



Catch documentation schemes for deep-sea fisheries in the ABNJ

Their value, and options for implementation



Cover photograph: Photograph by Rory Stevens on board the Isla Eden, fishing for Patagonian toothfish around Heard Island in Australia's sub-Antarctic during the winter of 2016.
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Gilles Hosch

Consultant Fisheries Expert

Food and Agriculture Organization of the United Nations

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Preparation of this document

This technical paper has been prepared under the auspices of the FAO-managed deep-sea fisheries component of the Areas Beyond National Jurisdiction project funded by the Global Environment Facility.

A limited number of countries, fisheries administrations, industry players and regional fisheries management organizations were visited physically within the remit of this work. Many consultations took place remotely during online meetings and electronic mail exchanges. Stakeholders from public and private sectors in the following countries and territories were involved in the consultations: Australia; Canada; China, Hong Kong SAR; Italy; Japan; Namibia; New Zealand; Spain; the United Kingdom of Great Britain and Northern Ireland; and the United States of America. Consultations were undertaken in 2017, while the drafting of the paper was undertaken in the last quarter of 2017 and the first quarter of 2018.

Abstract

This paper discusses the potential value of catch documentation schemes (CDS) in deep-sea fisheries (DSF), and the implementation modalities that have to be envisaged, to ensure the effectiveness of this trade-based tool to combat illegal, unreported and unregulated (IUU) fishing. The paper argues that CDS are indeed capable of directly addressing a number of IUU fishing practices known to occur in DSF, and that their adoption would improve compliance with fisheries management requirements. Key infringements that may be directly detected and addressed through a CDS include – but are not limited to – violations of closed areas harbouring protected vulnerable marine ecosystems (VMEs) in the deep ocean, and quota overfishing. The paper also establishes the notion that partial coverage of given species through a CDS at the level of individual RFMOs is incongruous from a trade monitoring and control perspective, and that CDS should be considered as either/or propositions with regard to species coverage. With most DSF species having broad distributions straddling many RFMOs, the implementation modality that avails itself as the most suitable option, enabling the operation of an effective CDS, is that of a centrally operated electronic CDS platform – called a super-CDS – shared by a plurality of institutional and state players.

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Abbreviations and acronyms

ABNJ	Areas Beyond National Jurisdiction
ALC	Automatic Location Communicator
BCD	Bluefin Catch Document (ICCAT)
CA	See RA (below)
CBP	United States Customs and Border Protection
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CCSBT	Commission for the Conservation of Southern Bluefin Tuna
CDS	Catch Documentation Scheme
CECAF	Fishery Committee for the Eastern Central Atlantic
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMM	Conservation and Management Measure
Code (the)	1995 FAO Code of Conduct for Responsible Fisheries
DCD	Dissostichus Catch Document (CCAMLR)
DSF	Deep-Sea Fisheries
EAFM	Ecosystem Approach to Fisheries Management
EEZ	Exclusive Economic Zone
EU	European Union
FAOCA	Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas of 24 November 1993
GFCM	General Fisheries Commission for the Mediterranean
HS	Harmonized System
IATTC	Inter-American Tropical Tuna Commission
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICES	International Council for the Exploration of the Sea
IOTC	Indian Ocean Tuna Commission
IPHC	International Pacific Halibut Commission
IPOA-IUU	2001 International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing
IUU	Illegal, Unreported and Unregulated (fishing)
IWC	International Whaling Commission
MCS	Monitoring, Control and Surveillance
MoU	Memorandum of Understanding
MSRA	2006 Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (United States of America)
NAFO	Northwest Atlantic Fisheries Organization
NEAFC	North East Atlantic Fisheries Commission

NOAA	National Oceanic and Atmospheric Administration (United States of America)
NPFC	North Pacific Fisheries Commission
PSMA	Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing of 22 November 2009
RA	Regulatory Area (of an RFMO), also referred to as the convention area (CA)
RFMO	Regional Fisheries Management Organization
SAI	Significant Adverse Impact
SEAFO	South East Atlantic Fisheries Organisation
SIMP	United States Seafood Import Monitoring Program
SIOFA	Southern Indian Ocean Fisheries Agreement
SPRFMO	South Pacific Regional Fisheries Management Organisation
SPS	Sanitary and PhytoSanitary (rules)
TAC	Total Allowable Catch
TDS	Trade Documentation Scheme (or statistical document program)
TREM	Trade Restrictive Measure
UNCLOS	United Nations Convention on the Law of the Sea of 10 December 1982
UNFSA	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 of 4 December 1995
UNGA	United Nations General Assembly
VME	Vulnerable Marine Ecosystem
VMS	Vessel Monitoring System
WECAFC	Western Central Atlantic Fishery Commission
WTO	World Trade Organization

Executive summary

This paper is the third technical paper of the Food and Agriculture Organization of the United Nations (FAO) on the topic of catch documentation schemes, published since 2016. The paper largely builds on the substance covered in earlier papers – endeavouring not to repeat what has already covered – though summaries are provided for ease of reference where useful. Including the introduction, this paper is structured into 6 chapters.

Chapter 1 introduces deep-sea fisheries and catch documentation schemes. While deep-sea fisheries have been the object of a series of UN General Assembly (UNGA) resolutions, catch documentation schemes find their origin in voluntary instruments such as the 1995 Code of Conduct for Responsible Fisheries and the 2001 International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (IPOA-IUU) – and most recently in the Voluntary Guidelines for Catch Documentation Schemes adopted by the FAO Conference in Rome in July 2017. The paper establishes whether a catch documentation scheme (CDS) would be useful when applied to deep-sea fisheries (DSF), and in what form (i.e. under which “implementation modality”) execution should occur.

Chapter 2 provides an overview of the 2008 FAO International Guidelines for the Management of Deep-sea Fisheries in the High Seas and their thrust, followed by an overview of deep-sea fish, associated ecosystems, and their fisheries.

Chapter 3 introduces catch documentation schemes, starting with a summary of what schemes are currently in existence. The recent (2017) FAO Voluntary Guidelines for CDS are introduced, and their purpose and content is discussed in detail. The paper then delves into an assessment of the benefits and limitations of unilateral and multilateral schemes, setting the stage for the discussion of multilateral CDS approaches in DSF, and as applied within the context of DSF management rules. The latter part of the assessment highlights which management measures a CDS is able to implement directly or in combination with other for monitoring, control and surveillance (MCS) tools, establishing their value as a tool to combat IUU fishing in DSF. The latter part of chapter 3 introduces harmonised CDS, and presents the rationale for such harmonisation. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is briefly described, presenting its certification scheme, and its use of a single platform and set of rules to cater for the trade certification of thousands of different species of animals and plants – including fish – under a single scheme. The notion of the global “super-CDS” – the logical end-point of harmonisation and acceptance-of-equivalence efforts – arises from this discussion.

Chapter 4 illustrates how DSF management frameworks are sensitive or conducive to CDS implementation, what typical IUU profiles are found in DSF, and what the capacity of regional fisheries management organizations (RFMOs) is in terms of developing and operating stand-alone (or “RFMO-specific”) CDS. The standing and consideration of CDS systems in RFMO performance reviews is assessed, in order to gain an understanding in how far the adoption of such systems by regional fisheries management organizations (RFMOs) covering DSF has been considered in the past, and what arguments have been advanced in favour of, or against such systems.

Chapter 5 deals with the trade in DSF, as trade conditions the relevance and the success of a trade-based tool to a very large degree. The paper establishes that the current Harmonized System (HS) classification of goods does not allow to confidently identify consignments of deep-sea species in trade documentation – with the exception

of toothfish – and that a deeper analysis of DSF product trade flows in the absence of CDS data and/or enabling HS classification is very difficult. The role of customs and border inspection agencies is introduced, and CDS and their related paperwork – and the potential multiplication of individual schemes that could occur – is assessed in relation to those agencies. It is argued that a potential multiplication of schemes covering only modest amounts of total global fisheries product trade is unsustainable and likely to face implementation challenges at this critical level.

Chapter 6 lists key findings regarding the value and options for CDS implementation. The overall conclusion, arguing that the individual CDS in DSF (based on the classic RFMO-specific implementation modality) is both unsustainable and likely to fail. It highlights the benefits of a multilateral global “super-CDS”, catering for the needs of many species (throughout their global distribution ranges), a plurality of RFMOs and many states – based on a single platform provided by a central service provider. The chapter closes by suggesting a way forward to exploring and bringing about such a modality.

1. Introduction

This document brings together and discusses two complex fisheries topics: deep-sea fisheries (DSF) in areas beyond national jurisdiction (ABNJ), and catch documentation schemes (CDS). The document explores how CDS do – or how they could – benefit DSF, protecting them from illegal, unreported and unregulated (IUU) fishing.

Deep-sea fisheries and vulnerable marine ecosystems (VMEs) are a domain of special concern for fisheries in the ABNJ. The sustainable use of DSF resources have been under consideration by international fora, such as the United Nations General Assembly, for more than two decades due, in part, to the limited amount of information and knowledge available about deep-sea ecosystems, the species and stocks targeted by fishing fleets within these ecosystems, and the significant adverse impacts (SAIs) that deep-sea fishing operations may have on these. This has led to a series of United Nations General Assembly (UNGA) Resolutions on Sustainable Fisheries¹ calling on regional fisheries management organizations (RFMOs) and states to establish standards for the management and the protection of DSF resources and their associated ecosystems.

Under UNGA Resolution 61/105 (2006), FAO was called upon to develop the International Guidelines for the Management of Deep-sea Fisheries in the High Seas. These were adopted in 2008, and were derived from a series of expert and technical consultations convened over the course of 2007 and 2008. The Guidelines outline principles that apply to the management of DSF (FAO, 2009a).

This document on DSF and CDS aims to further improve the understanding of the options available to more effectively manage and protect DSF resources.

Catch documentation schemes are also a subject matter that has received increased consideration in recent years. Catch documentation schemes are a specific form of trade- or market-based measure whose objective is to deny market access to fisheries products that have been obtained illegally.

The implementation of trade-based tools to combat IUU fishing remains a relatively little explored domain of enquiry and action in fisheries policy and law-making. One reason for this may stem from the fact that trade-based tools for fisheries law enforcement have not been provided for in the binding international agreements that form the body of international fisheries law today. While the basic texts establishing RFMOs do provide a direct mandate for a commission to act in the domain of markets for compliance purposes² (see also section 4.4.2), neither the UNCLOS, the 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 of 4 December 1995 (UNFSA), the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas of 24 November 1993 (FAOCA), nor the Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing of 22 November 2009 (PSMA) provide for trade-based tools and actions as options in fisheries management and law enforcement.

¹ e.g. UNGA Resolution 59/25 of 17 November 2004; UNGA Resolution 61/105 of 8 December 2006; and UNGA Resolution 64/72 of 4 December 2009.

² See, for example, the conventions of the NPFC and SPRFMO. For completeness, it should be noted that when member States agree to bestow specific powers to the RFMO – e.g. to act in the domain of market controls – even after the constituent instrument is adopted, then that stands. Hence, the legal mandate for an RFMO to act in such way may be derived from any of its decisions or binding instruments, including conservation and management measures. And there are of course a number of these in place today.

However, both the non-binding 1995 FAO Code of Conduct for Responsible Fisheries (the Code) and its related voluntary instrument, the 2001 International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (IPOA-IUU) do provide direct guidance regarding trade-based tools in fisheries management and law enforcement, including catch documentation schemes.^{3,4}

Two UNGA Resolutions on Sustainable Fisheries⁵ urge states, individually and through RFMOs, to adopt and implement trade measures in accordance with international law.

In light of the slowness of trade-related measures in fisheries management to take root, it is essential to underline here that unequivocal and motivated calls for the introduction of trade-based tools in DSF date back at least a decade and a half, highlighting their potential in complementing other measures to conserve and sustainably manage DSF stocks (Lack, Short and Willock, 2003).⁶

In response to the heightened attention afforded to the domain of CDS in recent years, and the need for guidance, FAO developed and published its latest set of international guidelines in 2017. The Voluntary Guidelines for Catch Documentation Schemes were adopted by the FAO Conference at its Fortieth Session in Rome in July 2017 (FAO, 2017a).

The two sets of FAO guidelines on DSF and CDS elaborated and published by FAO in 2009 and 2017, respectively, as well as the elements provided by the Code and the IPOA-IUU on CDS, provide the core foundation on which the assessment in this document is based.

1.1 SCOPE AND STRUCTURE OF THE DOCUMENT

The objective of this paper is not to explore how a CDS could or should be designed to work effectively as a traceability construct in preventing illegally harvested deep-sea products from entering supply chains. Much of that work has been covered in FAO Fisheries and Aquaculture Technical Paper No. 596 exploring CDS design options with regard to tuna fisheries (Hosch, 2016a),⁷ and was further explored in FAO Fisheries and Aquaculture Technical Paper No. 619 (Hosch and Blaha, 2017).

Hence, this document sets off from a position where the topic of CDS design *per se* has been covered, and focuses instead on how relevant or how valuable a properly designed CDS would be in the context of DSF, and under which organizational and institutional modalities they could be applied in order to operate effectively and to make substantive contributions to sustainable fisheries management.

This document is of interest to the contracting parties of RFMOs managing DSF that may be considering the application of CDS in the context of DSF, as well as to the individual states that may have an interest in unilaterally protecting their ports and/or markets from the importation of illegally sourced DSF products through the implementation of a CDS.

Following the introduction contained in this chapter, Chapters 2 and 3 first provide an overview of DSF, and a CDS overview is then provided. Importantly, Chapter 3 introduces notions regarding which management measures a CDS is able to implement

³ FAO (1995). 11 - Post-harvest practices and trade. Paragraphs 11.2 and 11.3.

⁴ FAO (2001). Internationally agreed market-related measures. Paragraphs 65–76.

⁵ UNGA Resolution 61/105 of 6 December 2006; UNGA Resolution 62/177 of 18 December 2007.

⁶ “In order to maximise the effectiveness of conservation and management measures for deep-sea species: (a) RFMOs must consider the role that trade-based measures might play in monitoring and enforcing conservation and management measures for deep-sea species, and introduce such measures where appropriate; (b) port and market States must co-operate with the implementation and enforcement of conservation and management measures established by RFMOs; [...]”

⁷ Although the initial CDS work was conducted with a particular focus on tuna fisheries, the specific species to which a CDS is applied is largely immaterial with regard to CDS design. Principles and design elements enabling a CDS to be sound and able to achieve its objective have general applicability and validity – regardless of the species covered.

directly or in combination with other tools for monitoring, control and surveillance (MCS), setting the scene for their application to DSF. This paper should not be understood as an undertaking providing encompassing summaries of individual DSF, or discussing the ins and outs of existing CDS, their design and effectiveness. Such documents have been prepared in the recent past, they are referenced throughout this document, and the reader is invited to consult them in combination with the summarized matter provided in this chapter in order to gain a more complete understanding. The matter provided in Chapters 2 and 3 should suffice to provide the reader with the basic DSF and CDS background upon which the following chapters build.

Chapters 4 and 5 cover RFMO management frameworks and trade in DSF. Chapter 4 expounds how DSF management frameworks are sensitive or conducive to CDS implementation, what typical IUU profiles are found in DSF, and what the capacity of RFMOs is in terms of developing and operating stand-alone CDS. Chapter 5 deals with the all-important question of trade in DSF, as this dimension conditions the relevance and the success of a trade-based tool to a very large degree.

Chapter 6 provides the discussion, listing the key findings regarding the value and the options for CDS implementation in DSF. The overall conclusion, establishing that the pursuit of individual CDS in DSF (based on the classic RFMO-specific implementation modality⁸) is both unsustainable and bound for failure. It suggests instead the adoption of a new modality centring around the development of a multilateral global “super-CDS”, catering for the needs of many species, many RFMOs and many states – based on a single platform provided as a technology solution by a central service provider. The chapter closes by suggesting the way forward to exploring this particular modality.

⁸ The “design” of a CDS, as discussed in the opening paragraph of this section, is treated as an issue distinct from its “implementation modality” throughout this paper. The latter refers to the options that pertain to implementing a CDS as a single state – unilaterally – as a single RFMO – multilaterally – or as a group of RFMOs and/or states. The “system design” of an effective CDS is largely unaffected by the number and constellation of envisaged institutional, state and/or individual users under any given implementation modality.

2. Deep-sea fisheries in the ABNJ

This chapter addresses the nature, the distribution, the key actors, the viability of DSF, and the international guidelines applying to them. The management of DSF in the high seas, and the RFMOs covering them, are discussed in more detail in Chapter 4.

2.1 THE 2008 FAO INTERNATIONAL GUIDELINES FOR THE MANAGEMENT OF DEEP-SEA FISHERIES IN THE HIGH SEAS

The FAO International Guidelines for the Management of Deep-sea Fisheries in the High Seas embody the current non-binding standard reference for the management of DSF. They are limited in scope to the ABNJ⁹, though they may also be applied by coastal States within national jurisdictions.¹⁰ The Guidelines were developed with a view to assisting states and RFMOs with the implementation of paragraphs 76–95 of UNGA Resolution 61/105 of 2006, concerning responsible DSF in the marine ecosystems of the high seas.¹¹

The stated objectives of DSF management – as put forward in paragraph 11 of the Guidelines – are two-pronged, as follows:

The main objectives of the management of DSFs are to promote responsible fisheries that provide economic opportunities while ensuring the conservation of marine living resources and the protection of marine biodiversity, by:

- i. ensuring the long-term conservation and sustainable use of marine living resources in the deep seas; and*
- ii. preventing significant adverse impacts on VMEs.*

The dichotomy in stated objectives is of significance, as both the stocks and the ecosystems within which they evolve are the direct objects of management efforts. It does not suffice to ensure that individual stocks are managed sustainably, the integrity of the associated physical deep-sea environments – often sensitive and vulnerable – also ought to be given due consideration. This implies spatial monitoring, control and enforcement efforts, which can be quite distinct from the suite of stock management measures that may apply, and thus tend to make management arrangements more complex than would be the case otherwise.

With regard to management considerations, a number of generic proposals are made for targeted types of actions to achieve sustainable fisheries management and the protection of VMEs. In addition to this, the Guidelines call for the enforcement of management measures through effective MCS frameworks and the application of IPOA-IUU and IPOA-Capacity mechanisms.

From a CDS perspective, a key point regarding DSF governance frameworks establishes that Regional fisheries management organizations or arrangements (RFMO/As) should develop mechanisms for communication, cooperation and coordination among themselves, as well as with relevant international organizations and scientific bodies.¹² Mirroring the preceding point, and specifically relating to combating IUU fishing, the Guidelines call for states and RFMO/As to “cooperate to prevent, deter

⁹ Preamble. Para. 5. “These Guidelines have been developed for fisheries exploiting deep-sea fish stocks, in a targeted or incidental manner, **in areas beyond national jurisdiction**, including fisheries with the potential to have significant adverse impacts on vulnerable marine ecosystems (VMEs).” (highlight by the author)

¹⁰ Preamble. Para. 10.

¹¹ Preamble. Para. 1.

¹² Management and Conservation Steps. Para. 29

and eliminate IUU fishing in DSFs, and to take action related to IUU vessels and their listing.”¹³ These two points, calling for communication, cooperation and coordination between RFMOs, are referred to later in this document, when the potential harmonization and/or unification of CDS platforms is considered.

Importantly, in paragraph 60, the Guidelines make direct reference to the development and the adoption of CDS in the following terms:

States should adopt and implement, consistent with international law and in a transparent and non-discriminatory manner, trade-related measures, such as catch and trade documentation schemes, in order to:

- i. enhance their ability to identify vessels and their DSF catch harvested outside or in contravention of applicable conservation and management measures; and*
- ii. adopt measures in respect of IUU vessels and catches from DSFs including, as appropriate, measures to prevent products from IUU DSFs from entering international trade.*

States should actively promote wide international cooperation in order to attain such goals.

“Catch and trade documentation schemes” are referred to as examples of trade-related measures that RFMOs should seek to develop.¹⁴ Trade documentation schemes (TDS) – also referred to as statistical document programmes – are the de facto precursor systems of the more evolved and robust CDS. While TDS had started to be dismissed as schemes of lesser utility ahead of publication of the Guidelines¹⁵ (Joint Tuna RFMOs, 2007), the provision referred to above provides full justification for the CDS assessment provided in this document. If CDS can be instrumental in preventing illegally harvested DSF products from entering international trade, then their adoption and implementation as non-discriminatory trade-related measures should be encouraged.

Other elements of importance to CDS development that the Guidelines propose are:

- “[...] *develop, adopt and publish standardized and consistent data collection procedures and protocols, including standardized logbooks and survey methodologies.*”¹⁶
- “[...] *It is highly desirable that electronic data collection and reporting systems be used.*”¹⁷
- “[...] *ensure that data reporting and analysis is as transparent as possible to facilitate review of the effectiveness of management of DSFs and protection of VMEs.*”¹⁸

These provisions introduce the ideas of data standardization, electronic data collection and submission, and the need for transparency in support of management efforts. All three elements are of equal importance to the development and effectiveness of CDS systems in DSF.

¹³ Management and Conservation Steps. Para. 59

¹⁴ It should be noted that the Guidelines call for the adoption and implementation by states of “trade-related measures, such as catch and trade documentation schemes” – not by RFMOs. At the time the Guidelines were formulated, only a single CDS had been developed and adopted by an RFMO (i.e. CCAMLR), and a further two were under development (i.e. ICCAT and CCSBT’s bluefin tuna CDS). The unilateral CDS of the European Union (Member Organization) had neither been adopted nor implemented at the time. Therefore, the text of the Guidelines is interpreted as meaning to say “adopted and implemented by states through RFMOs to which they are a party.”

¹⁵ The 2007 Joint Tuna RFMO working group on trade and CDS found that “[...] *SDPs [statistical document programmes] had major shortcomings, and that movement to catch documentation schemes [...] was needed.*” (Joint Tuna RFMOs, 2007).

¹⁶ Management and Conservation Steps. Para. 31.

¹⁷ Management and Conservation Steps. Para. 35.

¹⁸ Management and Conservation Steps. Para. 39.

2.2 DEEP-SEA FISH AND THEIR ASSOCIATED ECOSYSTEMS

The deep sea comprises some 90 percent of the world's oceans and is one of the most diverse ecosystems on the planet. It supplies human society with ecosystem services, including the provision of food, the regeneration of nutrients and the sequestration of carbon. Technological advances in the second half of the twentieth century set in motion the large-scale exploitation of mineral, hydrocarbon and fishery resources in deeper oceanic waters that, if managed irresponsibly, constitute a considerable threat to marine deep-sea biodiversity and productivity (Jobsvøgt *et al.*, 2014).

