buyer/receiver of the catch				<input type="checkbox"/> Yes <input type="checkbox"/> No	

\* Although coastal States are not assigned any specific responsibilities in existing CDS, with regard to their obligations under UNCLOS and related instruments, coastal States should consider emulating the responsibilities of fishing vessel flag States for foreign fishing vessels fishing in coastal State waters.

\*\* In some cases fishing vessel flag States are also responsible for transshipments, i.e. T1, T2 and T3, and/or landings, i.e. L1, L2 or L3.

\*\*\* Responsibilities for port States under CDS may be narrower than their responsibilities under the Agreement on Port State Measures. Therefore, port States should consider verifying fishing vessel, catch and transshipment KDEs and functional requirements even if these are the responsibility of other States in the context of CDS, and especially in cases where the catch certificate is not provided prior to, or upon landing.

1. Determine whether the country currently, or potentially in future, needs to provide validations for any CDS trade document (i.e. importing, exporting and/or processing activities; see [Table 1](#), right column (p. 12)). If not, this worksheet can be skipped. Countries which have validation responsibilities for CDS trade documents (either importing, exporting and/or processing) will need to consider all three functional requirements (P1, P2 and P3) shown in the first column.
2. In the first row, column A, start by describing the national system in use for preventing overuse of CDS catch certificates (P1). The specific yes/no questions listed are designed to prompt thinking about different aspects of such a national system – they may not all be relevant in all cases and there may be additional relevant features that are not listed. Then, complete column A for functional requirements P2 and P3 in the same way.
3. In column B, consider the functional requirements and questions in each row (P1, P2 and P3) from the perspective of other national systems that can, or do, track fish products for other reasons (e.g. sanitary or customs purposes). Briefly describe each system and check “yes” or “no” for each question (if relevant).
4. In column C, consider whether the systems described in columns A and B are or could be linked, in order to compensate for any shortfalls (e.g. any “no” answers) in column A.
5. In column D, consider whether there are residual risks of the products of IUU fishing entering the supply chain given the system in column A and, if relevant, given the opportunities for linkage noted in column C.
6. If there is residual risk identified in column D, consider how this could be reduced by improving national systems and note this in column E.

#### Summary Box 14

##### Evaluating national fish product tracking systems

- National authorities will not be able to rely on the KDEs included on CDS trade documents to provide the product-level tracking necessary to support the certification of legal provenance after processing and export.
- Domestic traceability systems can support certification of legal provenance as required by CDS trade documents if they fulfill three functional requirements. Key points of assessment are identified.
- National authorities may wish to reinforce the systems currently in use to certify the legal provenance of fish by linking with systems used for sanitary and/or customs purposes, thereby strengthening multiple systems.

### 5.1.3 Exercise 3: Taking stock of verification tools, systems and processes

A number of fundamental tools and systems underlie the ability of national authorities to properly source and verify KDEs and then validate CDS documents. While it is not necessary to have all of these tools and systems in place for proper validation to occur, the fewer tools and systems available, the higher the risk of insufficient oversight and failure to detect the laundering of IUU fishing products into certified supply chains. Beyond confirming that verification tools and systems exist, national authorities should test whether they can be accessed swiftly and efficiently, and provide information in the appropriate



Worksheet 2. Evaluating national fish product tracking systems					
National role(s): (check all that apply)	Importing (fill in P1, P2 and P3 below)		Exporting (fill in P1, P2 and P3 below)		Processing (fill in P1, P2 and P3 below)
Functional requirements for fish product tracking	A Current national system for tracking legal provenance of fish (e.g. to support CDS export validations)	B Other current national systems tracking fish (e.g. for sanitary or customs purposes)	C Opportunities for linkage or reinforcement of systems?	D Residual risk?	E What could be improved and how?
<b>P1 Prevent overuse of catch certificates</b>	Describe system: <input type="checkbox"/> Yes <input type="checkbox"/> No	Describe system: <input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Capable of mass balance checks?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	Explain:		
Central repository established?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No			
Mass balance checks performed?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No			
Yields monitored?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No			
Yield tolerances established?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No			
Yields periodically verified on site?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No			
<b>P2 Prevent substitution/mixing of certified with uncertified material</b>	Describe system: <input type="checkbox"/> Yes <input type="checkbox"/> No	Describe system: <input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Unique identifiers assigned to raw material batches (catch certificates) and production lots?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	Explain:		
Full segregation of materials with and without catch certificates?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No			
Processing plants required to maintain internal traceability records?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No			
<b>P3 Maintain an auditable domestic chain of custody</b>	Describe system: <input type="checkbox"/> Yes <input type="checkbox"/> No	Describe system: <input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Can the entire domestic chain of custody be mapped?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	Explain:		
Can any point in the chain be audited against P1 and P2 above?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No			
Is there a protocol for when to trigger an audit and how to conduct one?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No			

format and precision. By identifying the priority KDEs for verification in advance (see Section 5.1) national authorities can simulate the most important verification activities and use the results to identify where improvements are desirable.

Worksheet 3 outlines an approach, based on Section 4 in Hosch and Blaha (2017), for national authorities to test tools and systems to verify essential KDEs. The following five steps will help to ensure that CDS validations thoroughly support the certification of legal provenance.

1. Review what roles national authorities have in validating CDS documents from Worksheet 1 and Worksheet 2; check the appropriate boxes in the first column of the top five lines of Worksheet 3 (more than one role may apply). Note that with regard to their obligations under UNCLOS and related instruments, coastal States should consider emulating the responsibilities of fishing vessel flag States for foreign fishing vessels fishing in coastal State waters, and port States should consider verifying at-sea KDEs and functional requirements when a catch certificate is not available at landing (see Worksheet 3).
2. For each role that applies (i.e. each checked row in Rows 1–5) check the boxes corresponding to verification tools and systems currently available in the right column. If there are any tools or systems missing from the list, fill them in under “Other”.
3. Fishing vessel flag States, transshipment vessel flag States and port States should copy the critical KDEs from Worksheet 1, column C into the blank spaces in the left column of Worksheet 3. Importing, exporting and/or processing States will also need to complete the rows for P1, P2 and P3 – these are pre-filled with the functional requirements.
4. For each KDE filled in, and/or the product-tracking functional requirements (P1, P2 and P3), list which tool or system from the checklist above is used as the primary method of verification. Where secondary and tertiary tools or systems are used, list them as well. As verification will be considerably strengthened by using more than one tool or system, try to fill in columns A, B and C for each KDE or functional requirement.
5. For each row (KDE or functional requirement) consider how the verification works. For example, what data access permissions or other access limitations arise for each verification method? In what ways might the information available through the verification method(s) not match the format, precision or reliability required to verify the KDE? Are there cases of missing or otherwise unavailable data under each method that prevent verifying the KDE? Might there be delays in accessing or analysing information that could impede the efficiency of the supply chain? Which authorities should be involved in the verification and what coordination steps are required? Are there standard operating procedures to ensure the verification process flows smoothly?
6. After considering such questions, note what could be improved to strengthen verification processes in column D.

#### **Summary Box 15**

##### **Taking stock of verification tools, systems and processes**

- National authorities will have multiple tools and systems available to them to assist with verifying the KDEs that underlie their CDS validations. Testing the applicability of these systems to the priority KDEs can identify ways to make the verification process more robust.
- Multiple verification methods should be identified for each KDE, and tools and systems should be evaluated for ease of access, format and precision of available information, as well as prevalence of missing data.
- Issues encountered in this evaluation will highlight current risks faced when validating CDS documents, which can then be addressed through improvements to the tools and systems employed in the verification process.

**Worksheet 3. Taking stock of verification tools, systems and processes**

Check the national role(s) selected in Worksheets 1 and 2 below; then, indicate the verification tools and systems available within each checked row

<input type="checkbox"/> <b>Fishing vessel flag State**:</b>	<input type="checkbox"/> Vessel registry; <input type="checkbox"/> Fishing vessel registry; <input type="checkbox"/> Fishing license; <input type="checkbox"/> Authorization to fish beyond national jurisdiction; <input type="checkbox"/> Observers; <input type="checkbox"/> Logbooks; <input type="checkbox"/> VMS; <input type="checkbox"/> Unloading authorizations (transshipment or landing); <input type="checkbox"/> Record of penalties for non-compliance; <input type="checkbox"/> Other: _____																																
<input type="checkbox"/> <b>Transshipment vessel flag State:</b>	<input type="checkbox"/> Vessel registry; <input type="checkbox"/> Fishing vessel registry; <input type="checkbox"/> Operating License; <input type="checkbox"/> Authorization to operate beyond national jurisdiction; <input type="checkbox"/> Observers; <input type="checkbox"/> Logbooks; <input type="checkbox"/> VMS; <input type="checkbox"/> Unloading authorizations (transshipment or landing); <input type="checkbox"/> Record of penalties for non-compliance; <input type="checkbox"/> Other: _____																																
<input type="checkbox"/> <b>Port State for landings**:</b>	<input type="checkbox"/> Vessel registry; <input type="checkbox"/> Advance request for port entry; <input type="checkbox"/> Records of vessel inspection in port; <input type="checkbox"/> Coordination with relevant States; <input type="checkbox"/> Record of penalties for non-compliance; <input type="checkbox"/> Other: _____																																
<input type="checkbox"/> <b>Processing and/or exporting country:</b>	<input type="checkbox"/> Prior notification and approval of imports (if applicable); <input type="checkbox"/> History of catch certificate issues (risk profile); <input type="checkbox"/> CDS-related auto-alerts; <input type="checkbox"/> Central repository for mass balance checks; <input type="checkbox"/> Record of sanctions for handling IUU fish; <input type="checkbox"/> Inspection of consignments; <input type="checkbox"/> Traceability reporting system; <input type="checkbox"/> Traceability audit; <input type="checkbox"/> System for registering exporters; <input type="checkbox"/> Coordination with customs or sanitary authorities; <input type="checkbox"/> Other: _____																																
<input type="checkbox"/> <b>Importing country:</b>	<input type="checkbox"/> Prior notification and approval of imports; <input type="checkbox"/> History of catch certificate issues (risk profile); <input type="checkbox"/> CDS-related auto-alerts; <input type="checkbox"/> Record of sanctions for handling IUU fish; <input type="checkbox"/> Inspection of consignments; <input type="checkbox"/> Coordination with customs or sanitary authorities; <input type="checkbox"/> Other: _____																																
<b>Fishing vessel flag States, transshipment vessel States and port States</b> <b>List the critical KDEs from Worksheet 1, Column C below (each KDE in its own row)</b>	<table border="1"> <thead> <tr> <th>A</th> <th>B</th> <th>C</th> <th>D</th> </tr> <tr> <th>Primary verification system or tool (fill in from checklists above)</th> <th>Secondary verification system or tool (fill in from checklists above)</th> <th>Tertiary verification system or tool (fill in from checklists above)</th> <th>What tools, systems or processes could be improved and how?</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>	A	B	C	D	Primary verification system or tool (fill in from checklists above)	Secondary verification system or tool (fill in from checklists above)	Tertiary verification system or tool (fill in from checklists above)	What tools, systems or processes could be improved and how?																								
A	B	C	D																														
Primary verification system or tool (fill in from checklists above)	Secondary verification system or tool (fill in from checklists above)	Tertiary verification system or tool (fill in from checklists above)	What tools, systems or processes could be improved and how?																														
<b>Importing, exporting or processing countries</b>																																	
<b>P1 Prevent overuse of catch certificates</b>																																	
<b>P2 Prevent substitution/mixing of certified with uncertified material</b>																																	
<b>P3 Maintain an auditable domestic chain of custody</b>																																	