2.2.1 Deep-sea fish in the ABNJ

The definition of deep-sea living resources and their associated fisheries is not straightforward. Invertebrates (molluscs and crustaceans) and vertebrates (bony and cartilaginous fish) form part of the marine living resources targeted by DSF. Bony fish form the bulk of DSF harvests, followed by crabs and shrimps, then rays and sharks, and finally deep-sea molluscs.

The FAO Guidelines on DSF note that the total catch in deep-sea fisheries includes species that can only sustain low exploitation rates¹⁹ and provide a characterization of species targeted by DSF in the following terms:

*“Many marine living resources exploited by DSFs in the high seas have biological characteristics that create specific challenges for their sustainable utilization and exploitation. These include: (i) maturation at relatively old ages; (ii) slow growth; (iii) long life expectancies; (iv) low natural mortality rates; (v) intermittent recruitment of successful year classes; and (vi) spawning that may not occur every year. As a result, many deep-sea marine living resources have low productivity and are only able to sustain very low exploitation rates. Also, when these resources are depleted, recovery is expected to be long and is not assured. [...]”*²⁰

For the purposes of this document, any living marine fisheries resource that evolves beyond the realm of the continental shelf for part or all of its life cycle, and into depths of more than 200 m, some of which have the characteristics outlined in paragraph 13 of the FAO Guidelines on DSF, noted above, may be considered a deep-sea species (FAO, 2009b). Furthermore, the nature of the fishing gear targeting the species and its likelihood of impacts on the benthic habitats play a key role when considering deep-sea fisheries.²¹

Table 1 – adapted from its source – provides a non-exhaustive listing of deep-sea fish, providing biological parameters and an intrinsic vulnerability index for the species, where 0 is lowest and 100 is highest.

¹⁹ Scope and Principles. Para. 8.

²⁰ Description of Key Concepts. Para. 13.

²¹ Note, as an example, that in the NAFO RA in 2016, one particular fishing vessel targeted Alfonsino (*Beryx splendens*) operating pelagic (mid-water) trawl gear. While such operations are unlikely to negatively impact VMEs in the area, the vessel is still targeting a recognized deep-sea species of fish.

TABLE 1
Harvested deep-sea fishes

Family	Scientific name	Common name	L_{\max} (cm)	r_{\max} (per year)	Max. age (year)	Intrinsic vulnerability index
Anoplopomatidae	<i>Anoplopoma fimbria</i>	Sablefish	120	0.08	114	82
Berycidae	<i>Beryx splendens</i>	Splendid alfonso	70	0.50	17	62
Centrolophidae	<i>Hyperoglyphe Antarctica</i>	Bluenose warehou	140	0.15	60	85
Centrolophidae	<i>Hyperoglyphe perciformis</i>	Barrelfish	91	0.11	85	58
Channichthyidae	<i>Champscephalus gunnari</i>	Mackerel icefish	66	0.45	–	56
Emmelichthyidae	<i>Plagiogeneion rubiginosum</i>	Rubyfish	60	0.88	10	41
Epigonidae	<i>Epigonus telescopus</i>	Black cardinalfish	75	0.09	100	74
Lotidae	<i>Molva dypterygia</i>	Blue ling	155	0.38	–	75
Macrouridae	<i>Coryphaenoides rupestris</i>	Roundnose grenadier	110	0.17	54	78
Macrouridae	<i>Macrourus berglax</i>	Roughhead grenadier	110	0.12	–	75
Nototheniidae	<i>Dissostichus eleginoides</i>	Patagonian toothfish	215	0.17	50	85
Nototheniidae	<i>Dissostichus mawsoni</i>	Antarctic toothfish	175	0.29	31	86
Oreosomatidae	<i>Alloctytus niger</i>	Black oreo	47	0.06	153	69
Oreosomatidae	<i>Pseudocyttus maculatus</i>	Smooth oreodory	68	0.09	100	73
Pentacerothidae	<i>Pseudopentaceros richardsoni</i>	Pelagic armourhead	56	0.81	–	43
Pentacerothidae	<i>Pseudopentaceros wheeleri</i>	Slender (N. Pacific) armourhead	44	0.80	11	65
Pleuronectidae	<i>Reinhardtius hippoglossoides</i>	Greenland halibut	80	0.30	30	69
Polyprionidae	<i>Polyprion americanus</i>	Wreckfish	210	0.30	–	80
Polyprionidae	<i>Polyprion oxygeneios</i>	Hapuka	150	0.15	60	87
Sebastidae	<i>Sebastes fasciatus</i>	Acadian redfish	30	0.30	–	48
Sebastidae	<i>Sebastes marinus</i>	Ocean perch	100	0.15	60	77
Sebastidae	<i>Sebastes mentella</i>	Deepwater redfish	58	0.12	75	70
Sebastidae	<i>Sebastes proriger</i>	Redstripe rockfish	61	0.16	55	70
Serranidae	<i>Caprodon longimanus</i>	Pink maomao	50	–	–	34
Trachichthyidae	<i>Hoplostethus atlanticus</i>	Orange roughy	75	0.06	149	73
Trichiuridae	<i>Aphanopus carbo</i>	Black scabbardfish	110	0.33	–	70
Trichiuridae	<i>Lepidopus caudatus</i>	Silver scabbardfish	210	0.90	–	58

Source: Norse et al. (2012).

Table 1 shows that population growth rates (r_{\max}) are generally low and go hand-in-hand with high longevity,²² giving rise to high intrinsic vulnerability indices. For comparative purposes, one can point to the pelagic Peruvian anchoveta (*Engraulis ringens*), which has an r_{\max} of 3.0 and an intrinsic vulnerability index of 39, or the Atlantic herring (*Clupea harengus harengus*) with an r_{\max} of 0.45 and an intrinsic vulnerability index of 30. These are two examples of resilient non-deep-sea species capable of tolerating much higher levels of sustained fishing effort. Few of the deep-sea fishes listed in Table 1 display similar biological traits.

High biological diversity of species also defines the group of deep-sea fishes. Table 1 lists 27 commonly fished deep-sea species. In the North East Atlantic Fisheries

²² Note the longevities of orange roughy and alfonso, both commercially fished species, whose maximum reported age are 1.5 and 2 centuries, respectively.

Commission (NEAFC), for example, 53 deep-sea fish species are monitored and/or regulated in one way or another inside the regulatory area (RA).²³ This compares with five pelagic and oceanic species actively managed by NEAFC (redfish, mackerel, haddock, herring and blue whiting), representing the overwhelming majority of annual catches and the core of the RFMO's management activity.²⁴

Another important characteristic of deep-sea species is the geographic diversity of stocks. While a few species are spatially confined to a single oceanic basin – e.g. the Patagonian toothfish (*Dissostichus eleginoides*) occurring in peri-arctic waters under the purview of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) – other species are made up of a large number of individual stocks with global distribution. Orange roughy (*Hoplostethus atlanticus*), for example, is made up of an estimated minimum of 30 stocks spread across all major ocean basins (Lack, Short and Willock, 2003). This entails that deep-sea species generally fall under the purview of several RFMOs. DSF RFMOs usually do not oversee the management of a deep-sea species' fishery across its global range of distribution.

While stocks of a single species are often spread across several oceanic basins, more than one stock of the same species may also occur within a single RFMO. In NEAFC, the seven species of alfonosinos, tusk, roundnose grenadier, orange roughy, roughhead grenadier, blue ling, and ling are subdivided into a combined set of 23 stocks or management units.²⁵

Deep-sea species may or may not spend the entirety of their life cycles in close association with the benthos, and often have pelagic egg, larval and juvenile phases. Alfonsino (*Beryx splendens*), for example, usually found at depths of 200–400 m, is known to occur down to 1 300 m, and aggregates on seamounts on rocky or sandy substrates. Juveniles, however, are pelagic.²⁶

2.2.2 Vulnerable marine ecosystems

The deep-sea marine ecosystems that fish species are typically associated with consist of ocean-floor topographic features such as seamounts, mid-ocean ridges, banks, continental slopes and canyons. These features can support life-cycle strategies of deep-sea species because they modify the physical and biological dynamics in a manner that enhances nutrient delivery (Genin and Dower, 2007). Some commercial species form dense breeding aggregations over such deep-sea features, driving biomass concentration further. Sessile biota within these deep ecosystems include sponges and cold-water corals.²⁷ It is generally held that biomass concentrations in the deep sea away from such topographic features are low, and otherwise too deep for commercial fishing operations to target.

Hydrothermal vents and cold seeps, generally regarded as highly vulnerable to physical disturbance, and relying on chemosynthetic primary production, are also subject to protection under VME measures, though most are below the depths at which DSF occur.

²³ See: Annex 1b. of the NEAFC Scheme of Control and Enforcement 2016.

²⁴ Redfish (*Sebastes mentella*) is a deep-sea fish species not listed in NEAFC's deep-sea species list. The reason for this is that it is not bottom-associated in the Irminger Sea, the area in which it is fished, and where it is harvested with (deep-sea) pelagic trawls not making bottom contact. For the purposes of this document, redfish is considered a deep-sea fish (see also listing in Table 1), regardless of its lack of sea-floor association in given areas – as seen in Table 2.

²⁵ This compares with a total of four stocks for the four shallow-water pelagic species of mackerel, haddock, herring and blue whiting managed by the NEAFC, and embodying the bulk of the catches within its RA.

²⁶ Source: Australian Fisheries Management Authority (www.afma.gov.au/portfolio-item/alfonsino/)

²⁷ -water corals occur most commonly on continental slopes, on deep shelves and along flanks of oceanic banks and seamounts. Most occur at 200 – 1 000 m in depth. Bathymetric ranges become shallower towards the poles. (Bergstad, O.A. 2016. www.un.org/depts/los/reference_files/Presentations/PPT/Segment1/OAB.pdf)

It is the vulnerability of deep-sea ecosystems directly targeted by fishing operations that is of special interest in the context of this paper. Paragraphs 14 and 15 of the FAO Guidelines on DSF characterize the vulnerability of marine ecosystems in the following terms;

“14. Vulnerability is related to the likelihood that a population, community, or habitat will experience substantial alteration from short-term or chronic disturbance, and the likelihood that it would recover and in what time frame. These are, in turn, related to the characteristics of the ecosystems themselves, especially biological and structural aspects. VME features may be physically or functionally fragile. The most vulnerable ecosystems are those that are both easily disturbed and very slow to recover, or may never recover.

15. The vulnerability of populations, communities and habitats must be assessed relative to specific threats. Some features, particularly those that are physically fragile or inherently rare, may be vulnerable to most forms of disturbance, but the vulnerability of some populations, communities and habitats may vary greatly depending on the type of fishing gear used or the kind of disturbance experienced.”

What emerges from these two paragraphs is that it is the resilience from disturbance that determines the degree of “vulnerability” of these ecosystems. Vulnerability may relate as much to functional aspects of the ecosystem, as it may relate to the disturbance or destruction of the three-dimensional structural integrity of the ecosystem’s sessile biota (e.g. slow-growing cold-water coral or sponges), which in turn impacts the functional integrity of the ecosystem as a whole. It is in light of this that the type of fishing gear used to harvest fisheries resources in these environments is critically important.

This set of considerations leads the FAO Guidelines on DSF to describe a VME in the following terms:

“A marine ecosystem should be classified as vulnerable based on the characteristics that it possesses. The following list of characteristics should be used as criteria in the identification of VMEs.

- i. Uniqueness or rarity – an area or ecosystem that is unique or that contains rare species whose loss could not be compensated for by similar areas or ecosystems. These include:*
 - habitats that contain endemic species;*
 - habitats of rare, threatened or endangered species that occur only in discrete areas; or*
 - nurseries or discrete feeding, breeding, or spawning areas.*
- ii. Functional significance of the habitat – discrete areas or habitats that are necessary for the survival, function, spawning/ reproduction or recovery of fish stocks, particular life-history stages (e.g. nursery grounds or rearing areas), or of rare, threatened or endangered marine species.*
- iii. Fragility – an ecosystem that is highly susceptible to degradation by anthropogenic activities.*
- iv. Life-history traits of component species that make recovery difficult – ecosystems that are characterized by populations or assemblages of species with one or more of the following characteristics:*
 - slow growth rates;*
 - late age of maturity;*
 - low or unpredictable recruitment; or*
 - long-lived.*

- v. *Structural complexity – an ecosystem that is characterized by complex physical structures created by significant concentrations of biotic and abiotic features. In these ecosystems, ecological processes are usually highly dependent on these structured systems. Further, such ecosystems often have high diversity, which is dependent on the structuring organisms.*²⁸

2.3 DEEP-SEA FISHERIES

Deep-sea fishing in the high seas has a long-established history that can be traced back 450 years. Major expansion, both outwards and downwards, began with the development and deployment of factory-freezer trawlers in the mid-1950s.

By 1980, the expansion of DSF had slowed, and only three major developments have taken place since. Orange roughy trawling began in 1979 in the waters of New Zealand and expanded through the next 20 years, including onto seamounts in the high seas in the 1990s. Longlining for toothfish was developed in Chile in the 1980s and has continued a slow expansion within the ABNJ, while the high seas bottom trawling for Greenland halibut in the Northwest Atlantic intensified dramatically in about 1990.

Deep-sea demersal fisheries over the continental slope, ridges, seamounts, and plateaus landed between 800 000 and 1 000 000 tonnes per annum from the mid-1960s until the late 1990s (Koslow, *at al.*, 2000). Significantly lower landings have been recorded since the early 2000s.

Few new fishing grounds have been developed in high seas DSF in the last two decades, and it would seem that fishing for resources deeper than 400 m has been stabilising over the same period. However, these perceived global trends need to be contrasted against the weakness of available statistics.

2.3.1 Bottom trawling, and benthic and demersal sea-dwellers

Owing to UNGA Resolution 59/25 of 17 November 2004, much of the early work in DSF focused on bottom trawling in the high seas, i.e. the operation of fishing gear making sustained contact with the seabed. Owing to the fact that worldwide the vast majority of continental shelf is included within exclusive economic zones (EEZs), bottom trawling in the high seas has naturally applied to deep-sea fishing on continental slopes, seamounts and mid-ocean ridges in waters typically deeper than the continental shelf.²⁹ The “deep sea” and “deep-sea species” found no mention in UNGA Resolution 59/25 of 2004. The protection and conservation of benthic ecosystems preceded those of the associated and targeted fish stocks.

The fact that VMEs became one of the two direct objects of DSF management prerogatives led to a situation where bottom trawling as a fishing gear gained a high level of prominence.³⁰ Yet, from the perspective of managing deep-sea fish stocks, beyond (the important) consideration of VME protection, the gear *per se* matters less. It also matters less whether and when a deep-sea fish species is mesopelagic, bathypelagic or benthic throughout its life cycle. From the perspective of managing the fish stock, some of the salient concerns relate to the biological characteristics of the species (growth and maturation), the fishing pressure the stock is experiencing, and the need to subject the

²⁸ Management and Conservation Steps. Para. 42.

²⁹ In oceanographic terms (as opposed to the legal definition contained in art. 76 of UNCLOS) the average continental shelf is defined as extending to a depth of about 200 m, a depth beyond which – at its outer margin – the continental slope starts. In cases where the shelf extends beyond the confines of the EEZ, UNCLOS refers to this portion as the “extended” continental shelf. Areas of such extended continental shelf do exist, but are rare.

³⁰ FAO (2009) defines the scope of the review as being limited to fisheries that are “occurring in areas beyond national jurisdiction and conducted using fishing gears that either contact or are likely to contact the sea floor during the course of the fishing operation. These fisheries typically target demersal and benthic species.”

fishery to a management framework capable of achieving and maintaining sustainable outcomes; including also, as a concern separate to the biological management of the stock, the conservation of its habitat. All fishing vessels – including those operating gear not making sustained contact with the bottom – are to abide with sets of rules regarding a specific DSF (e.g. closed seasons, quota limits, depth ranges, etc.). From both a fisheries management and MCS perspective (the latter being a constituent part of the former), the focus has to be evenly distributed across all gear types and all DSF stocks, whether bottom-associated or not.

2.3.2 Global distribution of fishing grounds

The fishing grounds of DSF are spread across all major oceanic basins worldwide, but differ in volume of harvests extracted. Few are located in tropical latitudes. Based on 2006 figures, the most important oceanic basin for DSF was the Atlantic Ocean, with major fishing regions located in the Northwest, the Northeast and the Southwest Atlantic, and yielding more than 90 percent of the global harvest. The predominance of the Atlantic Ocean as containing the richest DSF fishing grounds remains unchanged today. In terms of yield, the Atlantic as a whole was followed by the Pacific Ocean, with the North Pacific providing the highest yield. The Indian Ocean followed next, and the Southern Ocean around Antarctica yielded the smallest harvest (FAO, 2009b).

The Southwest Atlantic yields some of the most productive DSF grounds worldwide. In 2006, almost half of the global harvest of bottom fisheries in the deep sea originated from there, though some 90 percent from within EEZs. The DSF in the ABNJ of the Southwest Atlantic are currently not managed through an RFMO.

TABLE 2
Key fishing grounds in three major ocean basins

	Northwest Atlantic	North Pacific	Indian Ocean
Fishing ground	Flemish Cap, Flemish Pass, Grand Banks, Southeast Shoal, continental slope	Emperor Seamounts, Eickelberg Seamounts, Warwick Seamount, Cobb Seamounts, Brown Bear Seamounts	Saya de Malha Bank (on the Mascarene Plateau) and other seamounts

Source: Author's own elaboration.

Table 2 lists a selection of key fishing grounds in three oceanic basins for illustrative purposes.

The selection of fishing grounds rendered in Table 2 shows that the typical topographic features on which DSF occur (banks, seamounts, ridges, slopes, etc.) can vary greatly between oceanic basins.

In terms of depth profile, 75 percent of DSF catches in the Atlantic Ocean occur at depths above 400 m. On the other hand, bottom fisheries above 400 m in the other world oceans are limited. About 25 percent of the total known catch from all world regions originates in waters deeper than 400 m – most of which would naturally be located in the ABNJ. Only in three fisheries have vessels routinely fished below 1 500 m depth,³¹ while a depth of 2 000 m is a limit rarely reached.

A large portion of the DSF harvest often originates from within EEZs; not the high seas. The NEAFC data shown in Table 3 are representative of that fact. Therefore, when focusing on DSF in the ABNJ, abstraction is made of a large portion of the stocks currently in existence. Most bottom fishing on the high seas occurs on smooth seabeds of continental shelves, while most exploited seamounts are located within EEZs. However, exceptions to this rule do exist, notably in the Northwest Pacific, where it is exactly the opposite.

As a result, globally, most deep-sea fishing in the ABNJ is not occurring in waters deeper than 400 m, and a large proportion of deep-sea fishing does not occur in the ABNJ.

³¹ Two fisheries in the Northwest Atlantic and one in the Southern Hemisphere.

2.3.3 Modest harvests

The global deep-sea fish harvest, when compared with catches of other oceanic and pelagic fisheries resources occurring in the high seas, is modest.

Table 3 summarizes 2014 NEAFC catch statistics. In this table, the various redfish stocks and species are added to the DSF harvest, differing from the way statistics are presented by NEAFC itself, by pooling all deep-sea species under a single set of figures. The pelagic catch statistics consequently only cover mackerel, haddock, herring and blue whiting, all of which are (generally) epipelagic.

TABLE 3

Summary: 2014 NEAFC catch statistics

	Total catch inside regulatory area (ABNJ)	Total Northeast Atlantic catch (ABNJ + EEZs)	Relative catch inside regulatory area
	(tonnes)		
DSF (incl. redfish)	37 738	285 946	13.2%
Pelagic fisheries	456 957	3 667 972	12.5%
DSF – relative portion	8.3%	7.8%	–

Source: NEAFC data.

Table 3 shows the typical situation of RFMOs in the Northern Hemisphere covering deep-sea species. When compared with the total annual harvest in the RA, the relative portion of deep-sea fish catches is well below 10 percent. Epipelagic and oceanic fish make up the bulk of the harvest. In NEAFC, more than 91 percent of catches in the RA stem from 4 stocks of 4 epipelagic species of fish, while the remaining 8.3 percent of catches derive from 41 deep-sea species, composed in turn of many more stocks. The DSF harvest comprises bony fishes, cartilaginous fishes and crustaceans. The total catch of deep-sea species in the NEAFC RA in 2014 – including redfish – amounts to a modest 37 738 tonnes.³² For the South East Atlantic Fisheries Organisation (SEAFO), the annual harvest within the RA in 2017 amounted to a total of 162 tonnes, down from 1 130 tonnes in 2010.³³ In the case of SEAFO, 100 percent of the harvest operations it oversees in the Southeast Atlantic ABNJ are deep-sea operations. Those catches represent a minute fraction of the DSF harvest in the Atlantic overall.

Globally, the harvest of bottom fisheries in the ABNJ was estimated at 252 000 tonnes in 2006 – excluding discards – for a landed value of €447 million (FAO, 2009b). FAO estimated the ABNJ DSF harvest at 155 330 tonnes for the year 2014.³⁴ This indicates a general and important declining trend in DSF harvest volumes globally.³⁵ These estimates are indicative only, owing to a number of difficulties to confidently sourcing and establishing the figures. However, with an annual global marine wild capture harvest in the order of 90 million tonnes, it follows that the more recent annual DSF harvests on the high seas amount to about 0.02 percent of the global marine wild-capture harvest.

2.3.4 Fishing gear, catches, fleets and key flag states

About 80 percent of high seas catch of bottom species are taken by bottom trawlers (Gianni, 2004). In 2006, slightly less than 75% of all deep-sea fishing vessels were trawlers (FAO, 2009b). Other important gear types include bottom-set gillnets and longlines of varying types. Bottom trawls are mostly towed over smooth sandy or silty seabeds. Tow duration may range from a few minutes to several hours at a time, depending on the fishery.

³² This volume is equivalent to what the pelagic super-trawler Atlantic Dawn (typically operating pelagic trawls and targeting small pelagics) would harvest over the course of eight fishing trips.

³³ Covering TAC managed species.

³⁴ This figure includes the Mediterranean deep-water shrimp harvest of 5 330 tonnes.

³⁵ The authorized and active fleet operating in NPFC DSF is reported as dramatically reduced in 2017 (P. Flewwelling, NPFC Compliance Officer, personal communication).

TABLE 4
Summary: 2006 DSF harvest and vessels per region

Region	Principal target species	Total catch (tonnes)	Total no. of vessels
Northeast Atlantic	Roundnose grenadier, Baird's slickhead, black scabbardfish, leafscale gulper shark, Portuguese dogfish, deep-water sharks, Greenland halibut, ling, tusk, beaked redfish, golden redfish, haddock, hake, monkfish, deep-water red crabs, orange roughy, blue ling	59 978	66–70
Northwest Atlantic	Northern shrimp, Greenland halibut, redfish and skates	56 523	67
	Orange roughy, alfonsino, Patagonian toothfish and deep-sea red crabs	747	6
Southwest Atlantic	Argentine hake and Argentine short-fin squid	110 983	55
Mediterranean	Norwegian lobster and deep-water shrimps	12 000	no data
North Pacific	Alfonsino and slender armourhead	10 331	16
South Pacific	Orange roughy and alfonsino	3 369	52
Indian Ocean	Alfonsino, orange roughy, deepwater longtail and red snapper	5 000–6 000	20–22
Southern Ocean	Toothfish (2 species)	4 582	20

Source: Adapted from FAO (2009b).

Some of the main species targeted in DSF in the ABNJ include roundnose grenadier (*Coryphaenoides rupestris*), blue ling (*Molva dypterigia*), smoothheads (*Alepocephalus* spp.), redfish (*Sebastes* spp.), black scabbardfish (*Aphanopus carbo*), Greenland halibut (*Rheinhardtius hippoglossoides*), orange roughy (*Hoplostethus atlanticus*), Chilean seabass (*Dissostichus* spp.) and deep-water sharks (see Table 1 also). Table 4 provides an overview by major oceanic basin, major species in the catch, total estimated catch for that year, and number of fishing vessels targeting them. Note that the number of species occurring in these areas is larger than the principal target species listed.³⁶

In 2006, 285 fishing vessels were estimated to have been directly involved in bottom fisheries in the high seas – possibly representing an overestimate. These vessels do not normally fish on the high seas exclusively, but also operate inside adjacent EEZs, often targeting the same or similar resources (FAO, 2009b).

In 2006, some 27 nations had at least one vessel operating in DSF. However, seven of these nations operated no more than nine vessels between them. The most important fishing bloc was the European Union (Member Organization), with 36 percent of the global DSF fleet (103 vessels), followed by the Republic of Korea (33 vessels), New Zealand (32 vessels), the Russian Federation (28 vessels), Australia (24 vessels), and Japan (12 vessels). Together, these represented more than 81 percent of the global DSF fleet at the time. These figures have changed since, with some flag states gaining in prominence, and others losing – as is the case for Spain within the group of states making up the EU fleet of the, for example.³⁷

2.3.5 Economic sustainability of DSF

Many, but not all, of the species targeted in DSF are long-lived, slow growing or late maturing species. The result are DSF that can only sustain low exploitation rates. This requires setting catch limits that are consistent with DFS productivity to ensure their sustainability. Catch limits for DSF are currently set at lower levels than those that were in place when the DSF were first developed. This has required fishing fleets to adjust their operations to ensure their viability. In the past, the goal had been to “fish

³⁶ Table 4 lists 18 principal target species for the Northeast Atlantic. NEAFC lists 48 species occurring in its RA, and provides its approach to management under the following link: www.neafc.org/system/files/NEAFC_approach_to_DSS_conservation-and-management_Nov16.pdf

³⁷ The Spanish DSF fleet operating in the NEAFC RA, for example, has evolved from an all-time high of 26 vessels to less than a handful of vessels more recently.

down” DSF to sustainable levels. This was, however, difficult to achieve and often resulted in overfishing.

Subsidies flowing into DSF operations have been estimated in the past to equal up to 25 percent of the landed value of deep-sea species, lowering the operating costs of subsidized bottom-fishing fleets in the high seas (Sumaila *et al.*, 2010). It has been noted that subsidy reform (through removal or reduction of subsidies) would probably alleviate pressure on stocks to some extent. These reforms would, however, have to be complemented with appropriate management and enforcement measures to DSF (Cox, 2003); including CDS such as explored in this paper.

In its review of DSF in the Northeast Atlantic, the EU Commission concluded that many deep-sea fish stocks have such low productivity that “sustainable levels of exploitation are probably too low to support an economically viable fishery” (EU, 2007).

3. Catch documentation schemes

Through its Resolutions on Sustainable Fisheries 61/105 of 6 December 2006 and 62/177 of 18 December 2007, the UNGA urged states, individually and through RFMOs, to adopt and implement trade measures in accordance with international law, including principles, rights and obligations established in World Trade Organization Agreements.

In Chapter 1 of this document, CDS systems were introduced as trade-based measures capable of tracing fish from hook to market, and whose objective it is to combat IUU fishing by denying market access to fisheries products that have been harvested illegally. Chapter 2 noted that the 2008 International Guidelines for DSF in the High Seas also call for the adoption of CDS to combat IUU fishing; with a view to identifying IUU vessels, and to denying market access to products derived from IUU fishing.

At the heart of CDS systems lies a certification scheme, which consists of catch and trade certificates that accompany products through the supply chain, from landing, through processing into consumer markets. Catch certificates are generally issued and validated by the flag state, while trade certificates are generally issued and validated by port and processing states when landed or imported products are exported (or re-exported) in the same or processed forms.³⁸

In 2017, four CDS were in existence and fully operational. Three of these were multilateral CDS, and one was a unilateral CDS. These are presented in Table 5.

TABLE 5
Existing multilateral and unilateral CDS in 2017

Organization	Species	CDS start	Annual volume (2016 – indicative)
Multilateral CDS			
			(tonnes)
CCAMLR	Toothfish	2000	17 000
ICCAT	Atlantic Bluefin Tuna	2008	19 000
CCSBT	Southern Bluefin Tuna	2010	14 000
Unilateral CDS			
European Union	Wild capture marine finfish exported to the European Union	2010	6.2 million

Source: Adapted from Hosch (2016a).

A further certification scheme covering fisheries products and certifying the legality of trade exists in the form of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). However, CITES is not a fish- or fisheries-specific instrument, and has rarely been acknowledged for its CDS-like mode of operation in the fisheries literature.³⁹ The CITES scheme is of considerable interest in the DSF/CDS context, owing to the fact that it is a market-based mechanism operating a certification scheme similar to a CDS, but under implementation modalities quite different from those underpinning classic- and fisheries-specific CDS. CITES is more fully discussed in a separate section further below in this chapter.

³⁸ A full-length discussion of the functioning of catch documentation schemes can be found in Hosch (2016a), and in summary form in Hosch (2016b) and Hosch and Blaha (2017).

³⁹ CITES is however indirectly referred to in the 1995 Code of Conduct for Responsible Fisheries, under the provisions for Responsible International Trade (11.2), where in paragraph 11.2.9 it provides as follows: “States should cooperate in complying with relevant international agreements regulating trade in endangered species.”

3.1 THE 2017 FAO VOLUNTARY GUIDELINES FOR CDS

A most recent set of international voluntary guidelines for CDS was adopted by the FAO Council in July 2017 (FAO, 2017a). It is generally correct to state that CDS are a politically sensitive topic, owing to their trade-related nature and their potential to impact and disrupt trade in fisheries commodities. With this in mind, the resulting guidelines represent a cautious first step in defining the scope and nature of CDS, their objective, and laying out general principles and functional elements with which CDS ought to be endowed.

In the 2017 Guidelines, which embody the international blueprint to follow and to apply in matters of CDS, the term “CDS” is defined as follows:⁴⁰

“Catch Documentation Scheme”, means 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, hereinafter referred to as “CDS”.

The CDS is thus defined as a system spanning the entire supply chain, from harvest to final importation, and enabling the establishment of the legal origin of the product throughout all stages of production.

The objective of the Guidelines is “to provide assistance to states, regional fisheries management organisations, regional economic integration organizations and other intergovernmental organisations when developing and implementing new CDS, or harmonizing or reviewing existing CDS.”⁴¹

3.1.1 Principles and their application

The Guidelines enunciate in section 3 basic principles that should be followed when developing a CDS, namely: (i) be in conformity with the provisions of relevant international law; (ii) not create unnecessary barriers to trade; (iii) recognize equivalence; (iv) be risk-based; (v) be reliable, simple, clear and transparent; and (vi) be electronic, if possible.

Harmonization of CDS is a goal that may be pursued in the future. This particular point finds resonance in the principle that equivalence (between schemes) should be recognized.⁴²

In addition to the notions of harmonization and equivalence, these six principles introduce the important ideas of “reliability” – interpreted to mean that a CDS must be designed in a way that it is able to effectively achieve its objective – and “transparency”. Transparency is gaining traction in supply chain management, not only for monitoring and compliance purposes, but also serving the commercial goal of building consumer trust through the marketing of products claiming social and environmental responsibility; such claims being based on transparent and verifiable sourcing frameworks. Limiting the risk of reputational damage is part of private-sector interests in pushing for more supply chain transparency (Bailey and Egels-Zandén, 2016), which in turn will facilitate the development and operation of future CDS.⁴³

Section 4 of the Guidelines lays out the de facto objective of a CDS, providing that:

“Every effort should be made to ensure that CDS are only implemented where they can be an effective means to prevent products derived from IUU fishing from entering the supply chain.”⁴⁴

⁴⁰ Definitions. Para. 2.1.

⁴¹ Scope and Objective. Para. 1.3.

⁴² Application of Basic Principles. Para. 4.3.

⁴³ Application of Basic Principles. Para. 4.5.

⁴⁴ Application of Basic Principles. Para. 4.4.

This mirrors the objective pursued through trade-related measures as provided in the International DSF Guidelines: “adopt [...] measures to prevent products from IUU DSFs from entering international trade.”⁴⁵ It also reflects the provisions of the IPOA-IUU on the same topic: “[...] to prevent fish caught by vessels identified [...] to have been engaged in IUU fishing being traded or imported into their territories.”⁴⁶

The notion that a CDS must be able to effectively prevent IUU-derived product from “entering” the supply chain is key, and must be emphasized. In other words; if mechanisms inherent to the CDS do not allow for the detection of IUU fishing operations, and IUU-derived products are able to gain certification and to migrate as legally certified products along supply chains towards their end-markets because of this, then the CDS cannot contribute significantly to eliminating IUU fishing. The capacity of the CDS system to detect fraud at the beginning of the supply chain is key, and conditions the decision of whether a CDS is an appropriate tool to implement or not.

While no definition and objective for CDS is provided in international law, the voluntary instruments developed since 2001 are patently clear regarding the nature and the objective of CDS. They are systems aiming to wall-fence legally obtained products in moving from harvest to market, ensuring that products of illegal origin are denied market access every stop along the supply chain.

From the perspective of the CDS objective, the Guidelines also provide that CDS should only be implemented “from within the context of an effective fisheries management regime.”⁴⁷

The other element of critical importance regarding principles and their application is the development and use of “secure electronic systems” for the operation of CDS – in order to avoid “the risk of falsification”. The Guidelines provide key attributes and functions with which the electronic systems should be endowed, including the following:⁴⁸

- 1 Serve as the mechanism for issuance and validation of catch certificates.
- 2 Function as the repository of catch certificate and supply chain data.
- 3 Allow verification of information.
- 4 Ensure that accurate and verifiable information is available along the supply chain.
- 5 Be based on international standards for information exchange and data management.
- 6 Minimize the burden on users.
- 7 Provide functions for uploading scanned documents.
- 8 Provide functions for running data queries.
- 9 Define roles and responsibilities for data input and validation.
- 10 Provide secure access via logins and passwords.
- 11 Define system levels to which individual users or user groups have access.

Certificates should hence be issued and validated through an electronic system, which serves both CDS functions of data generator/validator and data warehouse (points 1 and 2) allowing data to be linked (point 5) and to remain available and accessible along the entire supply chain (point 4).

This gives rise to what is more commonly referred to as a central registry. The central registry (or central data repository) is the centrepiece that allows a CDS to effectively meet its objective. It is this mechanism that enables meaningful verification

⁴⁵ Enforcement and Compliance. Para 60 (ii).

⁴⁶ Internationally Agreed Market-Related Measures. Para. 66.

⁴⁷ Application of Basic Principles. Para. 4.4. and Para. 4.4 (d) specifically

⁴⁸ Application of Basic Principles. Para. 4.6.

of information (point 3), either in manual or automated fashion,⁴⁹ along the supply chain from harvesting of fish to the final point of importation of fisheries products. In the absence of a central registry, verification of information becomes difficult, and in longer supply chains, operators and regulators may become unable to establish the validity of the paperwork accompanying consignments delivered to premises, or – in the case of authorities – imported into territories.⁵⁰

3.1.2 Cooperation, notification, functions and standards

Other attributes and functions provided for in the Guidelines – generally relating more to CDS development and implementation modalities – and that are especially important in the context of this paper, include:⁵¹

1. States should seek wide multilateral engagements in the development and implementation of CDS.
2. Cost-effectiveness considerations should guide [...] the development and implementation of CDS.
3. Multilateral or regional CDS are preferred.
4. The objective of a CDS should be clearly defined.
5. The CDS should be designed to meet its objective.
6. Applicable Harmonized System (HS) classifications should be listed.
7. In the validation process, different roles of relevant states to authorize, monitor and control fishing operations and verify catch, landing, and trade should be fully recognized.
8. Validation of catch documentation should be done by a competent authority.
9. All relevant states could take part in the verification of information in the catch documentation.

Multilateral approaches and resulting multilateral systems are preferred over unilateral approaches to developing CDS (points 1 and 3). This paper clarifies why this is especially pertinent in the context of DSF.

Points 4 and 5 also give rise to important considerations. With a single exception, the existing CDS do not clearly define the objective of the scheme,⁵² and they have hence a tendency to add functions not in support of the (putative) objective, and are therefore prone to becoming more burdensome, more ineffective and less cost-effective over time. Effective CDS functions can only be developed when an agreed and clear objective is being pursued.

The definition of the HS categories (point 6) to which the scheme applies to is important, and sometimes embodies an alienating factor for fisheries practitioners. However, as the CDS is a trade-based tool, and is largely implemented through the

⁴⁹ Automated data verification routines and alarms notifying detected discrepancies should be considered standard functions of such electronic systems, reducing the burden of authorities to verify submitted data – and the related claims – manually.

⁵⁰ From the perspective of data management and verification, it is not important whether the central registry consists of several autonomous electronic units connected to one another and capable of exchanging information, or whether it consists of a single centrally managed unit collecting all data. The latter presents many advantages over the former, but an interconnected satellite configuration consisting of many stand-alone units is possible in theory.

⁵¹ Cooperation and notification; and recommended functions and standards.

⁵² Only the EU IUU Regulation 1005/2008, establishing the unilateral CDS of the European Union, clearly defines the objective of the CDS in the preamble to the Regulation, as follows: “[...] As the world’s largest market for, and importer of fishery products, the Community has a specific responsibility in making sure that fishery products imported into its territory do not originate from IUU fishing. [...]” (Preamble para. 9), and “Trade with the Community in fishery products stemming from IUU fishing should be prohibited. In order to make this prohibition effective and ensure that all traded fishery products imported into or exported from the Community have been harvested in compliance with international conservation and management measures and, where appropriate, other relevant rules applying to the fishing vessel concerned, a certification scheme applying to all trade in fishery products with the Community shall be put in place.” (EU, 2008, Preamble para. 13).

action of border control agents and the customs agencies from which they depend, the translation of fish species and fish products into customs codes is of essence to ensure the smooth implementation of the envisaged controls.

Another key point relates to verifications and validations of certificates, and which state is responsible for these (points 7 and 9). Under all existing CDS, the flag state has the exclusive competence for the verification and validation of catch certificates. However, under international law, both the coastal state and the flag state share duties and responsibilities to administer and oversee fishing operations in the EEZ.⁵³ Expanding verification and validation competence in future systems to state actors other than the flag state may result in diluting the primacy of flag state domination in the CDS landscape, by extending it to other entitled state actors also. Flag state primacy in the context of CDS is inconsistent, bearing in mind the historically pervasive failure of flag states to discharge their duties under international law (Doulman, 2004; Rayfuse, 2004; Baird, 2005). Trade-based measures, as well as port state measures, the latter enshrined in the recent PSMA, ought to be understood as efforts to overcome the limits and failings of flag state jurisdiction and enforcement, and to spread duties and responsibilities for combating IUU fishing more evenly between interested state parties, including coastal, port and market states. Point 9 in the above list addresses this directly.

Finally, an act of validation of catch documentation (i.e. a certificate) by a designated competent authority is a hallmark of CDS (point 8). This has implications as to whether the United States Seafood Import Monitoring Program (SIMP), which entered into force in January 2018, will ultimately qualify as a CDS, or will eventually be considered a category of trade-based measures of its own standing (see section 3.3).⁵⁴ The SIMP does not foresee a certification system in the classic CDS sense, and validations of scheme-specific paperwork will not normally be provided by competent authorities upstream from the point of importation into the United States market. The onus to collect supply-chain information establishing the supposed legality of imported products rests on importers.

3.1.3 Non-CDS trade-related measures

Catch and trade documentation schemes are not the only “trade-related measures” existing in fisheries today. Other trade-related measures, implemented by both RFMOs, states and blocks of nations in the past, also cover trade restrictive measures (TREM). These equate to trade embargoes slapped on nations convicted of flouting – or quietly accepting or encouraging the flouting – of fisheries rules.

This paper does not discuss TREMs further. Both the European Union and the United States of America – the latter most recently⁵⁵ – have issued unilateral TREMs in the past to penalize fishing nations for perceived shortcomings in combating IUU fishing. The International Commission for the Conservation of Atlantic Tunas (ICCAT) is the only RFMO to have issued TREMs to date. TREMs can be used as a sanctioning mechanism against countries failing to implement a CDS with due diligence, but also other failings. TREMs are otherwise unrelated to CDS altogether. An encompassing discussion of these instruments has been published elsewhere (Hosch, 2016b).

⁵³ For an encompassing discussion on potential coastal state options regarding the statutory verification and validation of catch certificates under revised or future CDS systems, see Hosch and Blaha (2017).

⁵⁴ Based on the SIMP’s objective to eliminate the importation of products derived from IUU fishing, congruent with the objective of a CDS, the SIMP is currently regarded/understood by many as a unilateral CDS – despite its “unorthodox” mode of operation.

⁵⁵ In 2017, Mexico became the first country to receive a “negative certification” from the United States of America under the 2006 Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (MSRA) for unauthorized fishing in United States waters and overfishing of stocks shared with the United States of America. Mexico became subject to denial of port privileges, and export restrictions for certain fish and fish products to the United States of America were applied (NOAA, 2017). Since 2013, the European Union has “identified” (or “red carded”) six non-EU states under the EU IUU Regulation (as of March 2018).

3.2 MULTILATERAL SCHEMES – RFMOS

Existing CDS systems fall into two functional categories: multilateral systems, and unilateral systems. This categorization is pertinent as the underlying CDS models – while sharing commonalities – harbour some conspicuous differences.

Owing to the clear guidance provided in both the 2001 IPOA-IUU and the 2017 Voluntary CDS Guidelines regarding the desirability in developing multilateral systems, the assessment contained in this paper espouses the multilateral approach as the default option. However, from the point of view of CDS implementation modalities, the unilateral end-market approach is not to be dismissed, and unilateral systems and their key characteristics are introduced in summarized manner in section 3.3.

3.2.1 The schemes in existence today

Table 5 lists the three multilateral CDS in existence today. The oldest of these schemes is the CCAMLR⁵⁶ CDS; it covers two species of toothfish and was launched at the turn of the millennium. The introduction of the two single-species tuna CDS of ICCAT and the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) followed each other closely, almost a decade later.

The three schemes have been subjected to performance reviews and upgrades throughout their lifetimes. Two out of three schemes are electronic today, all three of them having originally started out as paper-based schemes. The remaining, paper-based, scheme at CCSBT operates a manual central registry capable of detecting inconsistent trades, and feasibility studies to move the scheme across onto an electronic platform have been prepared in the recent past.

A common trait of these three schemes is that they cover fisheries with relatively modest harvests. The combined total allowable catch (TAC) under the three schemes was less than 52 000 tonnes in 2016.⁵⁷

3.2.2 Strengths of multilateral CDS

Rather than introducing the schemes individually, the following subsections highlight strengths and limitations of the three multilateral schemes, and which serve as guidance in discussing the benefits of introducing CDS in DSF.

Coverage of the entire species and their management regimes

The major and most important trait of existing multilateral CDS is that they cover the fisheries of a particular species entirely. All Antarctic and Patagonian toothfish harvests, all Atlantic bluefin tuna harvests, and all southern bluefin tuna harvests are covered completely by the respective CDS.⁵⁸ This implies that the species as a whole, and their related individual fisheries and stocks, fall under the protective umbrella of the CDS. The CDS therefore embodies a holistic implementation tool for the full management regime applied to the species (and all of its individual stocks). This is not the case for unilateral schemes, where only the portion traded into the market state operating the scheme enjoys the protection conferred by the CDS.

Full supply chain coverage and enforcement

Multilateral CDS apply to all supply chain transactions that fish and their derived products are undergoing. Once fish start moving through the supply chain, and enter international trade, they must be accompanied by the relevant CDS paperwork. Failure

⁵⁶ It is acknowledged that CCAMLR is not an RFMO. However, it executes the functions of an RFMO with regards to toothfish fisheries, and the CDS it operates, and is therefore assimilated to other RFMOs with similar functions throughout this paper.

⁵⁷ This is equivalent to less than 0.1 percent of the world wild-capture harvest by volume.

⁵⁸ Note caveat regarding toothfish harvests and the CCAMLR CDS under the first subsection of section 3.2.3.

to adhere to these binding international rules applicable to the CDS results in illegal trade transactions.

The benefit of this is that the CDS can be enforced at any point along the full supply chain, which stands in contrast to unilateral schemes. In those schemes, the CDS applies to the full supply chain of products flowing towards the market state operating the scheme; but products may also be flowing towards other markets, and therefore the existence of paperwork only becomes mandatory at the border of the market state operating the scheme. Hence, the scheme can only be enforced at the border at the time of importation into the same market state. Supply chain oversight and the opportunities for enforcement are therefore inherently weaker.

Compatibility with international trade law

The strength of multilateral CDS lies in the fact that they can be designed to cover a fish stock or fish species across its entire geographical range, and that the bodies enacting CDS, and the putative related TREMs (i.e. trade sanctions) are grounded in international law as multilateral environmental agreements (WTO, 2005). This strengthens the general compatibility of such measures with WTO rules (Hosch, 2016b).