\* Although coastal States are not assigned any specific responsibilities in existing CDS, with regard to their obligations under UNCLOS and related instruments, coastal States should consider emulating the responsibilities of fishing vessel flag States for foreign fishing vessels fishing in coastal State waters.

\*\* Responsibilities for port States under CDS may be narrower than their responsibilities under the Agreement on Port State Measures. Therefore, port States should consider verifying fishing vessel, catch and transshipment KDEs and functional requirements even if these are the responsibility of other States in the context of CDS, and especially in cases where the catch certificate is not provided prior to, or upon landing.

## 5.2 Beyond compliance: Deciding the coverage and timing of national legal provenance documentation

Providing legal provenance documentation under a CDS offers several benefits at the national level. It ensures that the value of domestic products is maximized by being able to enter any market without delay, and enhances the national reputation for handling only legally sourced fish. Legal provenance documentation also reinforces fisheries management measures, thereby promoting sustainable fisheries and their associated long-term economic benefits.

Although legal provenance certification entails costs, limiting it to the smallest possible number of fish is not necessarily the most cost-effective option. In fact, the costs of operating systems that are able to provide legal provenance documentation for some fish some of the time may be higher than operating such systems for all fish all of the time. This is because the burden of identifying and especially handling certain fish may be greater than a default option of certifying legal provenance as a standard operating procedure. In the short term, economies of scale may allow the spectrum of fish currently covered under CDS to be broadened without substantially higher costs. In the long term, bringing more – if not all – regulated fisheries under a national legal provenance certification scheme would be an investment in keeping pace with the expected expansion of CDS and other demands for legal provenance certification over time. Opting for electronic systems would further increase the potential economies of scale and simultaneously ensure that national systems are prepared for the anticipated development of electronic CDS. A suggested list of national assessment topics – relevant when determining the appropriate coverage of national legal provenance certification – is provided in Table 3.

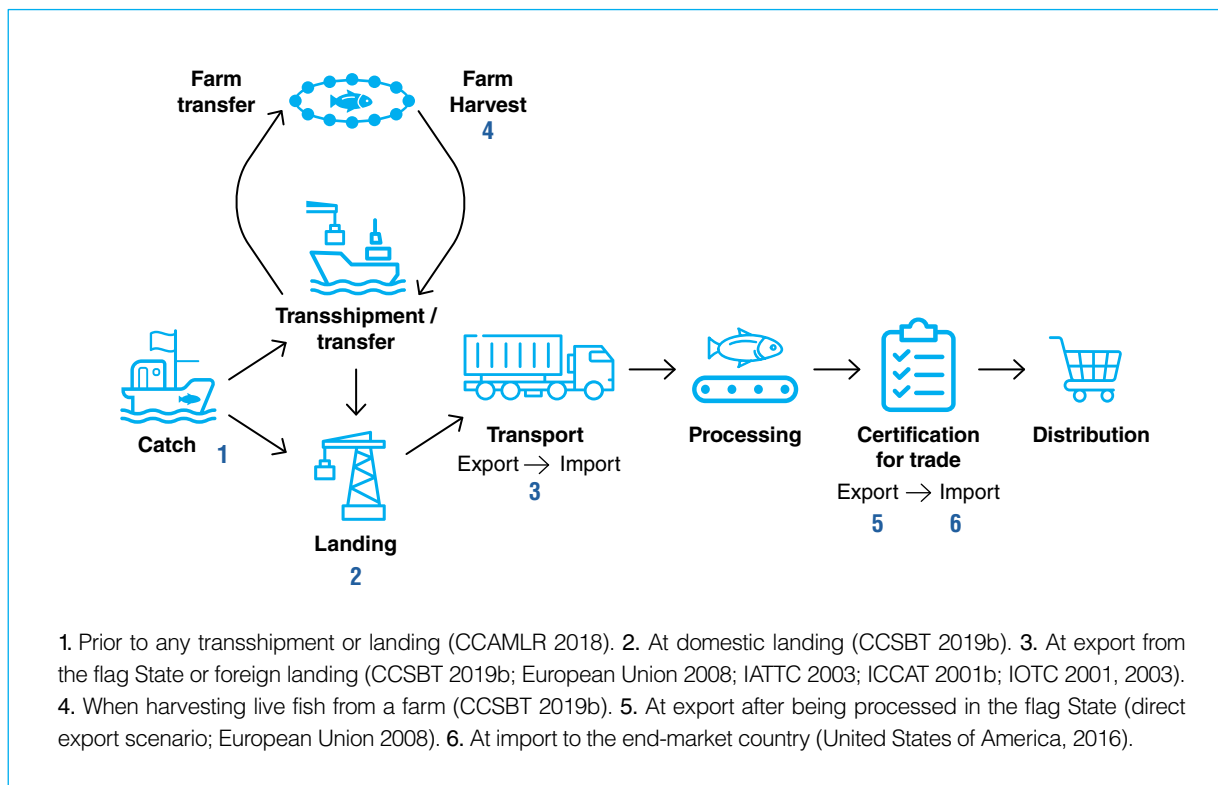
Similarly, countries may also wish to consider when would be the optimal point for issuing legal provenance certification for catches so as to reduce the risk of allowing IUU fishing products to enter the supply chain. As described in Section 4.1, catch tracking KDEs are compiled for the fishing vessel, catch, transshipment (if applicable) and landing, and are validated by means of a catch certificate. Various CDS have different requirements for when the catch certificates should be validated. This may be after processing has occurred (Figure 7), or well after the fish have left the jurisdiction of the flag State (e.g. after export, transport and cold storage, as described by Clarke and Hosch, 2013). Delaying validation of the catch certificate past the point of landing, while practised under some CDS, can thus leave some portions of the supply chain unprotected, with no CDS traceability mechanism in place (Hosch, 2016). In contrast, requiring a catch certificate to be validated before landing, as required by some CDS (Figure 7), maintains the tightest link between the act of legal catching and the certification of that act. It also guards against the use of port facilities by vessels engaging in IUU fishing (i.e. if no landing can be authorized without a catch certificate), and protects those taking custody of landed material from unwittingly being implicated in trading IUU fish (e.g. if the catch certificate fails to materialize after landed fish have already been purchased). **For all the above reasons, countries validating catch certificates should consider compiling and confirming all the necessary catch tracking information at the earliest possible time.**<sup>28</sup> The list of assessment topics outlined in Table 3 may assist with identifying these points.