3.2.3 Limits of multilateral CDS

Stock distribution beyond the regulatory area of the individual RFMO

Multilateral RFMO-operated CDS hit a first and important limit when the geographical range of the stock to be covered by a CDS extends beyond the regulatory area of the RFMO. In such cases, catches realized in waters outside an RFMO's RA would fall outside the scope of its CDS, and could hence be legally traded to markets in the absence of CDS paperwork, which applies only to fish caught inside the RA. This would then create a situation similar to that under unilateral schemes, where one part of a given species may be traded in the absence of CDS paperwork, while the other part must be covered – depending on the declared (or presumed) geographical location of the underlying harvesting operations.

However, in the absence of CDS paperwork, the putative fishing area is difficult or impossible to confidently establish as the market state has no access to such data, and in longer supply chains such information becomes complex to gather or manage.

In the case of CCAMLR, toothfish catches do occur outside its RA, notably in the RAs of the South Pacific Regional Fisheries Management Organisation (SPRFMO), the Southern Indian Ocean Fisheries Agreement (SIOFA), and SEAFO.⁵⁹ However, Conservation and Management Measure (CMM) 10-05 (2016) on a CDS for *Dissostichus* spp. applies to the species in a manner that is not confined to its RA, as contracting parties are not to allow the landing or trans-shipment of any of the species in its ports in the absence of a *Dissostichus* catch document (DCD).⁶⁰ This provision is further strengthened by key market states, such as the United States of America, which require vessel monitoring system (VMS) reporting to the CCAMLR, regardless of whether toothfish catches originate from within or outside the RA, if the related products are to be imported into the United States market thereafter.

With the exception of Cook Islands, Cuba and Taiwan Province of China, the contracting parties to SPRFMO are also contracting parties or cooperating

⁵⁹ In the Southwest Atlantic, Patagonian toothfish catches have been reported as far north as offshore Brazil (Sancho Andrade, Ortiz - Von Halle and Naranjo Cuvi, 2002).

⁶⁰ CMM 10-05. Paragraph 3. "Each Contracting Party and non-Contracting Party cooperating with CCAMLR by participating in the CDS shall require that each landing of *Dissostichus* spp. at its ports and each transshipment of *Dissostichus* spp. from, or to, its vessels be accompanied by a completed DCD. The landing or transshipment of *Dissostichus* spp. without a DCD is prohibited. The use of the e-CDS to generate, validate and complete a DCD is mandatory."

non-members of CCAMLR and are thus bound by the terms of CCAMLR CMM 10-05 to ensure adherence to the CDS. A memorandum of understanding (MoU) adopted by CCAMLR Members in late 2015 and submitted to SPRFMO for adoption in early 2016 seeks “to facilitate, where appropriate, cooperation between SPRFMO and CCAMLR in order to advance their respective objectives, particularly with respect to stocks and species which are within the competence and/or mutual interest of both organisations.”⁶¹ Toothfish is one of these species, and the MoU seeks to provide for cooperative arrangements on MCS issues in particular – including CDS.⁶²

Notwithstanding the legal implications and challenges, it is technically feasible to operate a CDS out of one RFMO, covering catches of a determined species whose natural geographic range extends beyond the regulatory area of that RFMO, basing the CDS on the species and the associated fishing operations, rather than limiting it to catches made within the RA of the same RFMO. Out of this consideration, *inter alia*, arises the idea of a single, harmonized, and global “super-CDS”, which overcomes the natural limitations of individual RFMO regulatory areas and jurisdictions, and may be applied to any number of species that could benefit from the protection conferred by a CDS. Given that DSF species generally are made up of many stocks straddling several RFMO RAs, this consideration is crucially important.

CDS resource needs and costs to RFMOs

In general, RFMOs are organizations with a limited staff contingent based at the secretariat of the organization.

However, a CDS – one among several MCS tools to be deployed (potentially) by an RFMO – requires significant resources to develop, and then to implement and manage. From experiences made at ICCAT, CCSBT and CCAMLR, it is reasonable to suggest that a part-time equivalent of a compliance manager, and a part-time equivalent of an IT/database manager (i.e. two positions equating to a single full-time staff equivalent) are the absolute minimum required to operate a CDS, and that this minimum is generally exceeded. For RFMOs overseeing DSF today, such extra capacity in terms of human resources is generally not given, thus requiring an increase in staff endowments if a CDS were to be added to an RFMO’s MCS toolbox.⁶³

With regard to these considerations on RFMO resource needs, the option to share the operation of a common CDS platform between several parties, would allow them to largely overcome limiting personnel and operating cost considerations (see section 3.6).

Multiplication of CDS globally

A further limitation of CDS development is the fact that the continued proliferation and multiplication of new schemes, whether multilateral or unilateral, place a severe burden on all involved stakeholders; the latter include the RFMO secretariats themselves, the operators in the fisheries sector along the entire supply chain asked to comply with schemes, and the different national administrations along supply chains

⁶¹ See: <https://www.sprfmo.int/assets/Meetings/Meetings-2013-plus/Commission-Meetings/4th-Commission-Meeting-2016-Valdivia-Chile/COMM-04-09-Memorandum-of-Understanding-with-CCAMLR.pdf>

⁶² MoU. Paragraph 2. *iii*. “The Organisations will establish and maintain consultation and cooperation in respect of matters of common interest to both organisations. In particular the Organisations will cooperate to harmonise approaches in areas of mutual interest and concern, including, but not limited to *v*. monitoring, control and surveillance policies and systems, including with respect to Vessel Monitoring Systems; *vii*. consider methods of recognizing and supporting conservation and management measures adopted under the SPRFMO Convention and conservation measures adopted under the CAMLR Convention;”

⁶³ The operation of the unilateral CDS of the European Union, which is not operated centrally – but independently by 28 individual member states, is extremely expensive. Hosch (2016b) estimated that after seven years of operating the CDS: “EU-wide member state staff costs relating to the operation of the scheme alone are likely to exceed a total of €100 million by the end of 2016.”

that have to implement, monitor and enforce the schemes. The latter span flag, port, processing and end-market states, and require different administrative and compliance arrangements at the level of each distinct state-type – honed to the needs of every single scheme for which products are traded. Country-level arrangements in support of CDS are discussed in another recent FAO publication (Hosch and Blaha, 2017).

Since January 2010, an importer of fisheries products into the EU market needed to understand and be in a position to confidently handle the differing rules and requirements of four different CDS (ICCAT, CCSBT, CCAMLR and the EU), depending on the products to be imported, and the same applies to the staff of customs and fisheries administrations of EU countries tasked with exercising oversight. A similar situation now exists in the United States of America.

Lack of a benchmarking scheme or standard for CDS

Another weakness relates to the fact that with every CDS, and potentially every future new CDS, a new way of designing and operating a CDS is potentially implemented. The SIMP is living testimony to this observation. No CDS standard exists, and a benchmarking tool allowing standardizing and aligning a prospective new CDS to operate in a known and recognized fashion along lines of system design proven to function effectively is absent. Documents and certificates under each scheme look different, are filled, submitted and filed in different ways, and rules applicable to the schemes – similarities apart – also present important differences.

Aside from the fact that this renders the proliferation of new schemes – discussed in the previous section – burdensome, the main consequence of the lack of a benchmarking tool is that all existing schemes were born with design flaws, enabling fraud to occur to varying degrees, and the CDS safeguards to be by-passed.⁶⁴

Market-state RFMO membership and collaboration

One of the problems for multilateral CDS is when important market states are neither parties nor cooperating non-members of the RFMO operating the CDS. Such non-membership implies that the market state is far removed from the debates and the work of the RFMO and is generally neither obliged nor properly enabled – in legal terms – to adopt and transpose RFMO resolutions into national law ruling importation of products otherwise falling under the international regulatory framework of the CDS. With the continued existence of open and risk-free markets paying premium prices for products harvested in contravention of applicable conservation and management rules, IUU fishing is facilitated, and the overall effectiveness of the CDS is undermined.

A pertinent example is the CCAMLR CDS and the market in Hong Kong SAR for toothfish. While China is a member of CCAMLR, and applies the CDS, Hong Kong SAR is a separate administrative entity, and the CAMLR convention has not been extended to it. Therefore, Hong Kong SAR has no stake in CCAMLR's toothfish CDS, and as an end-market state naturally participating in the toothfish supply chain, it does not implement the CCAMLR CDS in any form or manner.⁶⁵ However, as an important toothfish importer, Hong Kong SAR has been formally approached by

⁶⁴ Seventeen years after the coming into existence of the first CDS globally at CCAMLR, the 2017 Voluntary Guidelines on CDS were published by FAO (see section 3.1). The guidelines provide useful guidance as to what a CDS is, what it is aiming to achieve, and how – in broad terms – schemes should be designed and operated. This may prove instrumental in focusing and harmonizing ideas and efforts at RFMO level to develop new schemes. The Guidelines could embody a first step in the direction of developing a CDS benchmarking tool. Such a tool would allow assessing and revising existing schemes against an agreed standard; and provide a basis upon which new schemes could be developed faster, more effectively, and with much more confidence (Hosch, 2017).

⁶⁵ The same situation also applies to trade of Atlantic and southern bluefin tuna products into and out of Hong Kong SAR, for which the respective ICCAT and CCSBT CDS paperwork is also disregarded and not enforced.

CCAMLR and invited to collaborate with the RFMO and to apply the CDS to its market. Hong Kong SAR started to participate as an observer at annual meetings of CCAMLR in 2014, and by 2017, the process of developing the legal framework to apply the CCAMLR CDS to toothfish trade in a binding manner had been launched and was ongoing.^{66, 67, 68}

3.2.4 Successes of multilateral CDS

Given the important disparities between IUU fishing incidence, the types of prevalent IUU fishing and the impacts such IUU fishing has on the sustainable management of the resources in the various fisheries to which CDS have been applied, it is necessary to first establish what conditions must be met for any CDS impact to be measurable.

Establishing the impact of a CDS through the observation of stock recovery – the most relevant and important consideration from a fisheries management point of view – can only occur in a fishery in which the resource base (or standing biomass) has been severely reduced, and in which IUU fishing continues to be a severe problem. Second, after IUU fishing has been substantially reduced or eliminated, the management framework must be fit for purpose; its continued pursuit and implementation must naturally lead to the gradual recovery of the stock (or stocks) when IUU fishing has been significantly reduced through CDS implementation.

In CCAMLR, the CDS was introduced in a precautionary-like manner at a time when the estimated toothfish stock biomass was still in a close-to-virgin condition, implying that maximum sustainable yields had not yet been reached, let alone overshot. Hence, any reduction in IUU fishing through the CDS, leading to stock recovery, would have remained largely undetectable. Only trade- and market-based research would have been able to detect impacts. In CCSBT and ICCAT, the CDS was introduced at a time when stocks were severely reduced, and were facing the tangible prospect of collapse.⁶⁹ It is generally acknowledged that the willingness of ICCAT CPCs to agree to biologically safe exploitation limits was historically greater than that at CCSBT.⁷⁰ Therefore, the solidity of the management framework and the agreed limits on exploitation – and with it the potential to rebuilding the stocks in the absence of IUU fishing – was probably greatest at ICCAT, and it is hence appropriate to look especially at ICCAT to understand what the putative effect of a CDS may be.

Impact of the ICCAT and CCSBT CDS on bluefin tuna stocks

In ICCAT and CCSBT, most of the illegal fishing was perpetrated by licensed fishing vessels overfishing their allocated quotas and under-reporting their catches, and the lion's share of the harvest was exported to a single end-market state (i.e. Japan). Following the introduction of the CDS, and its implementation by the most important flag and market states, the option to under-report faded, and with it the economic

⁶⁶ Mr. Kin Ming Lai, Director, Department of Agriculture, Fisheries and Conservation, Hong Kong SAR, personal communication.

⁶⁷ The willingness and capacity of Hong Kong SAR to enact solid trade-related environmental conservation measures was underscored in January 2018, when lawmakers of the world's largest ivory market (i.e. Hong Kong SAR) voted into place a gradual ban on all ivory trade, to be complete by 2021 (see for example: www.bbc.com/news/world-asia-china-42891204).

⁶⁸ In its 2014 report on the Implementation of Conservation Measure 10-05, CCAMLR's CDS, the CCAMLR Secretariat noted: "The number of non-Contracting Parties that may be involved in the harvest and/or trade of *Dissostichus* spp. while not cooperating with CCAMLR by participating in the CDS continues to increase. As of September 2014, 23 non-Contracting Parties have been identified over the last five years to be possibly involved in the harvest and/or trade of *Dissostichus* spp. while not cooperating with CCAMLR by participating in the CDS." (CCAMLR, 2014)

⁶⁹ In 2010, the estimated standing stock biomass of bluefin tuna stocks was assessed to have declined by up to 97 percent from before commercial fishing began, and to evolve far below B_0 (i.e. the standing stock biomass at which the stock is fished at maximum sustainable yield) (Hosch, 2016b).

⁷⁰ Both RFMOs operate TAC and quota systems applying to their respective bluefin tuna stocks, in the same manner as the CCAMLR does for its two species of toothfish.

viability of flouting quotas. ICCAT's Standing Committee on Research and Statistics estimated that (undeclared) quota overfishing equalled 100% of TAC in the year preceding the introduction of the BCD, and fell to close to zero the year following its introduction, providing the foundation for a stock recovery to occur.

Both CCSBT and ICCAT have documented the signs of a recovery in their respective stocks since about 2010 (Boustany, 2011; ICCAT, 2015), following the introduction of CDS in both fisheries. This trend, more modest in the case of CCSBT, is continuing. In 2015, the Atlantic bluefin tuna TAC was increased for the first time in a decade, a trend that has continued since. The bluefin tuna annual TAC is poised to hit 36 000 tonnes by 2020 – marking an overall TAC increase of 123 percent over the six-year period starting in 2014.

By 2015, CCSBT's southern bluefin tuna TAC had gradually increased by 33 percent since the coming into force of its CDS (in 2010), but this trend has since slowed, especially when compared with ICCAT. The currently projected six-year overall TAC increase between 2014 and 2020 is limited to 42 percent, reflecting an overall weaker and slower recovery trend of the southern bluefin tuna stock.

Overall, for bluefin tuna, there is a strong correlation between the introduction of the CDS and the onset of stock recovery. While non-CDS MCS instruments may have played some part in documented bluefin tuna stock recovery trends, the respective CDS, combined with solid enforcement by relevant port and market states, are the most immediate and most important factors underpinning the triggering of the recovery that can be observed in those two fisheries today.

Impact of the CCAMLR CDS, and the difference from ICCAT

In CCAMLR, the largest share of IUU fishing in the convention area was practised by non-licensed vessels. These operations persisted to a substantial degree following the adoption of the CDS, owing to the fact that IUU vessels managed to continue landing into ports and end-market states of convenience (i.e. not applying the CDS) with important absorption capacities, thus providing an avenue to maintaining the economic viability and the practice of illegal operations. While it is not excluded that some illegal operations were eliminated with the coming into force of the CDS – as a CDS-induced port, processing and market state lock-down in compliant states took place – no study the author is aware of has shown such an effect to date.

Hosch (2016b) notes that: “In 2015, the Coalition of Legal Toothfish Operators (COLTO) estimated the proportion of the unreported/illegal catch to be 6 percent of the total annual harvest, crediting the CDS as one among several effective enforcement actions instrumental in achieving this result.”;⁷¹ adding that the effectiveness and impact of any of the other (non-CDS) enforcement actions at CCSBT and ICCAT would not be able to “rival the mix of sea patrolling and non-CDS related law enforcement exerted in (and beyond) the CCAMLR area, which has played a key part in eliminating the activities of many of the most persistent perpetrators of IUU fishing in the convention area.”

Owing to the specific profile of IUU operators in the CCAMLR area, as noted above, the impact of the CDS itself in eliminating the most damaging forms of IUU fishing was limited.

In conclusion, it is important to underline that a CDS may indeed embody the key-in-hand solution to largely and effectively eliminate IUU fishing in one fishery, while it may fail to have any palpable impact in another. However, a well-designed and effectively implemented CDS can directly and mechanically eliminate given forms of IUU fishing – potentially to a very large extent – depending on the situation, and thus ensure that stocks are being fished within the limits set in management frameworks.

⁷¹ See: COLTO (2016).

Although a CDS may not fix all forms of IUU fishing in all situations, it can effectively address many standard IUU fishing challenges.

3.2.5 Design and system components of multilateral CDS

Other FAO publications have delved into the question of effective CDS design and system components in great detail.⁷² It should be noted that the CDS design and system component considerations covered in FAO Fisheries and Aquaculture Technical Paper No. 596, which focuses specifically on tuna fisheries, are equally applicable and valid for all other RFMO-managed fisheries considering implementation of a CDS. The functional design and components of an effective CDS are not influenced by, and do not change as a function of the species a CDS covers – although specificities of given fisheries may be unique, and thus influence minor details of system design.

For a summarized overview, the reader is invited to consult section 3.2 “Shared CDS design and function” of FAO Fisheries and Aquaculture Technical Paper No. 619, on the components and functions of the three existing multilateral CDS. Relevant points are presented here for ease of reference:

1. Each CDS covers the entire species throughout its global range and is managed by a single RFMO.
2. Any given CDS may cover more than one species (e.g. CCAMLR).
3. CDS paperwork is submitted to, and validated by, designated government authorities along the entire supply chain, monitoring and vouching for the truthfulness of the submitted information.
4. Central certificate registry operated by RFMO secretariat: copies of all catch and trade certificates are registered once they have been issued, either electronically or physically.
5. CDS document system: consisting of two functional types of certificates, i.e. catch and trade certificates.
6. Sequential linking: catch and trade certificates are linked sequentially, enabling:
 - a. traceability between countries (international trade transactions);
 - b. mass balance monitoring within countries (in vs. out).
7. CDS can detect data and mass balance inconsistencies and laundering fraud into certified supply streams.⁷³
8. Following harvest and unloading, CDS do not trace product through national supply chains, but limit their remit to international trade transactions (between countries).
9. The trend for all CDS is to move to online electronic systems for submission, validation and tracking/control of data along the full supply chain.

⁷² See: Hosch (2016a) and Hosch and Blaha (2017).

⁷³ The linking of sequentially issued certificates, as listed in point 6, and the resulting detection capacity of laundering fraud, as listed in point 7, remains imperfect under ICCAT’s eBCD. The system remains incapable of detecting laundering fraud in automated mode: “The eBCD Working Group needs direction from the Commission on the following issue: (c) Should there be a clearer connection between the product weight listed on a re-export certificate and how much of that weight came from each of the underlying BCDs associated with that re-export certificate. Currently, Rec [11-20] only requires that a re-export certificate include the numbers of all underlying BCDs and the total weight of the shipment to be re-exported. Weights on re-export certificates are not broken down with individual pieces associated with a relevant underlying BCD when more than one BCD is associated with the re-export certificate. Without such a clear connection, the system cannot know when the total amount of an underlying BCD has been re-exported, which limits traceability and could create a loophole in the system. Adjustment of the eBCD to require this kind of tracking would require amendment to Rec [11-20]” (ICCAT, 2016b). This entails that ICCAT’s eBCD falls short of point 5 listed in section 3.1.2 (“The CDS should be designed to meet its objective.”). The challenge ICCAT – and all RFMOs – face is that the CMM establishing a CDS must be worded in terms that enable adoption of a CDS system design that is fit for purpose. This is currently not the case with ICCAT’s Recommendation 11-20, and CDS system functions must comply with the text and the spirit of a limiting recommendation.

3.3 UNILATERAL SCHEMES – END-MARKET STATES

Under international law, the distinction between processing and end-market state is not made. Both entities are treated as one and the same “market state”. However, these two state-types perform very distinct functions in the supply chain and respond to separate sets of considerations under a CDS.⁷⁴ While processing states are characterized by the actions of importing, processing and re-exportation of value-added products, end-market states are characterized through the importing and consuming of products (regardless of whether the latter are processed further domestically before consumption or not). Both state types will invariably share some characteristics, i.e. end-market states will also process and re-export some of the imported products, while some products in processing states will also enter the domestic market and be consumed.

The European Union and the United States of America, two of the very large and currently most important end-market “states” in existence,⁷⁵ started implementing unilateral CDS in 2010 and in 2018, respectively. The objective of both schemes is to ensure that products harvested illegally may not be imported into their respective markets.

In 2016, the value of total world imports of fish and fishery products was estimated at USD111.7 billion.⁷⁶ Table 6 shows the five most important world import markets (in descending order), and the value of exports of these same import champions. Countries for which the value of imports largely exceeds the value of exports are functioning primarily as consumer end-markets, while countries with the inverse profile (exports exceeding imports) are functioning to a very important degree as processing states.

TABLE 6
2016 world seafood trade – top five importing states

Rank	State	Value of imports (in USD billion)	Value of exports (in USD billion)
1	European Union	27.2	5.7
2	United States of America	20.5	6.2
3	Japan	14.1	2.1
4	China	14.0	23.1
5	Republic of Korea	4.6	1.6

Source: FAO (2017b).

It follows that, in 2016, the United States of America and the European Union represented 42.7 percent of the total world imports of fish and fishery products, functioning primarily as consumer end-market states. The sheer sizes of both these seafood markets turn their unilateral CDS initiatives into potential game-changers in the combating of IUU fishing.

3.3.1 Benefits of unilateral CDS

The big advantage of unilateral CDS lies in the numbers. While current multilateral CDS only cover a minute fraction of world fisheries output, these markets absorb a substantial fraction of it. Given that about 37 percent of all fisheries production is

⁷⁴ Under a multilateral CDS, a processing state can only import, process and then legally re-export products if it is cooperating with the RFMO, and is applying the scheme fully – which includes the issuing, validation and recording of trade certificates under the scheme by the competent authority of the processing state. Upstream and downstream supply-chain coercion can be exerted by compliant states on processing states (as suppliers to, or markets buying from, these) to demand adherence to a CDS. On the other hand, end-market states can opt much more easily to import products without enforcing a CDS, by disregarding the existence of certificates, with little to no system-bound coercive means at the disposal of other states complying with the scheme.

⁷⁵ It is acknowledged that the EU is not a “state”, technically speaking, but a regional economic integration organization. For matters of simplicity, it is referred to as a state – where and as useful – in substitution to the sum of individual member states that compose it.

⁷⁶ FAO (2017b). Figures are estimates and exclude intra-EU trade.

traded (FAO, 2014), the markets of the United States of America and the European Union are absorbing some 15.8 percent of all harvested fish through importation and trade, on top of the fish directly landed into these territories by their flagged vessels.⁷⁷ Thus, these two CDS have the combined theoretical potential to exclude IUU fish from an estimated 27 percent of the world harvest.⁷⁸ The combined potential and theoretical “reach” of these unilateral CDS therefore exceeds that of all multilateral CDS combined some 400 times.

Given that the markets of the United States of America and the European Union are very lucrative markets, as are the markets of Japan and the Republic of Korea, the risk of being excluded from those markets can result in significant financial losses. This probably mitigates to some degree the impact of the option for IUU operators to turn towards more lenient markets (see next section) following the coming online of unilateral CDS – as such alternative second-choice markets also generally pay lower prices, diminishing in turn the financial incentives for operating illegally.

3.3.2 Limitations of unilateral CDS

The first limitation of unilateral approaches is the fact that the World Trade Organization (WTO) favours multilateral action over unilateral action in the domain of trade measures.⁷⁹ This preference is mirrored in the IPOA-IUU⁸⁰ and the FAO Voluntary Guidelines (see section 3.1.2). This implies that unilateral CDS are vulnerable to challenges at the WTO.

The second important limitation is the fact that only a single market is closed to products derived from IUU fishing, meaning that diversion of IUU products to other markets is likely to occur, and that in such cases the CDS then fails to achieve its ultimate goal – which is to protect stocks from unsustainable fishing. This is due to the fact that, generally, individual markets do not represent the sole market for any single species or stock that is harvested and traded.⁸¹ The IPOA-IUU highlights this consideration in Article 70, stating that “stock or species-specific trade-related measures may be necessary to reduce or eliminate the economic incentive for vessels to engage in IUU fishing.” The same principle is provided by the Code in Article 7.3.1, stating “To be effective, fisheries management should be concerned with the whole stock unit over its entire area of distribution and take into account previously agreed management measures established and applied in the same region, all removals

⁷⁷ In 2015, this figure stood at 10.3 million tonnes (EU: 5.3 million tonnes; the United States of America: 5 million tonnes), representing 11.1 percent of world catch (FAO, 2017b).

⁷⁸ This implies that the SIMP would cover all imported species (not currently the case, but it may materialize in the future), and that the respective CDS (or equivalent assurances) are applied in equal terms to harvests of national-flagged vessels as they are applied to foreign-flagged harvests entering the market.

⁷⁹ Roheim and Sutinen (2006) argue that: “Given that the WTO prefers multilateral over unilateral approaches, trade actions taken by a group of countries under the auspices of an international agreement, such as an RFMO, would be viewed more positively than a unilateral action, particularly if the RFMO includes all the producing and consuming countries relevant to that particular species or group of related species.”

⁸⁰ The IPOA-IUU discourages the adoption of unilateral trade-related measures (Article 66: “[...] Unilateral trade-related measures should be avoided.”), and refers in Article 69 to CDS from an exclusively multilateral perspective: “Trade-related measures to reduce or eliminate trade in fish and fish products derived from IUU fishing could include the adoption of multilateral catch documentation and certification requirements, as well as other appropriate multilaterally-agreed measures such as import and export controls or prohibitions. Such measures should be adopted in a fair, transparent and non-discriminatory manner. [...]”

⁸¹ In the case of Atlantic bluefin tuna, and before the advent of the ICCAT CDS, Japan was the most important end-market for this species, accounting for almost 90 percent of all imports. This is one of the only examples where such an important concentration of imports of a single species across multiple stocks existed, and where a unilateral CDS could have proved quite effective. However, the importance of the Japanese market has diminished since, and a putative unilateral CDS would have been likewise affected. However, the effectiveness of the existing multilateral CDS is not similarly affected by changes in the trade dynamics of the species it covers.

and the biological unity and other biological characteristics of the stock. [...]” While multilateral CDS respond to these basic notions, unilateral CDS do not. Hosch (2016b) notes that “there is a clear international consensus that unilateral trade measures are, from a resource management perspective, second-best responses to IUU fishing.”

Arguably the most important drawback of unilateral schemes is their limited ability to track transactions and enforce the scheme from the point of harvest along the supply chain to the point of final importation. Multilateral schemes apply to all catches in the area of competence – or of the stock/species of competence – of an RFMO, and all catches must be covered by certificates from the point of harvest through all transactions along the supply chain to the point of final importation, and the CDS can and ought to be enforced by any competent authority at any time along the full supply chain. In unilateral schemes, no paperwork needs to exist at any point in time, as the products may not be headed to the end-market operating the scheme. Therefore, the scheme cannot be enforced from the fishery forward; it can only be enforced at the point of final importation, the time at which border inspection authorities must be able to verify that due diligence did indeed occur with regard to paperwork and records since the time of harvest. Owing to the design peculiarities of the schemes of both the European Union and the United States of America, lacking central registries, and not being compatible nor sharing information between each other, their effectiveness to detect IUU products and to deny their importation on a consistent and automated basis is limited.⁸²

3.4 CDS AND FISHERY MANAGEMENT RULES

One of the most important questions is which management rules a CDS can directly implement. Answering this question is important, because the CDS is often presented as the all-in-one solution to enforce any given management regime, and its complement of rules – and thereby eliminating IUU fishing altogether.

While the existence of a CDS may act as a deterrent to would-be offenders and is generally believed to have a positive effect that encourages compliance across the board, there are some rules a CDS can directly implement in a “mechanical” manner, while this is not so for other rules. This section briefly clarifies which rules a CDS can directly implement, and which ones it cannot. This serves to later contrast the results from this section with the management rules currently applied to DSF fisheries in the ABNJ at the global scale.

Table 7 shows a simple list of possible of management rules as they may typically apply to DSF, and the capacity of the CDS to directly implement and enforce these in the absence of any other tools – or in combination with other implementation tools. “In combination with other tools” qualifies for “indirect” or “assisted” implementation, as the CDS cannot implement the rule directly, in its own right, and in abstraction of other tools. However, when used in combination with other tools, such as a VMS, the

⁸² Hosch (2016b) notes: “If the CDS in the EU IUU Regulation was effective in eliminating IUU fish from entering the EU market, then changes in trade patterns would have had to occur since it came into force—assuming that engrained and worldwide IUU fishing practices persisted and that the CDS would have eliminated the entry of those products into the EU market. At least 10 percent of imports would have had to be substituted by similar products from other sources or some product categories would have been gradually substituted for other categories—partially or altogether. A study carried out during the fourth year of operation of the EU IUU Regulation analysed trade of marine fishery products imported into the EU under Chapter 03 and Tariff Headings 1604 and 1605 of the Combined Nomenclature [...]. The study found that ‘with the information used (analysis of trade statistics, Member States analysis and discussions with EU traders), the results showed that no impact on trade in relation with the IUU Regulation can be detected’ (DG MARE 2014). While this does not provide conclusive evidence that the EU CDS is not preventing at least some IUU fisheries products from entering the EU market, it does raise the question of whether similar levels of IUU fisheries products certified under the EU CDS as being of legal origin might still be entering the market.”

CDS remains an important element in a mix of MCS tools deployed to monitor and discipline the sector.

TABLE 7
CDS capacity to implement fisheries management rules

	Type of management rule	CDS capacity to implement	Required supporting tool
1	Blacklisted vessel (IUU listed)	yes	none
2	Authorized vessel	yes	none
3	TAC; country & vessel quotas	yes	none
4	Fishing area entry/exit reporting	yes	none
5	Logbook / catch reporting	yes	none
6	Designated ports for landing	yes	none
7	Observer presence	yes	none
8	VMS	yes	none
9	No. of days at sea	yes	VMS/AIS ¹
10	Area of operation (incl. closed areas)	yes	VMS/AIS
11	Trans-shipment	yes	VMS/AIS/observer/electronic monitoring
12	Uncharted VME encounter / clear area	no	observer
13	Vessel specifications (engine size, etc.)	no	n/a
14	Fishing gear specifications	no	observer/dockside monitoring
15	Fishing depth	no	observer/electronic monitoring
16	Minimum catch sizes (by species)	no	observer/dockside monitoring
17	Discards	no	observer

¹ VMS = vessel monitoring system; AIS = automatic identification system.

Source: Author's own elaboration.

It emerges from Table 7 that a limited number of management rules can be directly implemented and enforced through a CDS as a single MCS tool. These are listed in the table against row numbers 1–8. A limited set of rules can be implemented and enforced indirectly, in combination with VMS, AIS and/or physical or electronic monitoring, and are listed in rows 9–11. Management measures that cannot be enforced in a meaningful manner via a CDS, whether directly or indirectly, are listed in rows 12–17.⁸³

3.4.1 Management rules directly implemented via CDS

The types of rules that can be implemented and enforced directly – to a very high and relevant degree – via a CDS fall into four categories:⁸⁴

- **Limiting fishing and the trade of derived products to harvests from authorized fishing vessels** (rows 1 and 2): Only products derived from licensed operators may be landed, processed and traded. Blacklisted vessels and otherwise non-authorized vessels cannot have catch certificates established and validated, and therefore their products cannot legally flow to market.
- **Limiting fishing output to established TACs, country and vessel quotas** (row 3): Arguably the most important stand-alone feature of a CDS is its capacity to tally individual harvests and landings through the issuance and validation of catch certificates at the levels of the individual vessel, the flag state and the fishery as a whole. Once a quota is filled, the CDS can (and ought

⁸³ This would, for example, cover the restrictions adopted on the use of deep-water gillnets – a fishing gear specification rule – as per SIOFA CMM 2016/05.

⁸⁴ In the following sections, it is surmised that the states along the supply chain are actively implementing the CDS. As noted further above, especially in the case of products entering market states not applying the scheme, the CDS loses its capacity to implement and enforce the fisheries management framework – directly or indirectly.

to) be designed to deny all subsequent catch certificate emissions for a given vessel or a given flag. Under-reporting and legally accessing markets following a CDS-closure becomes impossible.⁸⁵

- **Forcing compliance with reporting obligations** (rows 4 and 5): Catch certificate issuance can be made conditional on compliance with reporting obligations relative to the fishing trip; these may include duly notified fishing area entry and exit reports, or the submission of a duly filled logbook (other types of submissions may also apply). CDS platforms can be designed to automatically cross-check the prior existence and consistency of e-logbook data, entry/exit report data, VMS data and CDS data – turning it into an extremely powerful detector (and deterrent) for misreporting fraud.
- **Forcing compliance with operational rules** (rows 6–8): Catch certificate issuance can also be made conditional on compliance with operational rules, such as the carrying of VMS, landing in designated ports only, or carrying on-board observers. The CDS can (and ought to) be designed for such mandatory elements to be nested within the CDS system, and to be verified in an automated manner by the system at the time when the catch certificate is submitted for validation.⁸⁶

These four categories apply to fisheries management rules at the level of harvesting operations. It should not be forgotten that the CDS continues to play an equally important part following landing and the end of fishing operations.

Once products have been certified as being of legal origin (i.e. covered by a duly validated catch certificate) and landed, and fishing operations have ceased, the CDS serves the purpose of eliminating all avenues for the laundering of non-originating products into CDS-certified supply streams by providing a solid traceability framework, by monitoring and ensuring mass balance between subsequent transactions, and by raising alarms should mass balance consistency be breached. A well-designed CDS also does this directly, as the stand-alone tool of choice, for international trade transactions.⁸⁷

3.4.2 Management rules indirectly implemented via CDS

There is one particular type of management rule that the CDS can only enforce in tandem with backup MCS tools, which come in the form of VMS, electronic monitoring and/or observers:

- **Forcing compliance with time-based and geographic location rules** (rows 9 and 11): Catch certificate issuance can be made conditional on compliance with time-based rules, such as cumulative days-at-sea limits, or avoidance of areas in which fishing is prohibited – the latter being very important in the context of DSF. While VMS is one technology of choice to monitor the respect of these rules, CDS can be tied in as the directly associated enforcement and sanctioning tool of choice.

⁸⁵ It is this specific ability that turned the ICCAT CDS into the success that it has become. Note also that all current multilateral CDS apply to fisheries that are TAC and quota managed, with one minor caveat with regard to CCAMLR, where only TACs exist, and the fishery is of the olympic type (i.e. no quotas).

⁸⁶ See article 3 of CCAMLR CMM 10-05(2016) on CDS for *Dissostichus* spp., showing how the VMS and its implementation is nested within the CDS system of implementation: “A Flag State must be satisfied, through the use of VMS data (as described in paragraph 2 of Conservation Measure 10-04) that the FAO area(s) or CCAMLR subarea(s) or division(s) where the *Dissostichus* spp. were taken was accurately reported by the vessel on the DCD [...] before issuing a unique Flag State Confirmation Number on a DCD. The Flag State’s CDS Contact Officer shall not issue a Flag State Confirmation Number on a DCD if there is reason to believe that the information submitted by the vessel is inaccurate [...]”

⁸⁷ See Hosch and Blaha (2017) regarding options for country-level CDS support mechanisms covering national trade transactions.

In this combination, VMS, electronic monitoring and/or observers are the de facto implementing tools for the management rule, and the CDS is the mechanically linked sanctioning tool. Under the previous set of four categories (section 3.4.1), the CDS is the actual MCS tool allowing for the implementation (enforcement) of a rule, **and** also embodies the first sanctioning option (i.e. denial of a catch certificate). With regard to the enforcement of time-based and geographical location rules, the CDS embodies the first (and very powerful) sanctioning option – which is the suspension of catch certificate validation until reported irregularities have been processed and settled.

Trans-shipments can be automatically monitored, and their legality can be established automatically, in the presence of VMS (and/or electronic monitoring and/or observers), and an enabling set of rules regarding location of trans-shipments and the carrying of specific technology and/or observers by fishing vessels and reefers.

3.4.3 Management rules not implemented via CDS

Finally, there is a swathe of management rules that cannot easily be directly implemented, nor directly (or mechanically) enforced by a CDS in combination with other MCS tools. These rules relate to aspects of a fishing campaign that cannot be automatically monitored through technology solutions, and that generally would require an at-sea and/or an in-port inspection to establish the infringement.⁸⁸

These management rules cover those listed in rows 12–17 of Table 7, and some of these – such as fishing depth, or VME encounter and area clearance rules – are highly relevant to DSF.

However, although there is no automated, mechanical and/or technology-based link between the implementation and compliance monitoring of these types of rules with the CDS as an enforcement tool, it is clear that, should an infringement be detected before landing, or reasonably soon after landing – at a time at which downstream economic operators may not yet have taken possession of already certified products – then one avenue for sanctioning remains the non-validation, or cancellation, of any validated catch certificate covering products derived from IUU fishing. This is the domain of fisheries management rules where a CDS fulfils its role as a generic deterrent to all types of fraud – as there is always a certain degree of risk (depending on the fishery) for infringements to be detected, and for operators to face sanctions.

3.5 CDS AND THE FORMS OF IUU FISHING IT CAN DIRECTLY ADDRESS

The substance covered in section 3.5.1 below is derived directly from section 3.4, by looking at IUU fishing as an inverse function of fisheries management. If a CDS is able to directly implement a given type of management measure, it naturally ought to be able to detect the infringement of the same measure.

⁸⁸ The author has a long-established preference for observers not to carry out active compliance roles aboard fishing vessels. The author holds that such active roles are incompatible with the international principle that the master of the vessel is the absolute authority aboard the vessel at all times, and that active enforcement roles endanger the life of observers and have repeatedly led to unacceptable loss of life at sea in the past. However, in cases where observers can and do establish infringements and communicate these to flag state authorities before or at the time of landing, the observer can play a role similar to that of VMS under section 3.4.2, and the potential indirect implementation function of the CDS would grow as a result. The same is true for electronic monitoring options, which have potential, but which are currently still largely confined to the domain of testing (e.g. to monitor fishing depth). Finally, at-sea inspections establishing infringements during a fishing campaign also apply here, but these are punctual, and the automated and mechanical aspect of the combination of enforcement mechanisms is lost at this level.

3.5.1 What forms of IUU fishing is a CDS best at addressing?

Based on the findings of section 3.4, a CDS is able to address and largely eliminate the following types of IUU fishing:

- Directly, and as a stand-alone tool:
 - fishing without a licence;
 - under-reporting or otherwise misreporting of catches (flouting of TAC and quota allocations);
 - non-compliance with reporting obligations (e.g. catch reporting);
 - non-compliance with operational obligations tied into the CDS (e.g. landing in designated ports or carrying VMS).
- Indirectly, in combination with VMS:
 - non-compliance with days-at-sea limitations;
 - non-compliance with temporal and spatial fishing closures;
 - non-compliance with trans-shipment rules.

For the types of infringements not listed in the two sets of listings above and relating to the infringement of the types of fisheries management rules listed in rows 12–17 in Table 7 (e.g. gear-type infringements), CDS is not the MCS tool of choice for enforcing compliance.

It must be underlined that the automated and mechanical law-enforcement and sanctioning functions a CDS can carry out alone, or in association with VMS, apply within the boundaries of compliant supply chains and in the absence of markets of convenience failing to apply the CDS. An illegal transshipment, for example, cannot be placed on a market complying with the scheme. Therefore, the operation of the CDS eliminates the malpractice within legal supply chains and markets. In the same way, a vessel harvesting a CDS-covered species in the absence of an authorization to fish cannot place its harvest on a market complying with the scheme. However, the existence of large and bullish markets accepting such IUU products can seriously undermine the CDS and its ability to protect fish stocks from IUU fishing. This is especially true in relatively modest harvest volume DSFs, where markets of non-compliance do not need to be endowed with enormous absorption capacity in order to substantially undermine the protection conferred through a CDS.

3.5.2 Sanctions for IUU fishing under CDS systems

As indicated in section 3.4.3, the threat of a CDS-related sanction to any detected infringement – including those that may not be detectable through the CDS itself – projects the threat of a sanction that may nudge operators to err on the side of legality in situations of temptation. This is especially the case in fisheries where the degree of monitoring and surveillance unrelated to CDS (and with it the risk of detection) is naturally high. However, this consideration leads to another very important question. What sanctions flow, or ought to flow, from a CDS?

State sanctions applying to operators

The principle of subsidiarity applies to matters of sanctioning under CDS systems⁸⁹ – unless it is entire states that are being identified for their shortcomings in combating IUU fishing, and in ensuring that vessels flying their flag comply with international norms ruling a given fishery. At the level of individual infringements perpetrated by masters of fishing vessels, it is thus the coastal, the flag or the port state authorities detecting an infringement that are expected to take punitive action.

⁸⁹ The principle of subsidiarity holds that a larger and greater body should not exercise functions which can be carried out efficiently by one smaller and lesser, but rather the former should support the latter and help to coordinate its activity with the activities of the whole community. In this context, this means that sanctions for infringements are applied by the state, rather than the RFMO, while the RFMO framework may provide binding rules for such sanctions to be effectively and transparently administered.

Some of the actions to undertake are clearly stated in CMMs and are supported by related international treaties such as the PSMA. Where a fishing vessel tries to land fisheries products in a port in the absence of a mandatory catch certificate, the port state authority ought to deny the landing, and alert the RFMO and the flag state authorities with regard to the incident.⁹⁰ Even without the administration of a separate sanction, the action translates into a de facto sanction for the operator, owing to the costs incurred for not being able to unload, neither for the fishing vessel to return to the fishing grounds.

A similar de facto sanction is the non-issuing of a catch certificate in light of a detected offence. Apart from preventing the landing of the catch in any aligned (or responsible port state) under a non-issuance scenario, the products cannot be marketed legally, thus forfeiting part or all of a harvest's value. Non-issuance of a catch certificate is an "either/or" affair, costing the operator dearly. While it may embody an appropriate de facto sanction for serious infringements (e.g. bottom-trawling in a charted and prohibited VME area), it is generally not an appropriate sanction for lesser offences, as the value of the sanction may be largely disproportionate with respect to the severity of the offence. There is thus a need to define apposite sanctions that reflect and respond to the severity of a range of potential infringements – minor and serious.

Few provisions exist under current CDS schemes – both multilateral and unilateral⁹¹ – that provide for the type (or types) of sanctions that should be applied in a consistent and harmonized manner for given infringements, or how and by what means an appropriate level of severity should be determined.

In the absence of clearer guidance, the option that competent authorities are left with is to validate or not to validate a catch certificate. Several CMMs ruling CDS are clearly worded in this sense.⁹² However, such an approach undermines the principle of proportionality in law enforcement, establishing that the severity of a penalty should reflect the seriousness of the infringement. Hosch (2016a) presents a model CMM for a harmonized tuna CDS, and dedicates a full section to "non-compliance and sanctions" provisions (articles 80 to 94). The key model articles relating the spirit of the above discussion provide as follows:

83. No product harvested in contravention of national and international fishery rules should be destroyed unless it poses a health hazard.

84. Harvested IUU products may ultimately be certified and channelled to markets once sanctions have been imposed on perpetrators and have been serviced: this shall confer the status of legal provenance on the products.

85. As a minimum, any financial benefits accruing to perpetrators of fraud from IUU fishing must be wholly forfeited under the sanctions imposed.

The model CMM also addresses the issue of trade certificate validation and sanctions – a matter that is generally muted or silent in existing CDS regulatory texts, as follows:

92. Validation of trade certificates should be refused by market states if mass-balance anomalies are detected, pending investigation. If fraud is established

⁹⁰ See for example article 3 of CCAMLR CMM 10-05(2016): "Each Contracting Party and non-Contracting Party cooperating with CCAMLR by participating in the CDS shall require that each landing of *Dissostichus* spp. at its ports [...] be accompanied by a completed DCD. The landing or transhipment of *Dissostichus* spp. without a DCD is prohibited. [...]"

⁹¹ It is important to distinguish between the schemes of the United States of America and the European Union at this level. The United States scheme applies to a single country, which can unilaterally define and apply sanctions as it deems fit. The EU scheme is implemented decentrally by its 28 sovereign member states, which have very limited guidance as to what sanctions ought to apply under the scheme in the event of detected infringements perpetrated by national and/or foreign operators.

⁹² See for example article 3 of CCAMLR CMM 10-05(2016): "[...] The Flag State's CDS Contact Officer shall not issue a Flag State Confirmation Number on a DCD if there is reason to believe that the information submitted by the vessel is inaccurate or that the *Dissostichus* spp. were taken in a manner inconsistent with CCAMLR conservation measures if fishing occurred in the CAMLR Convention Area."

sanctions in line with the standards in Paragraph 85 should be applied, including the option of indefinite non-validation of submitted trade certificates.

Indefinite non-validation implies the incapacity of operators to legally export their products for lack of required paperwork. These enforcement measures further down the supply chain and applying to trade transactions – rather than fisheries transactions – are key to ensuring that product-laundering attempts along the terrestrial supply chain are actively suppressed.