<sup>28</sup> For those CDS that require catch certificates to be issued at the point of export so that they can specifically refer to the weight being exported (rather than the weight caught) – e.g. the CCS, when catches are processed in the flag State of the fishing vessel before being directly exported to the European Union – the country providing the catch certificate can still confirm all of the KDEs and functional requirements necessary for validation at the earliest possible point, while issuing the catch certificate at the time required by the CDS.

**Table 3. Coverage and timing issues for legal provenance certification systems**

Issue	National assessment topics
<p><b>Coverage:</b> what fish to include in legal provenance certification?</p>	<p>Determine the range and quantity of fish subject to CDS requirements: What are the current levels? Trend(s)? Effects of future market aspirations?</p>
	<p>Document how CDS and national legal provenance KDEs are compiled and verified, and how validations are carried out: How many, and what types of parties are involved? Are procedures standardized? Are they paper or electronic? Any opportunities for streamlining? Where and for how long are data/documents stored?</p>
	<p>Identify the costs associated with meeting these requirements, e.g. staff time, system operation costs, communication costs, other costs.</p>
	<p>Consider the extent of non-CDS demands for legal provenance information and benefits associated with providing certification (national stakeholders, non-CDS reporting requirements, market opportunities).</p>
	<p>Assess the practicalities of expanding legal provenance certification beyond fish covered by CDS: What is the range of fish to be covered? Are there cost implications or jurisdictional issues?</p>
	<p>Evaluate the benefits of expanding legal provenance certification beyond fish covered by CDS: Does this have greater market potential? Facilitate trade? Does it provide economies of scale and/or enhance the reputation of national products?</p>
	<p>Appraise the feasibility of using digital systems for existing or expanded scope of legal provenance certification: Is there a degree of existing digitalization? What is the cost of new systems? Are they compatible with other digitalization initiatives?</p>
<p><b>Timing:</b> when to provide legal provenance certification for catches?</p>	<p>Determine the points at which national authorities validate catch certificates: Are they single or multiple points? Are these points determined by the CDS or other factors?</p>
	<p>Evaluate the risks associated with the validation points identified above: What risks exist? To whom? How can they be reduced?</p>
	<p>Identify barriers to earlier validation points, e.g. prior to transshipment or landing: What barriers are there? Why? How can they be overcome?</p>
	<p>Consider whether better international coordination is required for verifying catch tracking information: Which parties does this concern? What procedures or systems are needed? What incentives could be offered?</p>
	<p>Document any past issues with catch certificate validation: Have there been any verifications or rejections? Have any remedial actions been required? Have they been effective?</p>

**Figure 7.** Points at which catch certificates (or other forms of legal provenance KDEs) are validated under existing CDS (not all scenarios are shown)



### Summary Box 16

#### Coverage and timing of national legal provenance documentation

- In addition to complying with CDS requirements, legal provenance certification can maximize value as well as facilitate and promote fish trade at the national level.
- It may be more cost-efficient for national legal provenance systems to define their own coverage (i.e. which fish, fisheries and product flows) and to provide certifications proactively, as a standard operating practice, rather than only when required by a CDS, particularly as demands for legal provenance information expand.
- Catch tracking KDEs and functional requirements confirmed prior to landing provide the firmest control of at-sea activities and can protect national ports and fish receivers from unwittingly being implicated in IUU fishing activities. National authorities can choose to confirm this information at the earliest possible time, even if some CDS require catch certificates to be issued at later points in the supply chain.