Compliance and sanctioning mechanisms along the full supply chain – from port to final importation – constitute the weaker parts of current CDS systems, and future systems will have to address these in a much more consistent manner.

TREMs – RFMO sanctions applied to states

States can also become targets for sanctions, owing to their perceived or established leniency regarding monitoring, inspecting and disciplining of operators.⁹³ Such sanctions generally come in the form of trade sanctions, and are often referred to as TREMs. In such cases, it is the RFMO, or a market state – operating a unilateral CDS – that may issue such TREMs.

Owing to the fact that the European Union has issued seafood TREMs against third countries in recent years under the provisions of the its IUU Regulation (which also defines the its unilateral CDS), TREMs have become associated as a form of sanction that is intimately linked to the operation of a CDS. ICCAT has issued TREMs against RFMO member and non-member states in the past on the basis of incriminating evidence collected through its TDS, while the United States of America issued TREMs against Mexico in 2017 on the basis of incriminating evidence collected through means other than a CDS.⁹⁴ The European Union has issued so-called “yellow and red cards” to third countries, starting in 2013, amounting to full trade embargoes on all marine seafood caught by the fishing vessels flying the flag of the identified (i.e. red-carded) country. Six countries in total have been so red-carded, and four remained under sanctions at the time of writing. While the mechanism establishing this course of action is enshrined in the 2010 EU IUU Regulation, it is independent of the CDS. Indeed, the vast majority of arguments presented for red-carding third countries have so far been unrelated to a flag state’s performance with regard to compliance with, and implementation of, the CDS of the European Union, and almost half of the sanctioned countries (e.g. Cambodia) had no established seafood trade with the European Union at the time of carding.⁹⁵

However, for a CDS to have a deterrent effect at the multilateral level, it is necessary for the operator (the RFMO) to provide for mechanisms through which states and part of their product lines may become identified and face trade sanctions. In the absence of punitive trade measures that can be leveraged against lenient states, the effective

⁹³ A relevant example of state-sponsored IUU fishing in the domain of DSF, including the active undermining of a CDS, in the early 2000s – a case in which TREMs would have represented the ultimate course of action – is reported by Sancho Andrade, Ortiz - Von Halle and Naranjo Cuvi (2002) as follows: “Allegations have also been made by a number of other CCAMLR Members that vessels flagged to Uruguay have engaged in illegal fishing for toothfish. This included the alleged sighting of two Uruguayan-flagged vessels inside the CCAMLR Convention Area, and the arrest and successful prosecution by France of a vessel fishing illegally within its territorial waters that was flagged to Uruguay. Concerns have also been expressed that, through the validation by the Uruguayan government of the information contained on the Dissostichus Catch Document (DCD) from these vessels, the alleged IUU toothfish product was able to be legally traded.”

⁹⁴ See: NOAA (2017).

⁹⁵ Hosch (2016b) notes that: “48 percent of the countries identified to date were not trading seafood to the EU at the time of their identification. This trend is continuing, as none of the latest three countries identified in 2016 exported fish products to the EU at the time of their pre-identification.” (Note: the word “identification” in this citation encompasses both pre-identification [yellow card] and identification [red card]).

implementation and enforcement of a multilateral CDS is expected to succeed in a vacuum where tangible pecuniary risks associated with the consistent disregard of fisheries and trade rules – notably through corrupt practices – are zero.

Webster (2015) reports that 9 out of 17 RFMOs have adopted CMMs allowing their members to impose TREMs upon states identified as failing to meet their obligations under international fisheries law. These include four of the five tuna RFMOs – CCSBT, ICCAT, the Inter-American Tropical Tuna Commission (IATTC), and the Indian Ocean Tuna Commission (IOTC) (CCSBT, 2000; ICCAT, 1994, 2006; IATTC 2006; IOTC 2010). Others, including CCAMLR, managing DSF, have not adopted measures that would allow them to enact such sanctions. While some RFMOs, such as IATTC, ICCAT and IOTC, have adopted resolutions targeting both non-compliant members and non-members as potential objects of TREMs, many RFMOs have limited the application of these instruments to non-members. Many RFMOs also provide for elements of TREMs in resolutions covering compliance matters in more general terms, such as NAFO's Conservation and Enforcement Measures (2017), which in articles 54 and 55 provide for “prohibiting landing and importation of fish from onboard or traceable to a vessel listed in the IUU Vessel List”, or “restrict the export and transfer of any fishing vessel entitled to fly its flag to any State identified [...] as not having taken action sufficient to prevent, deter and eliminate IUU activities by any vessel entitled to fly its flag listed in the IUU Vessel List.”⁹⁶ In the case of SPRFMO, the potential adoption of TREMs is provided for in the convention establishing the RFMO, and they may be directed against any type of party.⁹⁷

The TREMs that ICCAT imposed on a number of member and non-member countries as of the mid-1990s remain unique in many ways today, and were instrumental in largely eliminating the operation of flag-of-convenience fishing vessels in ICCAT's area of competence.⁹⁸ The take-home message from ICCAT's experience is that RFMO rules must come with enforcement capability. If states are seen to allow their vessels and operators to disregard RFMO rules, and efforts in diplomacy fail, then multilaterally imposed TREMs – compatible with international trade law – are a powerful weapon to force such states into compliance, and/or out of the fishery. In the case of CDS (a trade-based tool itself), TREMs come to the fore as the natural and versatile enforcement tool against any state falling foul of properly applying CDS rules and refusing to align after repeated demands by a commission to do so, in their capacities as coastal, flag, port or market states.

⁹⁶ The NAFO provisions do not enable it to enact trade sanctions against any state and/or the products derived from its vessels, but call for products from individually listed IUU vessels to face trade restrictions, and for states whose vessels are listed on the IUU Vessel List, and seen as not doing enough to address existing problems, to face trade embargoes in terms of access to fishing vessel sales or transfers from contracting parties.

⁹⁷ SPRFMO Convention, article 27, paragraph 2: “The Commission may adopt procedures that enable measures, including trade-related measures in relation to fishery resources, to be applied by members of the Commission to any state, member of the Commission, or entity whose fishing vessels engage in fishing activities that diminish the effectiveness of, or otherwise fail to comply with, the conservation and management measures adopted by the Commission. Such measures should include a range of possible responses so that account can be taken of the reason for and degree of non-compliance and should include, as appropriate, cooperative capacity-building initiatives. Any implementation of trade-related measures by a member of the Commission shall be consistent with that member's international obligations, including its obligations under the Agreement establishing the World Trade Organization.”

⁹⁸ In all countries, external trade in products targeted by TREMs subsided completely within a few years. See Hosch (2016b) for a detailed analysis. Note also, that while ICCAT adopted the TREMs, their implementation occurred at the level of the individual member states, owing to the fact that only states have enforcement powers.

3.6 HARMONIZED CDS AND GLOBAL SUPER-CDS-LIKE SYSTEMS

3.6.1 Harmonized CDS – what for?

There is much reason to focus attention on the potential for harmonizing and ultimately unifying CDS systems, rather than continuing to envisage an ever-growing number of individual schemes covering particular species or types of species governed and operated by single RFMOs or single market states. The reason to consider a unified super-CDS option over that of multiplying schemes pertains both to considerations of improving operational and cost effectiveness (i.e. reaching objectives **and** spending as little as possible), as much as it pertains to the reduction of the burden of compliance and enforcement and reducing inconsistencies in practices.

A CDS – instead of embodying a programme and major undertaking by an RFMO or market state, needing serious planning and development resources – would be developed and provided as a unique mechanism based on a standardized technology solution operated by a single, central service provider. This would function in the same way as it does for RFMOs deciding to adopt a commission VMS system today, providing for authorized member and cooperating non-member vessels to transmit VMS data directly to the RFMO secretariat’s fisheries monitoring unit. The RFMO does not need to develop, build, launch and operate satellites, nor to design automatic location communicators / mobile transceiver units (ALCs/MTUs), nor to train industry in how to install them correctly. The capabilities of the technology are known – they are a given. It is merely down to the RFMO to decide which capabilities to leverage, and in what ways. The RFMO’s work consists in deciding on whether this standard technology must be used, which and/or how rules apply, and what consequences flow from established forms of non-compliance.

Any number of species can be covered by a harmonized CDS. Instead of developing a CDS as an expensive custom-tailored and limited venture for the management of a single species and its species-specific supply chain, the harmonized CDS is designed to allow for the coverage of any species, and to apply to any type of supply chain, and all the regular and exceptional transactions that may occur along these.

It is critical to appraise that a central platform could be adopted by both RFMOs and port and market states, thus catering to both multilateral and unilateral modes of demanding catch certification. This would bring about the natural multilateralization of the current unilateral market-state endeavours to combat IUU fishing (see Hosch [2016b] for a full discussion). Moreover, because the system is harmonized and unique, falsification and fraudulent multiple usage of legally certified paperwork covering a single fishing trip under separate CDS systems⁹⁹ (for example, exporting inflated amounts of catch through laundering to two or more separate markets operating a stand-alone CDS) would become impossible.¹⁰⁰

Finally, and most importantly, many species of fish have a global distribution range straddling several RFMO RAs. This is also the case for most of the commercially fished deep-sea fish species. If one CDS covers the species in one part of the world, while it is not covered in several others, the way to place IUU fish on the market from

⁹⁹ Called the “double-spend problem” by cryptographers developing blockchain technology. The latter is applied to the transfer of, or trade in, digital assets.

¹⁰⁰ Currently, it is possible to export the totality of a legally certified harvest to the United States of America under the SIMP, and to also export the same volume of product accompanied by copies of the same underlying paperwork to the European Union. As the two systems are not harmonized, and do not exchange information, the risk of detection of such a laundering event – if reasonably well conducted by the perpetrators – is close to nil. As long as CDS systems remain many, and covering the same species from the same harvest areas, this type of laundering will occur, and will require extraordinary resources to combat and detect – defeating the primary purpose of the CDS, which ought to be denying market access to IUU products in a mechanical manner.

the CDS-managed fishery is by simply misreporting its origin.¹⁰¹ The two conceivable options to make CDS a worthwhile tool under this constellation is either for all RFMOs in whose RA the species occurs to develop their separate CDS – but still facing the “double-spend” conundrum if systems do not exchange data – or to subject the species to a harmonized single CDS covering the species as a whole.¹⁰²

Who is backing a global super-CDS?

The idea of a unified global CDS has been sustained by FAO for a number of years. The case for a single harmonized tuna CDS has been argued in FAO's Fisheries and Aquaculture Technical Paper No. 596 “Design Options for the Development of Tuna Catch Documentation Schemes”,¹⁰³ stating: “The obvious and rational solution would be to create a single global CDS that covers all remaining commercially exploited tuna stocks and species. This would address stakeholders’ requirements in terms of: i) preventing proliferation of separate CDS; ii) minimizing administrative burden; iii) minimizing the costs of designing and operating CDS; and iv) maximizing the effectiveness of CDS.”

The European Commissioner for Fisheries and Maritime Affairs indicated in late 2015 that: “We need to close the loopholes that still make it possible for illegal fish to make it to some markets. A global catch certificate, like the one FAO is working on, could be a big part of the solution.”¹⁰⁴ The same proposition is reflected elsewhere as follows: “The international community could assess the feasibility for the development and operation of global multilateral CDS systems, designed to apply to specific species in need of protection from IUU fishing. A risk-based framework of mandatory multilateral schemes could be harmonised by virtue of being managed by the same organisation, based on the same approach and platform, and thus reducing the overall global costs and burden of compliance to a minimum. Instead of having single or multiple CDS operated by several RFMOs, for specific species, a central operator could provide a centralised and globalised CDS platform to any RFMO that determines that a CDS would be beneficial for combatting IUU fishing in its fisheries. The impact of such global schemes – in terms of sustainable fisheries management outcomes – would be maximised [...]” (Hosch, 2016b).

What super-CDS foundations already exist?

It is of interest to appreciate what has been developed in this sense, and what is up and running already.

The idea to cover multiple species within a single CDS materialized with CCAMLR's CDS in 2000. It covers two separate species of the genus *Dissostichus*.¹⁰⁵ Second, the unilateral scheme of the European Union covers all species of marine cartilaginous and

¹⁰¹ Such misreporting between ocean basins has been reported by ICCAT following the introduction of its first TDS in tuna fisheries. The reporting of deflated catches in one oceanic basin, and inflated catches in another – motivated by escaping the strictures of a TDS or a CDS – falsifies fisheries data, is detrimental to fisheries science in all affected ocean basins, and may impair fisheries management efforts across several RFMOs. Therefore, a CDS applied to a particular species in one RFMO, but not in another, may create and inflate, rather than solve, problems.

¹⁰² Given that for the first option to work, data exchange – and therefore system compatibility – must be a given, the option of developing anything else but a single system serving all interested parties would be largely nonsensical. There is little chance that all RFMOs covering a single species would all adopt a CDS at the same time, while under the second option, RFMOs could simply vote to opt into a shared system at a time when members are ready to enact such provision. Under such premises, with every new and relevant member joining in, the CDS becomes increasingly efficient and effective in attaining its goal.

¹⁰³ See Chapters 12 and 13 specifically.

¹⁰⁴ Speech by Mr Karmenu Vella in Vigo, Spain, on 8 October 2015, on the occasion of the twentieth anniversary celebrations of the Code. See: https://ec.europa.eu/commission/commissioners/2014-2019/vella/announcements/responsible-fisheries-eu-and-beyond-20th-anniversary-fao-code-conduct-vigo-spain_en

¹⁰⁵ As opposed to the ICCAT and CCSBT tuna CDS, which cover a single species each.

bony fish. It also covers all oceanic basins and all world fisheries from which products are traded to its market. These experiences show that a single system can indeed cover any number of species, many fisheries worldwide, many types of fishing gear, and a plethora of regional and global supply chains.

The idea of sharing a single CDS system between more than a single RFMO to cover a species that is of mutual interest also already exists, and also hails from CCAMLR. As discussed in section 3.2.3, the Antarctic toothfish (*D. mawsoni*) has a distribution range that stretches beyond the RFMO's RA. However, CCAMLR covers the most important area of this range and has taken upon itself the responsibility of managing the species. RFMOs that border the CCAMLR RA, and where toothfish is harvested, may choose to associate themselves with the CDS requirements of CCAMLR CM 10-04 (2017) when catching toothfish in their respective RAs, or authorising the landing of toothfish in their ports.

For example, the second SEAFO performance review notes that “As highlighted in the first Performance Review, the Commission discussed the possible introduction of a Catch Documentation Scheme (CDS) for *Dissostichus* spp (Patagonian toothfish) in a SEAFO context, similar to that established by CCAMLR. [...] Mindful that all SEAFO Contracting Parties, except for Angola, are also Contracting Parties of CCAMLR, the SEAFO Commission noted that for those Contracting Parties there is no need for a specific SEAFO scheme. The Commission encouraged Angola to cooperate with CCAMLR if Patagonian toothfish are landed in its ports or enter its market.” (SEAFO, 2016) [Emphasis by the author].

In the meantime, the current main market states make it a requirement for all shipments to be covered by CCAMLR catch certificates, while CCAMLR makes it an obligation for its members to demand valid certificates before authorizing a landing, regardless of whether the area of harvest lies within or outside the CCAMLR RA. This establishes the CCAMLR CDS as a de facto super-CDS for toothfish, regardless of the RFMO area in which it has been harvested.

Hence, a unified and single CDS model, shared between RFMO parties, is already in existence. Therefore, a single global CDS covering many (or all) species merely requires the evolution and expansion of systems already in place.

3.6.2 CDS-like systems covering multiple species globally

In addition to the considerations in the preceding section, it is worth highlighting that a unified functioning global CDS-like system is already in existence.

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

The text of CITES was agreed at a meeting of representatives of 80 countries in Washington, DC, the United States of America, on 3 March 1973, and on 1 July 1975 CITES entered in force.

CITES is a binding international agreement to which states and regional economic integration organizations may adhere. States that have agreed to join CITES are known as Parties. CITES provides a framework to be implemented by each Party through the adoption of domestic legislation, enabling CITES implementation at the national level.¹⁰⁶

The aim of CITES is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. At the heart of the CITES framework sit three lists of sensitive flora and fauna; the Appendix I, II and III lists. Species included in Appendix I are threatened with extinction, and commercial trade in specimens of, or products derived from, these species is proscribed. Species included in Appendix II are not necessarily threatened with extinction, but trade in them is controlled to avoid

¹⁰⁶See: <https://www.cites.org/eng/disc/what.php>

utilization and trade incompatible with their survival. Appendix III contains species that are protected in at least one country, and which has asked other CITES Parties for assistance in controlling the trade.

The objectives of the CITES framework on one hand, and a CDS on the other, are thus largely the same. Trade is monitored and controlled in order to ensure that living organisms are harvested within the limits of existing rules, and that trade – as a conduit for monetization and profits derived from harvesting – is neutralized as a factor that may be driving, or may be contributing to, a species' demise. Market access is denied for specimens harvested in contravention of the prevailing rules.

CITES mode of action

CITES functions on the basis of a single standardized permit system that applies globally to a collection of 35 000 species of flora and fauna.¹⁰⁷

Generally, countries define their own export quotas through the work of a designated national CITES-specific Scientific Authority, issuing species-specific non-detriment findings for listed species. Alternatively, quotas may also be imposed through the Conference of the Parties. This is part of the management framework for the protection of individual species and can be likened to the work of the RFMOs' Commission proposing, debating and setting fisheries management rules. Given that under CITES a lot of the fauna and flora originates from within national territories – rather than international waters not under the jurisdiction of individual states – the discretion of individual parties to set limits on trade is naturally higher.

The permit system consists of CITES permits, import permits and export permits. Permits are issued by the designated national CITES-specific management authority.¹⁰⁸ When re-exportation occurs, re-export permits are issued. This part of the system can be likened to the CDS system of the RFMO, and is in fact largely equivalent, regardless of the design differences existing between the CITES permit system, and individual CDS systems. The CITES permit system is basic, but has been slowly evolving over time. First elements of electronic administration, such as the Electronic Permit Information Exchange system (EPIX)¹⁰⁹ were introduced and adopted more recently, allowing the system (which remains largely paper-based) to start closing loopholes and gaps that would otherwise allow fraud to flourish.¹¹⁰ eCITES – an electronic platform providing for electronic permits, improved traceability, and integrated with the global system of trade controls – is being actively pursued, and remained under development at the time of writing.

As a multilateral tool, and mirroring the mode of action of multilateral CDS, all legal trade in specimens under CITES must be covered by permits from the country of first exportation along the supply chain into the country of final importation. However, reflecting a key weakness of current unilateral CDS schemes, the CITES permit system also lacks a central registry through which all permits are issued, validated, recorded and linked – entailing the inability of the system to enforce mass-balance integrity between trade events along given supply chains.

¹⁰⁷This point alone should provide sufficient confidence to assert that covering a few dozen commercial aquatic species of fauna by a single CDS – to be applied globally – is clearly feasible.

¹⁰⁸In 2016, 950 000 CITES permits were issued. It was estimated at that time that one million certificates may be issued in 2017. That is equivalent to 114 permits issued every hour of every day of the year.

¹⁰⁹This system allows an importing state to check whether a given permit was factually issued by the management authority of the exporting state, and whether the permit has already been used in a separate transaction (see: <http://epix.unep-wcmc.org/Home/About>).

¹¹⁰The annual value of illegal trade in wildlife is estimated at USD50–100 billion, while the legal trade through the CITES permit system amounts to USD25 billion. Illegal trade is thus some 200–400 percent more important than legal trade. This is an indication, inter alia, that the CITES permit system faces an uphill battle to close gaps and loopholes.

CITES and fisheries

One very interesting point is that a number of fisheries resources have been included under the CITES framework over time. This means that instead of these resources – recognized as vulnerable to overfishing and listed in a CITES Appendix – enjoying protection under a fisheries-specific trade-based tool such as a CDS, they are already provided protection under the generic framework of CITES today.

CITES thus provides a CDS-like alternative – and is already operating as such – for a number of species of vulnerable and commercially fished marine and freshwater species. The species covered by CITES include trochus (*Strombus gigas*), sturgeons, rays, sharks, sawfishes, whales, and marine turtles.

Sharks were first included in Appendix II of CITES in early 2003, after the Conference of the Parties decided to include the basking shark (*Cetorhinus maximus*) and whale shark (*Rhincodon typus*) in Appendix II. All seven species of sawfishes (*Pristidae* spp.) – belonging to the same subclass of fish as sharks and rays – are listed in Appendix I (effective date: 13 September 2007). By October 2017, 12 species of sharks¹¹¹ and all manta and devil rays had been included in Appendix II, and their listing was effective.¹¹²

The annual trade value of sturgeon products in the European Union alone is in the order of €2.7 billion per year.¹¹³ This underlines the importance of the value of fisheries-related trade fluxes covered under CITES today.

CDS lessons from CITES

The first and most important lesson to take away from CITES is that a global, single CDS system – as a technological solution – to cover the harvesting and trade-related monitoring and enforcement needs for DSF is possible. Such a platform can be designed and implemented, and RFMOs and individual states can then opt in to using the platform at their own pace. Such platform would be operated as a service by a central service provider, without any further institutional implications¹¹⁴, RFMOs and states retaining their natural rule-making prerogatives in terms of how established cases of non-compliance are to be administered.

Multiple species can be covered by a single system. There is no need to design separate CDS to cover different species – reflecting the same lesson learnt from the experiences of CCAMLR and the European Union.

A global system shared between a number of institutional (i.e. RFMOs) and/or state parties confers protection to a single species at the global level – as opposed to the RFMO level – and undermines misreporting and double-spending avenues as well as reducing costs of establishing and operating individual CDS. It thus solves an important range of issues relating to the limitation of individual RFMOs not covering the full distribution range of individual species, a signature limitation of RFMOs covering DSF. Species-level protection is achieved at the global level, and the pitfalls of partial and imperfect, RFMO-centric CDS ventures are avoided.

Finally, the CITES experience also shows that the permit system should be electronic, and that the absence of a central registry forfeits the automation of checks and balances – favouring the persistence of fraud.

¹¹¹Basking shark (*Cetorhinus maximus*); whale shark (*Rhincodon typus*); great white shark (*Carcharodon carcharias*); oceanic whitetip shark (*Carcharhinus longimanus*); porbeagle shark (*Lamna nasus*); scalloped hammerhead shark (*Sphyrna lewini*); great hammerhead shark (*Sphyrna mokarran*); silky shark (*Carcharhinus falciformis*); thresher sharks – all three species (*Alopias* spp.).

¹¹²See: <https://www.cites.org/eng/prog/shark/more.php>

¹¹³Equivalent to roughly USD3.2 billion (2018)

¹¹⁴i.e. there is no suggestion for the need of a new CITES-type organisation to operate a central, shared CDS platform.

4. RFMOs and DSF management

The more general characteristics of DSF in the ABNJ, globally, have been presented in Chapter 2. This chapter looks specifically into which RFMOs manage DSF fisheries, and what management measures apply to these fisheries broadly. This in turn, will make it possible to assess how far CDS would be a useful tool to integrate the management framework of these fisheries.

The distribution and importance of DSF fishing grounds have been discussed in section 2.3.2. It is recalled here that the most important oceanic basin for DSF is the Atlantic Ocean, yielding more than 90 percent of the global DSF harvest in 2006 – with half of that originating in the Southwest Atlantic. The next-most important oceanic basins, in descending order by volume of harvest, are the Pacific Ocean, the Indian Ocean, and finally the Southern Ocean.

4.1 RFMOS COVERING DSF AND MANAGEMENT MANDATE

As DSF have a global distribution, and occur in all major ocean basins, a number of RFMOs are tasked with their management and conservation. Table 8 lists the principal RFMOs and the oceanic basins in which they have an active involvement in DSF management in the ABNJ.

TABLE 8
RFMOs with DSF management mandates by oceanic basin

Oceanic basin	Basin area	RFMO
Arctic Ocean		–
Atlantic Ocean	Northwest	NAFO
	Northeast	NEAFC
	Southwest	–
	Southeast	SEAFO
Mediterranean		GFCM
Indian Ocean	North	–
	South	SIOFA
Pacific Ocean	North	NPFC
	South	SPRFMO
Antarctic Ocean		CCAMLR

Source: Author's own elaboration.

A total of eight principal RFMOs share responsibility for the management and conservation of DSF in the ABNJ. This group of RFMOs comprises the recently created RFMOs: SPRFMO (2012), SIOFA (2012) and NPFC (2015).¹¹⁵

Three major oceanic basin areas do not have RFMO coverage. These are the Southwest Atlantic, the northern Indian Ocean, and the Arctic Ocean. While the Southwest Atlantic yields important volumes of DSF harvests globally, the northern Indian Ocean has few exploitable DSF grounds¹¹⁶ – owing largely to its bathymetry – while a changing and opening Arctic Ocean, undergoing increasingly important thawing of its polar ice cap, may well become a potential focus for DSF endeavours in the future.¹¹⁷

¹¹⁵Dates in brackets denote the entry into force of the agreement establishing the RFMO.

¹¹⁶Still, opportunities for DSF development in the ABNJ of the northern Indian Ocean exist, and are being actively investigated (see Sinha *et al.* 2017).

¹¹⁷Note the Fairbanks Declaration (2017) of the Arctic Council, laying the foundation for further collaboration by states bordering the Arctic, potentially including fisheries: https://oarchive.arctic-council.org/bitstream/handle/11374/1910/EDOCS-4339-v1-ACMMUS10_FAIRBANKS_2017_Fairbanks_Declaration_Brochure_Version_w_Layout.PDF?sequence=8&isAllowed=y

Other fisheries arrangements dealing with DSF also exist, such as regional fisheries management arrangements limited to advisory functions. These include arrangements such as the Western Central Atlantic Fishery Commission (WECAFC) or the Fishery Committee for the Eastern Central Atlantic (CECAF), and some of these bodies directly address DSF agendas also.¹¹⁸ Bilateral arrangements specifically covering DSF resources in the EEZ, such as the International Pacific Halibut Commission (IPHC), established between Canada and the United States of America, also exist. These bodies and arrangements are beyond the scope of this paper, as they either do not cover DSF in the ABNJ, or lack rule-making and enforcement powers.

It is important to underline that all RFMOs have a mandate to manage resources within an RA. None of the DSF-related RFMOs has a species, or a set of species, of competence assigned to it, such as is the case for the International Whaling Commission (IWC)¹¹⁹ – with global competence for a number of whale species – or CCSBT, with global competence for the management of southern bluefin tuna. The only exception to this rule is CCAMLR, which has taken a quasi de facto approach to assuming competence over all toothfish catches regardless of their area of harvest, as discussed above. Thus, CCAMLR assumes a hybrid position within the landscape of RFMOs, where the norm is that they are either fully RA-bound, or fully species-bound with regard to their management mandate. This has deep implications for the successful management of DSF species distributed across several RAs under a CDS.

4.2 DSF MANAGEMENT BY RFMOS FROM A CDS PERSPECTIVE

The high diversity in deep-sea species and their general existence in multiple discrete stocks within and beyond RFMO boundaries pose challenges in terms of data collection and analysis, and by extension, management measures to be developed for individual species (or assemblages) at the RFMO level. Added to this is the great depth at which these fisheries occur, adding an extra layer of complexity to scientific research. The FAO Guidelines on DSF provide a characterization of these challenges in the following terms:

“[...] The great depths at which marine living resources are caught by DSFs in the high seas pose additional scientific and technical challenges in providing scientific support for management. Together these factors mean that assessment and management have higher costs and are subject to greater uncertainty.”¹²⁰

The aim of this section is to obtain a comprehensive overview of which types of management rules are being applied across the various categories that a CDS can support alone or in combination with other MCS tools – as presented in Table 7 (see section 3.4). Such management rules are hereafter referred to as “CDS-sensitive” rules. The overview of those rules will then make it possible to develop an understanding as to where and in what capacity CDS as one MCS tool, *inter pares*, would prove useful to implementing and enforcing DSF management rules, and better protecting stocks from IUU fishing.

¹¹⁸See for example the WECAFC working group on deep-sea fisheries management: http://www.fao.org/fishery/docs/DOCUMENT/weca/wg_2012/WECAFCWGmanagement-deep-sea-fisheries.pdf

¹¹⁹IWC Convention (1946). Article I. Para. 2 : “**This Convention applies to** factory ships, land stations, and whale catchers under the jurisdiction of the Contracting Governments and to **all waters in which whaling is prosecuted** by such factory ships, land stations, and whale catchers.” (Highlight by the author.)

¹²⁰Description of Key Concepts. Para. 13.

TABLE 9
CDS-sensitive management rules across RFMOs

RFMO	Fishing vessel authorization		Limited output	Reporting obligations		Other operational rules			Time- & geographical-location-based rules (with VMS support)		
	IUU list	White list		TACs & quotas	Entry/exit reporting	Logbook or catch reporting	Mandatory ports	Observer programme	VMS	Temporal closure*	Area closure
NAFO ¹	1 Art. 52; 53	1 Art. 25, 26	1 Art. 5; Annex I.A	1 Art. 28.6	1 Art. 28	1 Chapter VII	1 Art. 30	1 Art. 29	1 Art. 5; Annex I,B	1 Art. 17	1 Art. 28.6
NEAFC ²	1 Art. 44	1 Art. 5	1 Rec 01 2018	1 Art. 12	1 Art. 12	1 Art. 21	0	1 Art. 11	1 Rec 06 2018	1 Art. 11; Rec 10 2018	1 Art. 13; Annex VIII
SEAFO ³	1 Art. 28	1 Art. 4	1 CM 32/16	1 Art. 11	1 Art. 11; CM 32/16	0	1 Art. 18	1 Art. 13	0	1 CM 30/15	1 Art. 5, 14
GFCM ⁴	1 Rec 33-2009-8	1 Rec 33-2009-6	0	0	1 Rec 35-2011-1	1 Rec 40-2016-4	0	1 Rec 33-2009-7	1 Rec 40-2016-4	1 Rec 40-2016-4	1 Rec 40-2016-4
SIOFA ⁵	1 CMM 2016/06	1 CMM 2017/07	0	0	1 CMM 2017/10	0	1 CMM 2017/10	1 CMM 2017/10	0	0	1 CMM 2017/10
NPFC ⁶	1 CMM 2017/02	1 CMM 2016/01	1 CMM 2017/05	0	0	0	1 CMM 2017/05	1 CMM 2017/05	0	1 CMM 2017/05	1 CMM 2016/03
SPRFMO ⁷	1 CMM 04-2017	1 CMM 05-2016	1 CMM 14-2016; CMM 03-2017	0	1 CMM 02-2017	0	1 CMM 03-2017; CMM 02-2017	1 CMM 06-2017; CMM 02-2017	0	1 CMM 14-2016; CMM 03-2017	1 CMM 12-2017
CCAMLR ⁸	1 CM10-06 (2016); CM10-07 (2016)	1 CM10-02 (2016)	1 various; e.g. CM41-02 (2017)	1 CM10-02 (2016); CM10-04 (2015)	1 various; e.g. CM 23-01 (2016)	0 Res 15/XXII	1 CM 22-06(2017)	1 CM 10-04 (2015)	1 various; e.g. CM41-08 (2017)	1 various; e.g. CM 91-03 (2009); CM 33-02 (2017)	1 CM 10-09 (2011)

Note: For every measure covering at least 1 DSF stock, the table renders a "1", while it renders a zero for every measure applying to no single DSF stock.

* Includes limited number of days at sea.

¹ NAFO Conservation and Enforcement Measures (2017): www.nafo.int/Portals/0/PDFs/fc/2017/CEM-2017-web.pdf

² NEAFC Management Measures (2018): www.neafc.org/managing_fisheries/measures/current; and NEAFC Scheme of Control and Enforcement: www.neafc.org/scheme/contents

³ SEAFO Conservation Measures: <http://www.seafo.org/Management/Conservation-Measures>; and SEAFO System of Observation, Inspection, Compliance and Enforcement (2017): www.seafo.org/media/9396af91-f459-42a0-b296-623edca01ac4/SEAFOweb/pdf/System/SEAFO%20SYSTEM%202017.pdf

⁴ GFCM Conservation and Management Measures (2017): https://gfcmm.sharepoint.com/CoC/Relevant%20Legal%20Documents/GFCM_Compendum_2017-e.pdf?siid=448f479e-802d-5000-f3f2-db59ff022e69

⁵ SIOFA Conservation and Management Measures (2017): www.siofa.org/sites/siofa.org/files/documents/cmm/Compendum%20of%20SIOFA%20CMM%202017.pdf

⁶ NPFC Conservation and Management Measures (2017): https://www.npfc.int/system/files/2017-11/NPFC%20Compendum%20of%20Active%20CMMs%2028%20November%202017_0.pdf

⁷ VMS only applies to fishing vessels operating in bottom fisheries in the Northwest Pacific Ocean (per CMM 2017/05). VMS coverage for transshipments in the Northeast Pacific is not mandatory, and therefore "CDS sensitivity" is not given in that part of NPFC's RA.

⁸ CCAMLR Conservation and Management Measures (2017): www.sprfmo.int/conservation-measures/

⁹ CCAMLR Schedule of Conservation Measures in Force (2017/18): www.ccamlr.org/en/system/files/e-schedule2017-18_1.pdf

* CCAMLR does not require carrier/refer vessels to operate VMS, creating a critical weakness in automated oversight and "CDS sensitivity".

Source: Author's own elaboration.

Table 9 summarizes the CDS-sensitive management rules the eight RFMOs are currently applying to at least one of the DSF that they cover. The table contains detailed references to individual management measures, citing RFMO-specific management rules. This table regroups often-adopted, major and CDS-sensitive RFMO management measures. The table does not imply that other similar – or quite distinct – management measures susceptible to high degrees of CDS “enforceability” do not exist.¹²¹ The 11 management measures set out in the table represent a cross-section of existing key measures often applied to DSF. This provides one of the foundations for the discussion of how useful a CDS is (or could be) in supporting the implementation of currently existing management frameworks as they apply to DSF.

Table 9 shows that the older RFMOs have adopted and applied a wide range of CDS-sensitive management measures to their DSF, and the virtual totality of the overall management categories covered by the table have been adopted in one form or another. The only exception to the rule is the absence of output limits (TACs and quotas) in the General Fisheries Commission for the Mediterranean (GFCM). With regard to the more-recent RFMOs, it is noted that SIOFA has not yet developed output limits for DSF, and that the NPFC has not yet developed stringent reporting obligations for DSF. It is also noted that all of the RFMOs have adopted VMS rules, many of which are so-called “commission VMS” (i.e. VMS data are received and monitored by the commission in near-real time), which would allow for the CDS-related enforcement of time- and geographical-location-based rules – as already practised in CCAMLR. However, with regard to VMS, both NPFC and CCAMLR DSF management frameworks display a gap in VMS coverage, which weakens the CDS-related mechanical enforcement of the rule.¹²²

Overall, the management substance that can be mechanically enforced through the implementation of a CDS across the eight RFMOs is both vast and deep. There is no single RFMO in which a CDS could not or would not play a fundamental part in enhancing compliance across this range of management measures.

Importantly, 75 percent of RFMOs have adopted output limits in DSF – including two out of three of the more recent RFMOs. While TACs and quotas can be – and invariably are – flouted in enforcement contexts limited to flag state oversight and enforcement,¹²³ the existence of an effective CDS denies the flouting of quotas and TACs by otherwise compliant vessels to the largest extent, as has been shown in the case of ICCAT. Finally, in order to be complete, it ought to be highlighted that in those RFMOs endowed with vast numbers of deep-sea species – as in NAFO and NEAFC – only a few DSF species are covered by TACs and quotas, while the vast majority may simply be regulated as bycatch. In these RFMOs, the DSF management substance focuses more on VME protection and gear rules (these latter typically being “CDS-insensitive”), rather than the management of the harvest regimes of individual species.

¹²¹ A pertinent example of a measure not reflected in Table 9 is the mandatory standardized labelling of products to be landed, adopted by several RFMOs, and which also exhibits a high degree of CDS sensitivity.

¹²² In the case of CCAMLR, trans-shipments are extremely rare, with this being the likely origin of the gap as to why carriers are not required to carry VMS. In NPFC, the reason for the gap is down to the very young age of the commission, the lack of full trans-shipment data to the commission, the lack of a commission observer programme and resulting data to the commission, the lack of an entry/exit system, the fact that no VMS CMM has been adopted to date, and that summary VMS rules within the CMMs provide only rules for national fisheries reporting, with no VMS reporting directly to the commission.

¹²³ For a discussion on faltering flag state enforcement in RFMO contexts, and RFMO means to overcome these, taking the example of CCAMLR, see, for example, Baird, (2005).

4.3 IUU FISHING AND COMPLIANCE

The IUU profile of DSF is varied and differs as a function of the management frameworks adopted by the various RFMOs, as much as it is a function of the strength and deterrent effect of the adopted MCS framework – including sanctions.

For the stocks subjected to TAC and quota rules – and this applies to few species and stocks worldwide – obvious and expected IUU issues pertain to under-reporting and misreporting of catches. In the only deep-sea fishery where a CDS has been put in place, i.e. CCAMLR's toothfish fishery, this issue is mechanically minimized throughout supply chains implementing the CDS. In other RFMOs, such as NAFO and NEAFC, e-reporting and port state control measures – combined with able monitoring and at-sea and port inspection frameworks – are often regarded as addressing issues of this nature in an equally effective manner. However, they are not able to mechanically eliminate them, and misreporting of catches remains one of the lingering IUU-fishing issues across all RFMOs covering DSF, including in the North Atlantic.^{124,125} This highlights the fact that, in the absence of a CDS, misreporting of catches remains a possible avenue to (illegally) increase revenue streams for operators, and that the detection of misreporting requires a permanent and high level of monitoring and surveillance at sea and in ports. Under a CDS scenario, a considerable portion of these resources can be saved or redirected to other functions.¹²⁶

Fishing without a licence – sometimes referred to as “pirate fishing” – has disappeared in some parts of the world's high seas fisheries, while it remains a hot topic in other parts. In NEAFC, for example, the last detected case of fishing in the RA without a licence dates back to 2006. In NAFO, no cases of such fishing have been detected since the mid-1990s. In the CCAMLR area, the most important fleet of pirate vessels, the so-called “band of six” (including the *Viarsa*, *Thunder* and *Viking*), has been largely eliminated through active at-sea law enforcement campaigns throughout the earlier years of the twenty-first century, and it is thought that pirate fishing incidence in the CCAMLR area at the time of writing was very low. However, in the North Pacific, there are many cases of unauthorized fishing on the high seas that are difficult to address. This situation is due to the fact that the NPFC is one of the newer RFMOs and is still going through the process of establishing a deterrent monitoring and compliance framework.¹²⁷

Then there are the more regular infringements consisting of violating spatial closures, seasonal closures, gear restrictions, observer coverage, etc. In this respect, DSF do not differ from other fisheries. Ultimately, it is the monitoring and compliance framework developed and pursued by RFMOs, and the resulting risk of detection, that determines the level of deterrence, and the resulting levels of compliance. The variability in RFMO MCS frameworks fundamentally modulates the nature and variability of IUU fishing incidence in DSF globally.

¹²⁴Rogers and Gianni (2009) report that: “In the NEAFC area there has been extensive misreporting, under-reporting and non-reporting of catch, particularly of by-catch species, in the fisheries for deep-sea species.”

¹²⁵Portugal and Spain were identified by the United States of America under the MSRA in 2011, in 2013 and in 2015 (Spain only in 2013), for a variety of infringements in the NAFO RA, including misreporting (see for example, NOAA, 2015).

¹²⁶Under-reporting catch in a CDS is possible in the absence of a full port inspection at landing. However, legally marketing the non-reported portion of the catch is then impossible, as the non-declared portion is also absent from the catch certificate. Under a port-state control regime, such as that of the NEAFC or NAFO, once a landing has been approved, including unreported catch, the illegal portion of the harvest/landing can be legally marketed. Therefore, complementing a port-state control system of the sort with a CDS is a sound option.

¹²⁷Victorero *et al.* (2018) estimate that the deep-sea bottom-trawl fisheries of the Northwest and Northeast Pacific between 1950 and 2015 only had 34.9 percent of the catches reported, meaning that their actual importance may be three times higher than currently thought. On the other hand, and for the same period, they estimate that 89.8 percent of the deep-sea bottom trawl catches of the Northwest Atlantic were reported.

4.3.1 A series of recent SEAFO examples

Regarding the infringement of spatial closures, the findings in SEAFO's most recent compliance report (SEAFO, 2017a) serve as an appropriate example of IUU fishing for DSF in the ABNJ, and the putative benefits of a CDS.

The tenth report of the SEAFO annual compliance committee and the underlying annual compliance review (SEAFO, 2017a and 2017b) report that four fishing vessels were active in SEAFO's RA in 2017, flying either Japanese or Namibian flags.¹²⁸ Of the four vessels, both Namibian vessels presented compliance issues.

For one vessel, targeting deep-sea red crab, catch reporting between five-day catch reports, scientific observer reports, port inspection and logbook differed widely. Port inspection established a landed volume 31 percent larger than the harvest recorded in the logbook, and quarterly reports were not filed as provided for in the rules. However, five-day reports very much reflected the actually landed weights, and overall, the non-compliance issues of the crab vessel were minor. The two Japanese vessels were in full compliance.

The second Namibian vessel, a trawler, other than being on the SEAFO authorized vessel list, failed to comply with any of the rules on catch reporting (including five-day reports), was not transmitting VMS positions to the secretariat, and was fishing in the RA unbeknown to the secretariat – also disregarding entry-and-exit reporting rules. In addition, the vessel harvested 672 kg of alfonsino (the total catch of the year in the RA) in a closed area on Wust Seamount where trawling is prohibited. The secretariat only became aware of the spatial closure infringement when reports, including logbook and VMS data, were submitted to it six months after the facts, following an exchange of letters between the secretariat and the flag state authorities.¹²⁹

In addition to these infringements, the European Union reported a Bolivian registered vessel, F/V *Cape Flower*, which was operating in the area illegally in 2016; providing a documented case of fishing in the RA without authorisation.

Regarding the Namibian-flagged trawler infringements, the operation of a CDS would have deterred the infringements from occurring since the catch could not have been certified through a properly configured CDS platform supported by an able body of rules. In the latter case, the catch certificate could not have been issued in the absence of the underlying data establishing the existence and the legality of the fishing trip. Even in the absence of a sanction from the flag state – a sanction that had yet to be set and administered at the time of writing – the non-issuance of a catch certificate would have ensured that the operator would not fail again in the duty to comply with reporting requirements and spatial closures.¹³⁰

This example also highlights why it is essential for courses of action and sanctioning mechanisms under CDS to be clearly defined. In this case, the CDS system would have required the existence of a rule specifying that a catch certificate cannot be issued through the system in the absence of the required reports and data, and that in

¹²⁸The total catch for 2017 consisted exclusively of deep-sea species, of which 0.67 tonnes of alfonsino, 0.99 tonnes of pelagic armourhead, 12.5 tonnes of Patagonian toothfish, and 147.67 tonnes of deep-sea red crab.

¹²⁹See Annex V of SEAFO (2017b) for the exchange of letters. The spatial closure infringement is not mentioned in the exchanges, owing to the fact that the secretariat had no data or records submitted to it and was unaware of the infringement at the time.

¹³⁰In its letter to the SEAFO Executive Secretary, dated 18 July 2017, the Namibian Ministry of Fisheries and Marine Resources argued that the lack of reporting was due “to a lack of dissemination of information between the Ministry and the Fishing Right Holder [...] in that no further clarity were provided to the Right Holder upon receiving the authorization to fish in the SEAFO CA [...]”. The question arises whether the onus is on the operator to gain full understanding of publicly disseminated and available RFMO rules (published by the RFMO as per article 6 para. 7 of the SEAFO convention) and to comply fully, or whether the onus is on the competent authority to ensure operators are first made to understand the rules via “mini-workshops”, and that in the absence of such workshops, operators may not be held accountable for their actions. The answer to this question has obvious implications for sanctioning.

the presence of a spatial closure violation, a relevant sanction would have had to be administered and serviced prior to the issuance of a catch certificate.¹³¹

4.4 RFMOS AND THE ADOPTION OF CDS

As shown in Table 5, only three RFMOs have adopted CDS to date. One of these is CCAMLR, covering the deep-sea species of Antarctic and Patagonian toothfish. Seven out of the eight main RFMOs managing DSF in the ABNJ do not operate a CDS.

4.4.1 RFMO capacity

The first consideration of importance is RFMO capacity. This is broken down into financial and human resource parts.