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## 6. CONCLUSION

Catch documentation schemes cannot single-handedly stamp out IUU fishing. They rely on other monitoring, control and surveillance systems to generate information about the legal provenance of catches, and depend on product-level tracking systems to prevent the mixing of illegal and legal catch throughout the supply chain. In providing a framework for the compilation and sharing of legal provenance data, CDS represent an opportunity for cooperation and collaboration between different States along the seafood supply chain. Strengthening each State's contribution to that framework therefore strengthens the system as a whole.

In their day-to-day participation in CDS, States face an array of choices which balance risk, cost and other factors. They must determine how and when data are collected and provided; what quality assurance underlies the data; and how such data are stored in order to respond to queries. States may aim to: meet the minimum standards of the CDS in which they are currently participating, uphold a higher standard required by the more advanced of the existing CDS (in the event that their fisheries or markets expand), or go beyond all of the existing CDS to anticipate future standards. Those that are proactive can protect the value of certified catch for their stakeholders, and avoid the broad-scale reputational damage of being associated with IUU fishing activities.

This analysis has presented several ways that national authorities can assess their tools and systems against CDS requirements in order to identify issues and formulate actions to address them. These include identifying national catch tracking KDEs, evaluating national fish product tracking systems, assessing verification tools and systems, and weighing the benefits and costs of expanding CDS coverage. States which undertake these kinds of exercises not only stand to improve their own national systems, but will also set higher benchmarks for the ongoing evolution and expansion of CDS. Continuing improvement in the documentation of legal provenance, both CDS and its implementation at the national level, will serve as a potent deterrent to persistent IUU fishing activities.

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# APPENDIX 1

## DETAILED ANALYSIS OF CATCH DOCUMENTATION SCHEMES FISHING VESSEL KEY DATA ELEMENTS

Key data elements related to fishing vessels in existing CDS and recommended by other sources (FAO, 2017; FAO, 2016; EU IUU Coalition, 2020; Blaha and Katafono, 2020; GDST, 2020c) are shown in Table A1.

F	C	C	T	P	F	#	KDE	CCAMLR CDS	ICCAT CDP	SDPs	CCSBT CDS	CCS	SIMP
L	H	O	R	O	A								
						1	Vessel name						
						2	Vessel flag						
						3	Registration #						
						4	Authorization #						
						5	Home port						
						6	Call sign						
						7	Fishing license #						
						8	Vessel contact details						
						9	Quota						
						10	Length overall						
						11	Fishing vessel Master's name						
						12	Fishing authorization validity period						
						13	<b>Unique Vessel ID (UVI)</b>						
						14	Sanitary license number						
						15	Registry website						
						16	VMS Authority						
						17	<b>Observer trip ID</b>						
						18	External ID						
						19	Fishing authorization issuing authority						
						20	Fishing authorization area, Species and gear						
						21	Vessel owner(s)						
						22	Vessel beam						
						23	Vessel draft						

**Note:** The columns to the left indicate which parties are likely to supply some or all of the information (FL=flag, CH=charter, CO=coastal, TR=transport, PO=port and FA=farm). The basic KDEs are shown in light blue, enhanced KDEs in medium blue and advanced KDEs in darker blue (see text below for definitions). Black shading indicates a requirement to provide; grey shading indicates optional provision. KDEs in bold are discussed in the "Special considerations" section below.

## Responsible authorities

Supplying data to populate fishing vessel KDEs will generally be the responsibility of the flag State unless the vessel is chartered, in which case some CDS allow information to be provided by other sources. A coastal State may be in a position to supply or verify information relating to fishing license number and quota, which VMS applies and the identifier for the observer trip (if an observer was present), when the vessel is fishing in its waters.

## Basic, enhanced and advanced key data elements

For fishing vessels, the **basic** set of KDEs consists of data types used by at least two of the six existing CDS (SDPs are considered as a unit as their requirements are basically identical). This basic set includes vessel name, vessel flag, vessel registration number, vessel ‘authorization to fish’ number, fishing license number, home port and international radio call sign (IRCS).

The **enhanced** set of KDEs for fishing vessels is defined by the basic set above plus those fields which must be provided under at least one of the existing CDS and consists of vessel contact details (e.g. email or fax), quota (if applicable), length overall (of the vessel), fishing vessel master’s name, and fishing authorization validity period.

The **advanced** set of KDEs consists of the basic and enhanced sets above plus fields recommended by other sources but not required by any of the existing CDS. These fields include: Unique Vessel Identifier (UVI – optional under some of the existing CDS); sanitary license number for the vessel; the website address of the vessel registry with which the vessel is registered; the VMS authority monitoring the vessel; a link to the observer trip record (if any); external ID (other than call sign, registration number, authorization number or UVI); fishing authorization issuing authority; fishing authorization area, species and gear type; vessel owner(s); vessel beam; and vessel draft.

## Special considerations

Several of the fishing vessel KDEs in the advanced set would be widely applicable across fisheries and particularly useful in linking to other datasets relevant for validation and/or verification. These include the **UVI** for information about the characteristics and background of the vessel, and **Observer Trip ID** for additional information about the behavior of the vessel during the fishing trip (including catch not recorded in catch KDEs, e.g. discarded bycatch). Another benefit of these two KDEs is that they would likely contain the information required for many of the other fishing vessel KDEs and would therefore serve to streamline (or cross-check) the fishing vessel KDE list.

## APPENDIX 2

### DETAILED ANALYSIS OF CATCH DOCUMENTATION SCHEMES CATCH KEY DATA ELEMENTS

Catch KDEs in existing CDS and recommended by other sources (FAO, 2017; FAO, 2016; EU IUU Coalition, 2020; Blaha and Katafono, 2020; GDST, 2020c) are shown in Table A2.

**Table A2.1 KDEs related to catch**

F	C	C	T	P	F	#	KDE	CCAMLR CDS	ICCAT CDP	SDPs	CCSBT CDS	CCS	SIMP
L	H	O	R	O	A								
						1	Species						
						2	Estimated Wt to be landed (kg)						
						3	Product type		*				†
						4	<b>Catch area</b>						
						5	Catch month and/or date						
						6	Number of fish						
						7	Gear						
						8	Trip dates						
						9	Fishing dates						
						10	EEZ						
						11	Ave Wt per fish (kg)						
						12	Applicable CMMs						
						13	Estimated live Wt						
						14	Type of processing Onboard						
						15	Name and address of processing establishment						
						16	Fishery improvement project						
						17	<b>Availability of catch coordinates</b>						

\* Not recorded under catch but can be recorded at transshipment or when traded (exported dead).

† Potentially recorded in custody of chain records; retained by the importer of record for inspection on demand.

**Note:** The columns to the left indicate which parties are likely to supply some or all of the information (FL=flag, CH=charter, CO=coastal, TR=transport, PO=port and FA=farm). The basic KDEs are shown in light blue, enhanced KDEs in medium blue and advanced KDEs in darker blue (see text below for definitions). KDEs in bold are discussed in the "Special considerations" section below.

#### Responsible authorities

Supplying data to populate catch KDEs will generally be the responsibility of the flag State unless the vessel is chartered, in which case some CDS allow information to be provided by other sources. A coastal State may be in a position to supply or verify information relating to area, time, gear and applicable regulations by referring to the license conditions and monitoring systems. Coastal States may also be able to verify details of the catch such as species and quantity, particularly if an observer is present.

## Basic, enhanced and advanced key data element Sets

The **basic** set of catch KDEs, required by at least two of the existing CDS, includes: species, estimated weight of fish to be landed, product type (e.g. gilled and gutted), catch area, time of catch (month and/or date), number of fish, and gear type (Table A2). Although there is good agreement among CDS on these basic data types, the precision required for each varies. For example, some CDS require only the month and year of catch, whereas others require the date; the catch area can be specified by fishery management statistical area, EEZ or simply by ocean.

The **enhanced** set of KDEs – i.e. the basic KDEs plus those required by at least one of the existing CDS – introduce some potential duplication of information. For example, if both the estimated weight to be landed and the number of fish are provided it should be possible to compute the average weight per fish (and therefore it would not be necessary to specify it as a separate KDE). Similarly, if both the estimated weight and the product type are provided, standard yields could be applied to compute the live weight and the onboard processing type could be inferred. While listing the applicable conservation and management measures might be useful in some cases, these could be cumbersome to specify in full. The provision of the name and address of processing establishments under the CCSBT CDS seems designed to cater for the specific issue of domestic processing of farmed products.<sup>29</sup>

The additional KDEs in the **advanced** set derive from the KDEs developed by the Global Dialogue on Seafood Traceability (GDST, 2020c). Recording whether the catch comes from a fishery participating in a Fishery Improvement Project may be important for a sustainability assessment but is not strictly relevant to determining legal provenance. In addition to requiring the catch location to be recorded by area, as in the basic set, the GDST specifies an additional catch KDE documenting whether the catch coordinates are available (as per the Special considerations below).

## Special considerations

The specification of **catch area** can be a challenge for legal provenance certification systems. While catch coordinates can be essential for determining compliance with applicable rules and regulations, they can also be protected by law as confidential business information. Most RFMOs have addressed this issue by agreeing rules governing the resolution of data to be provided and/or publicly disclosed (e.g.  $1^{\circ} \times 1^{\circ}$  or  $5^{\circ} \times 5^{\circ}$  map grid square). However, these resolutions vary amongst RFMOs and by data type, making it difficult to define a single, standardized KDE. The GDST considered that specifying a KDE to capture the **availability of catch coordinates** would indicate whether the validating official has access to the precise catch location without necessarily disclosing it to the CDS. This approach has merit but would be usefully complemented by a requirement to specify the catch location as precisely as the law permits. This could be formulated as latitudinal-longitudinal coordinates which could represent either the exact location of the catch (if not confidential) or an agreed centre point of an area (e.g.  $10 \times 10$  or  $50 \times 50$  map grid square, or larger area if necessary).

<sup>29</sup> Note that under the CCSBT CDS harvest out of farms is considered a form of catch, therefore it is analyzed in this section



## APPENDIX 3

### DETAILED ANALYSIS OF CATCH DOCUMENTATION SCHEMES TRANSSHIPMENT KEY DATA ELEMENTS

Key data elements related to transshipment in existing CDS and recommended by other sources (FAO, 2017; FAO, 2016; EU IUU Coalition, 2020; Blaha and Katafono, 2020; GDST, 2020c) are shown in Table A3.

F	C	C	T	P	F	#	KDE	CCAMLR CDS	ICCAT CDP	SDPs	CCSBT CDS	CCS	SIMP
L	H	O	R	O	A								
						1	Receiving vessel name						
						2	Location (port or sea coordinates)						
						3	Transshipment date						
						4	Transshipment in Port authority name						
						5	Fishing vessel master's name						
						6	Receiving vessel master's name						
						7	Receiving vessel call sign						
						8	Receiving vessel flag						
						9	Estimated weight transhipped (kg)						
						10	Receiving vessel authorization number						
						11	Receiving vessel registration number						
						12	Intended landing port						
						13	Intended landing date						
						14	Transshipment in Port Authority Contacts						
						15	Name of transshipment Observer						
						16	<b>Receiving vessel UVI</b>						
						17	<b>Donor vessel UVI</b>						
						18	Receiving vessel license number						
						19	<b>Transshipment declaration/ authorization number</b>						
						20	Transshipment authorization authority						
						21	Transshipment authorization validity						

**Note:** The columns to the left indicate which parties are likely to supply some or all of the information (FL=flag, CH=charter, CO=coastal, TR=transport, PO=port and FA=farm). The basic KDEs are shown in light blue, enhanced KDEs in medium blue and advanced KDEs in darker blue (see text below for definitions). KDEs in bold are discussed in the Special Considerations section below.

## Responsible authorities

The parties responsible for supplying information about transshipment could be the flag State of the fishing vessel or the flag State of the transshipment vessel (or in some cases both). Port States may become involved in data provision if the transfer occurs in port.

## Basic, enhanced and advanced key data element sets

The **basic** set of transshipment KDEs (required by at least two of the existing CDS) includes information about the vessel receiving the transshipped fish (vessel name, call sign, flag, and master's name), the transshipment event itself (location, date, the supervising authority, and transshipped weights), and the name of the master of the fishing vessel.

The **enhanced** KDEs (required by at least one existing CDS) provide more information about the intended landing port and date, the contact details for the supervising authority, the name of the transshipment observer, and the receiving vessel registration and authorization numbers.

**Advanced** KDEs add the receiving vessel's UVI and license number, the donor vessel's UVI, as well as the transshipment declaration/authorization number, authority and validity period. A list of the information required for an example transshipment declaration can be found in WCPFC (2009).

## Special considerations

As discussed in Appendix 1 for fishing vessels, specifying a KDE for the **UVI** would be particularly useful in linking to other datasets connected to the verification of the transshipment vessel's background and characteristics. In the event of a single transshipment, the fishing vessel KDEs would capture the information about the fishing vessel (including a UVI if possible) and the transshipment KDEs would capture the information about the transshipment vessel (including a UVI if possible). In the event of multiple transshipments, it would be necessary to populate the transshipment KDEs twice: i.e. once for each transshipment, and specify an additional KDE for the donor vessel UVI, given that in subsequent transshipments the donor vessel would not be the fishing vessel.

A similarly important linking KDE is the **transshipment declaration/authorization number**. Such numbers would derive from authorization procedures prior to transshipment, or declarations or observer reports after transshipment. Even if these systems are not widely used at present, they are expected to strengthen over time and will be an important component of verifying legal provenance. Therefore, as with the UVI, it would be prudent to plan to include such KDEs both in CDS themselves and in national systems supplying data to CDS. A benefit associated with both the UVI and transshipment number KDEs is the potential to streamline the list of transshipment KDEs through cross-referencing to other systems (see Topic Box 3).

## APPENDIX 4

### DETAILED ANALYSIS OF CATCH DOCUMENTATION SCHEMES FARMING KEY DATA ELEMENTS

Key data elements pertaining to farming activities under existing CDS and recommended by other sources (GDST, 2020c) are shown in Table A4. The large number of farming KDEs (33) are organized in sequential order according to the nature of the activity: towing (transfer); stocking and farming; and harvesting.

F	C	C	T	P	F	#	KDE	CCAMLR CDS	ICCAT CDP	SDPs	CCSBT CDS	CCS	SIMP
L	H	O	R	O	A								
<b>TOWING (TRANSFER)</b>													
						1	Name of towing vessel						
						2	Flag of towing vessel						
						3	Registration number of towing vessel						
						4	Authorization number of towing vessel						
						5	Number of tow cages						
						6	Number of towing mortalities						
						7	Weight of towing mortalities (kg)						
						8	Transfer declaration number						
						9	Dates of tows						
<b>STOCKING AND FARMING</b>													
						10	Authorization to farm (Reg #)						
						11	Name of farm						
						12	Farm address						
						13	Number of fish stocked						
						14	Total weight of fish stocked (kg)						
						15	Average weight of fish stocked						
						16	Date of transfer into farm						
						17	Weight estimation method						
						18	Date placed in cage & cage number						
						19	National sampling programme (y/n)						
						20	Farm State						
						21	Stocking size composition						
						22	Stocking observer name						
						23	Stocking observer title						
						24	Production method						
<b>HARVESTING</b>													
						25	Date of harvest						
						26	Number of fish harvested						
						27	Total round weight harvested (kg)						
						28	Average weight harvested (kg)						
						29	Tag numbers						
						30	Harvest observer name						
						31	Harvest observer title						
						32	Receiver of harvested fish						
						33	Product form and type						

**Note:** The columns to the left indicate which parties are likely to supply some or all of the information (FL=flag, CH=charter, CO=coastal, TR=transport, PO=port and FA=farm). The basic KDEs are shown in light blue, enhanced KDEs in medium blue and advanced KDEs in darker blue (see text of other Appendices for definitions).

### **Responsible authorities**

Providing the KDEs associated with towing the fish to the farms is generally the responsibility of the quota holder, which could be the flag State of the fishing vessel (original or chartered) or the coastal State. Information about the farming itself – including the harvest out of the farm – is the responsibility of the country where the farm is located.

### **Discussion of farming key data elements**

Most of the towing (transfer) KDEs are common to both the ICCAT CDP and CCSBT CDS schemes. The KDEs dealing with the farm itself are more extensive for the ICCAT CDP, including specific KDEs on sampling programmes, size composition and observer details. Reflecting the wide geographic and species scope of its intended coverage, the SIMP picks up some of the basic KDEs about the farms (name, location and authorization) and presumably leaves the other information to be documented in the chain of custody paperwork kept on file by the importer. In the final stage of farming, i.e. when fish are harvested, the ICCAT CDP again requires the greatest number of KDEs, probably because it is the more complex of the two tuna farming CDS (tuna are farmed under CCSBT only in Australia, whereas ICCAT farming operations occur in several countries).

Most of the recent KDE studies did not include farming KDEs in their scope. One exception is the recent work by GDST, which suggested that production method be recorded. This is the only KDE proposed that is not already required under one of the existing schemes (advanced set).

In summary, the CCSBT CDS and particularly the ICCAT CDP represent the most advanced tracking systems for fattened wild fish. While some streamlining, improvement and harmonization of the KDEs is undoubtedly possible, there are other technical issues, e.g. how to estimate the fish biomass stocked and harvested accurately, and how to determine whether growth rates are reasonable, which may be more critical to eliminating IUU fishing.

## APPENDIX 5

### DETAILED ANALYSIS OF CATCH DOCUMENTATION SCHEMES LANDING KEY DATA ELEMENTS

Key data elements capturing data on landings in existing CDS and recommended by other sources (FAO, 2017; FAO 2016; EU IUU Coalition, 2020; Blaha and Katafono, 2020; GDST, 2020c) are shown in Table A5.

Table A5.1 KDEs related to landings

F L	C H	C O	T R	P O	F A	#	KDE	CCAMLR	ICCAT CDP	SDPs	CCSBT	CCS	SIMP
						1	Landed weight by product type (verified)						
						2	Name of landed product receiver						
						3	Name of fishing vessel master						
						4	Landing location						
						5	Landing date						
						6	Contact details for landed receiver						
						7	Landed quantity by product type						
						8	Net weight sold (kg)						
						9	Landing authority name						
						10	Port entry date						
						11	<b>Unloading authorization number</b>						
						12	Nationality of fishing vessel master						
						13	Sanitary authorization of port						
						14	Purpose(s) of landing						
						15	Port and date of last port call						
						16	Total catch onboard						

**Note:** The columns to the left indicate which parties are likely to supply some or all of the information (FL=flag, CH=charter, CO=coastal, TR=transport, PO=port and FA=farm). The basic KDEs are shown in light blue, enhanced in medium blue and advanced in darker blue (see text below for definitions). KDEs in bold are discussed in the Special Considerations section below.

#### Responsible authorities

A number of parties may be responsible for providing data for landing KDEs. The flag State (or if chartered, the charter State) of the vessel landing the fish will likely provide some of the necessary information regardless of whether it is a fishing vessel or a transshipment vessel. The port State will likely be in a position to provide or verify some of these data, but the procedures of which supply chain participant fills in each KDE may vary.

#### Basic, enhanced and advanced key data element sets

The **basic** set of KDEs (i.e. required by at least two existing CDS) includes verified landed weight by product type, name and contact details of the landed fish receiver, landings location and date, and name of the master of the fishing vessel. Some schemes require the recording of the quantity landed (as well as the weight), the net weight sold, and the name of the landing authority approving the landing (enhanced set; required by at least one existing CDS).

Additional fields in the **advanced** set (not required by an existing CDS but recommended by other sources) include date of entry to port, unloading authorization number, nationality of the fishing vessel master, port sanitary authorization, purpose of landing, port and date of last port

call, and total catch on board. It should be noted that a number of information elements specified in the PSMA, which are to be provided in advance of port entry, would be available in the fishing vessel or transshipment KDEs (rather than as landing KDE *per se*), depending on whether the landing is direct from the fishing vessel or via transshipment.

### **Special considerations**

Many ports operate a landings authorization system to ensure that: i) permissions are denied in cases of suspected or established IUU fishing; and ii) landings data are recorded for traceability purposes (Blaha and Katafono, 2020). Assuming such systems assign a unique identifier for each landings event (**unloading authorization number**), and make this identifier publicly available, capturing this identifier as a KDE would provide important cross-referencing capabilities for verification. It could also help streamline the landings KDE because a landings authorization system is likely to hold much of the information specified by the basic, enhanced and advanced landings KDEs. Similar to other KDEs recommended for linking to external databases (i.e. UVIs, observer trip identifiers and transshipment authorization codes), even if the information content and linkage capabilities of these systems are limited at present, they are expected to strengthen over time. Providing for a linkage between these systems and KDEs will therefore provide critical support for CDS.









Catch documentation schemes (CDS) are just one in an array of tools designed to combat illegal, unreported and unregulated (IUU) fishing. The schemes provide a means for countries to cooperate in providing information about the legality of fish as it moves through the supply chain, from catch to market.

Many countries are familiar with the specific information requirements on catch documentation scheme forms; some, however, are less aware of the need for robust national systems to validate and verify that information. This document seeks to align and improve existing national monitoring, control and surveillance (MCS) tools, as well as product tracking systems, in order to support more effective national CDS implementation and strengthen CDS throughout the international supply chain.

The document contains chapters on the legal and policy background to catch documentation schemes, an introduction to the features and requirements of existing schemes, as well as guidance on how to handle CDS information requirements and identify national key data elements. Finally, it provides a series of exercises for assessing relevant national capabilities and coordination processes, including the management and exchange of information.