The development costs of stand-alone CDS systems are not to be underestimated, especially modern systems based on online electronic platforms with decentralized logons; receiving and managing all of the data in real time, along and throughout the entire supply chain from hundreds of operators – overseen and monitored by dozens of competent authorities. The development of these systems invariably ranges in the domain of 6 to 7 digits in United States dollars.¹³²

Further to the financial implications related to the development of a CDS, and as indicated in Chapter 3, the operation of an “in-house” CDS solution requires the absolute minimum of a full-staff equivalent to administer the system – split between a compliance officer and an IT administrator. In the case of ICCAT, with the electronic bluefin tuna catch document (e-BCD) still under development and finalization, human resource needs are estimated to eventually settle at a 1.5 full-time staff equivalent.¹³³ Most RFMOs do not have such freely available human resources within their existing staff contingent and would have to increase their secretariat’s human resource budget, and recruit new personnel, in order to achieve this.

This means that for RFMOs with small secretariats, and staff contingents of fewer than five people, the development and operation of an in-house (i.e. stand-alone) CDS is generally not a tangible option within the existing structure and envelope of the RFMO budget.

Finally, in RFMOs where DSF only represent a minor portion of the harvest (e.g. NEAFC and NAFO), important investments of this sort would face steep competition from the management and related budget needs tied to the main non-DSF species managed by such RFMOs.

4.4.2 Where does the remit of the RFMO stop?

Another key question pertains to the remit of the RFMO. Is an RFMO naturally called to manage the fishing activities of a fishery, providing a consistent and effective management framework (including MCS) naturally finishing at the point of landing; or does the remit of the RFMO extend further – following fisheries products into trade?

This question is pertinent, and it is actively debated in commission meetings. There are two schools of thought. For the more conservative elements, the RFMO’s remit clearly finishes at landing, and port-state control frameworks are the furthest that

¹³¹The option of issuing catch certificates for illegally harvested resources, in cases where infringements have been established, ought to be provided. In such cases, a period to set and administer a sanction is set, and only when the sanction is of the minimum severity established in the rules, and it has been paid, may the catch certificates be issued. Such a mechanism reflects CCAMLR’s practice of issuing specially validated catch certificates (or “SVDCCs”) for known IUU catches. In the absence of such a mechanism, the fate of the catch is unclear, and would have to be destroyed under regulatory rigour. However, the destruction of high-value protein should not be the finality of a CDS, but rather the operation of a deterrent mechanism that has operators complying with the rules.

¹³²Upgrading the ICCAT bluefin tuna catch document (BCD) from a paper-based system to an electronic system (e-BCD) incurred costs of €1.63 million – equivalent to some USD 2 million – between 2012 and 2016 (ICCAT 2016a).

¹³³J. Cheatle, ICCAT compliance officer, personal communication.

an RFMO can venture in terms of rule-making. However, for the more progressive elements, trade is a natural extension of the RFMO's remit. With the CDS being a trade-based tool, covering the entire supply chain from harvest into the end-consumer market, proposals to develop and adopt CDS find natural opposition within commission membership.

In the more recent conventions establishing RFMOs, reference may be made to the fact that the remit of the RFMO may indeed cover trade-related measures – naturally including CDS – as shown in the following two examples:

*“The Commission shall adopt measures to ensure effective monitoring, control and surveillance, as well as compliance with and enforcement of the provisions of this Convention and measures adopted pursuant to this Convention. To this end, the Commission shall: establish, where appropriate, non-discriminatory market-related measures consistent with international law to prevent, deter and eliminate IUU fishing.”*¹³⁴

*“The Commission shall establish appropriate cooperative procedures for effective monitoring, control and surveillance of fishing and to ensure compliance with this Convention and the conservation and management measures adopted by the Commission including, inter alia: non-discriminatory market-related measures, consistent with international law, to monitor transshipment, landings, and trade to prevent, deter and eliminate IUU fishing including, where appropriate, catch documentation schemes.”*¹³⁵

These provisions, providing a firm grounding for the adoption of market-related measures, are exceptions in the landscape of RFMO convention texts. Those RFMOs whose conventions are silent on trade measures include, *inter alia*, CCAMLR, ICCAT and CCSBT, these being the three RFMOs that were operating multilateral CDS at the time of writing this paper. The same applies to NEAFC and SEAFO, to name but two more examples.

Finally, the fact that the potential adoption of market-related measures is provided for in the RFMO founding texts does not imply that the commission therefore feels urged to develop such measures. Several RFMO secretariats with enabling convention texts indicate that the commissions are generally more comfortable with managing fisheries up to the point of landing – including the putting in place of port-state control measures – while there is a generally a higher level of reluctance to consider the adoption of CDS.

4.4.3 CDS in RFMO performance reviews

RFMOs may be subjected to performance reviews periodically. Such reviews assess the overall performance of the RFMO in pursuing its mandate, and are good indicators to gauge what experts external to the secretariat and the commission feel with regard to the potential of adopting market-based measures – i.e. if and how a CDS could complete the range of management tools that the RFMO is currently applying to its fisheries. It is of use to focus on external performance reviews for the assessment of the potential usefulness of politically sensitive CDS, as the external review panels are generally understood to be more politically unbiased, and better equipped to candidly assess the technical potential of hitherto unadopted measures and technologies. This sharply distinguishes views expressed by performance review panels from decisions that are adopted – generally by consensus – by a commission.

¹³⁴Convention on the Conservation and Management of High Seas Fisheries Resources in the North Pacific Ocean (NPFCA), article 7, para. 2, subparagraph (g).

¹³⁵Convention on the Conservation and Management of High Seas Fishery Resources in the South Pacific Ocean (SPRFMO). Article 27, paragraph 1, subparagraph (d).

RFMOs that do not yet have a CDS in place and that have run a performance review in the recent past are: SEAFO (2016), NEAFC (2014), NAFO (2011), and GFCM (2011). Coincidentally, the four RFMOs administer DSFs across the Atlantic Ocean basin and the adjacent Mediterranean, yielding the most important share of global DSF catches.

SEAFO's 2016 review, the most recent on hand, notes the existence of a CCAMLR CDS for toothfish, and proposes the logical course of action for SEAFO members – all but one of which are also members of CCAMLR¹³⁶ – to align with the CCAMLR CDS, rather than establishing a separate CDS covering the same species at SEAFO. The review panel recommends as follows: “23. If fishing activities sharply increase in SEAFO, the Commission should evaluate the need and consider the prospect to develop a Catch Documentation Scheme for relevant species in harmony to CDSs already in force in other RFMOs. In this context the Commission should closely follow the ongoing FAO works on Catch Documentation Schemes.” With this recommendation, a clear impetus is provided for SEAFO to harmonize CDS efforts with existing CDS by buying into them, rather than duplicating them in isolation, and to following FAO's work on CDS (including work such as that enshrined in the present paper) exploring ways of harmonizing CDS and rendering it more effective. The level of fishing effort, deemed too modest at the time of the evaluation, is put forward as a relevant criterion against which to weigh the decision of whether to adopt a CDS or not.¹³⁷

NEAFC's 2014 second performance review first notes that “some components of modern MCS tools seem to be missing in the NEAFC Scheme. [...] The Scheme does not provide for the implementation of a regional observer programme,¹³⁸ or catch documentation and/or trade tracking schemes, as additional MCS tools to ensure compliance with NEAFC conservation and management measures”, leading to the understanding that the complementary value of a CDS is being endorsed in the same way as it is under section 4.3 of this paper. However, the review panel goes on to conclude: “UNFSA does not refer specifically to trade-tracking schemes, such as catch documentation scheme (CDS) or trade-certification schemes, although the FAO IPOA particularly encourages such tools in the fight against IUU fishing. However, introduction of such schemes may not be currently necessary in the NEAFC RA, in view of the success of the [existing MCS] Scheme in combating IUU fishing.” Rather than underlining the complementarity between a more diverse array of management and enforcement measures, such as VMS, port state control and CDS, the review views them more readily as mutually interchangeable and/or exclusive, and capable of achieving satisfactory outcomes in isolation. The position of NEAFC on the matter has not substantially changed in recent years.

The performance review of NAFO, conducted in 2011, also assesses the question of market-related measures, as foreseen in the criteria for the review.¹³⁹ The review first establishes that “NAFO's Basic Texts and the 2007 Amended Convention contain comprehensive legally binding provisions which [...] empower the Organization to adopt and apply cooperative and integrated monitoring control and surveillance

¹³⁶The only SEAFO member that is not a member of CCAMLR is Angola.

¹³⁷If SEAFO were to formally align with the CCAMLR CDS, and make it mandatory for its members to apply its terms for SEAFO-related catches and landings, the size of the SEAFO toothfish fishery would be irrelevant. The size of the fishery would only be a relevant consideration if SEAFO were to develop its own in-house and stand-alone system. In actual fact, assuming that the CCAMLR system is designed to accommodate a given fleet size and volume of transactions, then the smaller the addition of number of vessels, catches and/or landings from outside the RA to be added and covered by the CCAMLR system, the less likely the need to upgrade the capacity of the CCAMLR platform.

¹³⁸See Table 9.

¹³⁹See NAFO (2011), Appendix II - Criteria for Reviewing the Performance of NAFO. “Compliance and enforcement. Monitoring, control and surveillance (MCS). Extent to which NAFO has adopted integrated MCS measures (e.g. required use of boarding and inspection schemes, VMS, observers, catch documentation and/or trade tracking schemes, and restrictions on transshipment).”

measures. Such measures include [...] catch documentation and trade tracking schemes [...].” After confirming NAFO’s enabling legal foundation regarding the potential to adopt a CDS, it notes – with specific regard to market-related measures of the CDS type, that: “The use of market-related measures as a means to combat IUU fishing is a recent development.¹⁴⁰ [...] STACTIC¹⁴¹ is also given broad powers to make recommendations on ways to combat IUU fishing. These can include market-related measures.” The review panel concludes that “NAFO is encouraged to continue developing market-related measures as a way of improving the monitoring of total removals from the various fish stocks harvested in the Convention Area and in the event of any potential IUU fishery developing.” While the wording leads one to understand that NAFO had already undertaken the development of such tools – which was not the case at the time – it provides a clear recommendation for the development and adoption of market-related measures to complement the arsenal of NAFO MCS tools. It also highlights the capacity of a CDS, next to combating IUU fishing, to function as a complementary quota monitoring and enforcement tool.

The performance review of GFCM in 2010 – the oldest of the four assessed here – focused largely on a legal and policy analysis of the GFCM agreement (Szigeti and Lutgen, 2015), and no assessment was made of market-based measures under the broader domain of compliance and enforcement. Given the year of publication and the relatively low profile of market-related measures at the time, this is not entirely surprising. The review notes: “The GFCM has not adopted market-related measures. Although marketing is a concern for aquaculture, the diverse characteristics of the Region and its fisheries would not at present make such a measure practicable. Consequently, there is no Panel analysis or recommendation.”¹⁴² However, a 2015 Roadmap on Fighting IUU Fishing in the Mediterranean, adopted five years later and published as Annex J to the GFCM’s Thirty-eighth Meeting Report of the Commission, proposes that, in order to “improve traceability mechanisms and take measures to prevent, deter and eliminate **the trade** in IUU products, a deterrent system to fight IUU fishing would have to ensure that controls are performed from the net to the plate. Work done by the FAO and the GFCM could be taken into account as well as the requirements by EU regulations. Market related measures should be developed, extending beyond the FAO International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (IPOA IUU).” (Emphasis by the author). This marks the point where GFCM moves beyond the findings and lack of recommendations of its performance review on market-related measures, giving formal consideration to developing such tools, in line with IPOA-IUU provisions, and as implemented by the European Union, this being a clear reference to CDS systems. Again, taking stock of FAO’s work in this domain is underlined.

In summary, the following insights are derived from these reviews:

- Market-related measures remained ill-understood at the beginning of the current decade, more than ten years after CCAMLR’s CDS had started implementation. The advent of the CDS systems of ICCAT, CCSBT and – most importantly – the European Union were instrumental in raising the profile of these systems and fostering a better understanding of their function and potential.

¹⁴⁰In 2011, the three current multilateral CDS schemes were all operating, and the unilateral CDS of the European Union had been launched a year earlier also. Two of the 3 multilateral schemes had started their operation 1 and 3 years prior to the NAFO review, while the CCAMLR scheme had already been in operation for more than a decade. This statement underlines the painstaking slowness of mainstreaming trade-related measures in fisheries management, and their continued existence on the margins of obscurity – despite their adoption in multiple fisheries.

¹⁴¹NAFO Fisheries Commission Standing Committee on International Control.

¹⁴²See GFCM (2011). Appendix I. The criteria for reviewing the performance of the GFCM asked the review panel to review the “Extent to which the GFCM has adopted integrated MCS measures (e.g., required use of VMS, observers, catch documentation and trade tracking schemes, restrictions on transshipment, boarding and inspection schemes).”

- In the majority of performance reviews, RFMOs have been advised – or have later taken the decision – to move forward with the adoption of market-based tools, bearing in mind the following considerations:
 - apply FAO’s work, findings and recommendations for future market-based systems to CDS applying to DSF in the ABNJ;
 - harmonize and integrate approaches with existing CDS systems; and avoid developing systems in isolation to existing ones, when covering the same species.

4.5 NON-RFMO MANAGEMENT OF DSF IN THE ABNJ

Management measures for DSF in the ABNJ have also been taken unilaterally by states, and it is of interest to briefly highlight these, and assess how market-based control measures could relate to such initiatives. Especially with regard to the Southwest Atlantic, some states have taken unilateral action – in their capacity as flag states – to establish DSF rules applying to their fleets only.

Regarding the United States of America, the MSRA defines IUU fishing to include any fishing activity that has an adverse impact on VMEs, including seamounts, hydrothermal vents, and cold-water corals, located beyond national jurisdiction, for which there are no applicable conservation or management measures or in areas with no applicable international fishery management organization or agreement.¹⁴³ While this unilateral legal position may not reflect the position of other major fishing nations, and does not provide a substitute for multilateral arrangements, it clearly ties in with the text and the spirit of the UNGA Resolutions covering VMEs and DSF, and the 2008 International Guidelines on DSF. It enables the United States of America to exercise flag-state control over its vessels, as well as long-arm jurisdiction over vessels voluntarily calling to its ports for trans-shipping or landing high seas DSF catches. However, no country has been identified under the MSRA on the basis of such a violation by fishing vessels flying its flag.¹⁴⁴

Especially in areas where there are no RFMOs (e.g. Southwest Atlantic), such unilateral approaches are the only mechanisms currently available to protect VMEs. In a similar move, Spain has unilaterally closed nine VME areas on the Southwest Atlantic continental shelf to bottom trawling, and vessels flying its flag must comply with these spatial closures¹⁴⁵ (Durán Muñoz *et al.* 2012). In the absence of a multilateral mechanism, such flag-state initiatives will go some way to protecting VMEs.

In 2008, the European Union adopted a regulation applying to the fishing fleets of its members operating in ABNJ waters not under the responsibility of RFMOs with competence to regulate fishing activity.¹⁴⁶ It provides that no bottom fishing may take place in scientifically hitherto unassessed ABNJ areas, that member states should close recently discovered VME areas to bottom-fishing vessels flying their flags (providing the legal basis for Spain’s rules discussed above), and that all vessels operating in such waters carry VMS and comply with 100 percent observer coverage.

¹⁴³ For the purpose of the Moratorium Protection Act, IUU fishing means:

(1) Fishing activities that violate conservation and management measures [...];

(2) Overfishing of fish stocks shared by the United States [...]; or,

(3) Fishing activity that has a significant adverse impact on seamounts, hydrothermal vents, cold water corals and other vulnerable marine ecosystems located beyond any national jurisdiction, for which there are no applicable conservation or management measures, including those in areas with no applicable international fishery management organization or agreement. (MSRA section 609.)

¹⁴⁴ Identifications under the MSRA started in 2009, published bi-annually in NOAAs report to Congress. By 2017, five such reports had been published.

¹⁴⁵ Spatial closure for the Spanish bottom-trawling fleet in ABNJ waters of the Southwest Atlantic, effective as of 1 July 2011. The currently closed area amounts to 41 300 km².

¹⁴⁶ Council Regulation (EC) No 734/2008 of 15 July 2008 on the protection of vulnerable marine ecosystems in the high seas from the adverse impacts of bottom fishing gears.

In 2016, the European Union also enacted rules on existing fishing areas and maximum fishing depth,¹⁴⁷ banning bottom trawlers from operating in waters outside of their existing historical footprint, or in waters deeper than 800 meter. The rule applies to EEZ waters of the European Union,¹⁴⁸ as well as the ABNJ of the Eastern Central Atlantic Ocean.¹⁴⁹ ABNJ waters of the North and the Southwest Atlantic were excluded from the measure, following intense negotiations with some of the powerful fishing lobbies of the European Union. This means that the most important DSF fishing grounds targeted by the EU fleet in ABNJ waters fall outside the scope of the regulation. However, as with the Spanish example, it is apparent that unilateral protective measures can and are being taken in order to provide environmental protection to VMEs in areas where RFMOs with competence to regulate fishing activity are absent.

Overall, DSF-related long-arm jurisdiction type initiatives are rare or altogether absent, although United States legislation provides the basis for it. However, unilateral measures applied to a flag-state's fleet are more common and have largely been enacted by the European Union and one of its member states (Spain). Unilateral market-related measures that could potentially be made to apply under both the SIMP of the United States of America and the CDS the European Union have not been considered to date, while it is obvious that multilateral CDS in their current form, i.e. largely limited to the RA of the RFMO operating them, do not harbour the potential to be leveraged in such manner. However, it is easily conceivable that, under a global super-CDS, particular spatial closures falling outside the RA of any RFMO could be adopted "remotely" – either by being agreed multilaterally, or by being imposed unilaterally by flag, port and/or market states within such a framework.¹⁵⁰

¹⁴⁷Regulation (EU) 2016/2336 of the European Parliament and of the Council of 14 December 2016 establishing specific conditions for fishing for deep-sea stocks in the north-east Atlantic and provisions for fishing in international waters of the north-east Atlantic and repealing Council Regulation (EC) No 2347/2002.

¹⁴⁸European Union waters of the North Sea, of the northwestern waters and of the southwestern waters as well as European Union waters of ICES zone IIa.

¹⁴⁹International waters of CECAF areas 34.1.1, 34.1.2 and 34.2.

¹⁵⁰Currently, it is conceivable that a fishing vessel, flying a flag other than that of Spain, operates bottom-trawling gear in areas unilaterally closed by the Spanish legislator in the Southwest Atlantic. The resulting deep-sea harvest may then be landed in any port and legally exported to Spain. If the same fishing operation were to fall under the tenets of a global super-CDS, and Spain unilaterally established within that system that fishery products from specified areas could not enter the Spanish market, then the protective measure would gain in profile and effectiveness through the CDS mechanisms denying access to particular markets.

5. Trade in deep-sea fishery products

As a trade- or market-based tool, CDS start out at the harvesting end, but the lion's share of their action applies along supply chains, whenever international trade transactions take place. These actions relate to those instances when product is exported from the port state¹⁵¹ to an end-market state,¹⁵² or from a port state to a processing state.¹⁵³ In the case of semi-finished products are manufactured, products may be further re-exported to another processing state, or in the case of finished products, they may be then re-exported to the consumer end-market state. In some cases, involving brokerage of raw or semi-finished products, consignments may also be imported into, and re-exported from, given territories in the same form without undergoing changes. Every time an exportation or re-exportation takes place, a trade certificate under the CDS is issued and validated by a competent authority, linking the exported product to the source certificate (or certificates) under which the original product entered the territory. The precise CDS-related handling of these transactions, and how they ought to be managed and supported at the state level, have been discussed by Hosch (2016a) and Hosch and Blaha (2017). Thus, these aspects are not covered here.

What is of particular importance to appreciate in this chapter is that every importation under a CDS carries with it a burden of control that has to be applied at the border. The border control framework applying to the importation of CDS-covered products must be able to provide a number of assurances:

- that the CDS is known and well understood, and that CDS paperwork is subjected to official controls by border inspection agents;
- that the formal CDS-related control framework embodies a tangible risk for fraudulent consignments of being detected;
- that a formal framework of deterrent sanctions – including import denial – is in place, and is applied in instances of detected fraud.¹⁵⁴

A CDS, as a fishery management tool, only makes sense in fisheries in which trade plays a key part. In fisheries where the overwhelming majority of products are landed and consumed domestically, a CDS is of limited use.¹⁵⁵ Trade is an important dimension in DSF, and hence the fact that CDS may play an important part in the management of these fisheries – from this particular perspective – is a given.

¹⁵¹The port and country where a harvest was first landed, accompanied by a valid catch certificate.

¹⁵²The country to which the products are exported for final consumption, and from which they will not re-emerge.

¹⁵³The country in which products will be substantially processed into value-added products, before being re-exported.

¹⁵⁴The recent report by Mundy (2018) suggests that these basic assurances are not yet provided in an equal manner between entry points of seafood into the EU market – indicating that important disparities in the effectiveness of the control framework applied by individual EU member states to the EU's unilateral CDS do exist, resulting in detectable diversions of seafood trade between entry points into the its market. (see also footnote 89)

¹⁵⁵This relates to the fact that in the case of domestic landings and consumption – and the absence of trade – oversight and jurisdiction remain limited to the flag state. Market-based tools seek to overcome exclusive (and often faltering) flag-state jurisdiction by expanding it to port and market states also, improving enforcement and compliance outcomes within a multilateral framework providing for peer-to-peer oversight and control.

5.1 DSF TRADE STATISTICS

Trade in DSF is important, but also difficult to fathom. In terms of trade volume, it is safe and conservative to assume that at least half of all DSF harvests do enter international trade (including intra-EU trade). This is due to a combination of: (i) fisheries often being conducted far from consumer markets (implying landing in foreign ports and re-exportation of products as freight); and (ii) flag states involved in fishing not being the primary consumers of many of the harvested resources.

The only way RFMOs can track trade and raise trade statistics in species (and their derived products) of which they oversee the fishery is when they operate a trade tracking programme (such as the TDS operated by ICCAT) or a CDS. Among the RFMOs covering DSF, only CCAMLR is currently operating a CDS and, therefore, only it has a centralized overview of international trade in toothfish products. The other RFMOs with a mandate covering DSF have a very limited understanding of the supply chain through which fish harvested in their RA migrate, and in which markets they ultimately end up in.

5.1.1 Sources of DSF trade statistics

Fish trade statistics under an effective CDS are both complete and encompassing (i.e. covering not only the flag of origin and the final destination markets, but also the whole gamut of supply-chain transactions), and they are recorded and filed in the RFMO's CDS data repository. These represent the potentially most complete source of fish trade statistics. Such CDS trade data can be analysed on a recurrent basis in order to gain a deep understanding of the trade dynamics in RFMO-managed stocks, and potential compliance issues – especially in combination with other sources of trade data, foremost among them being those recorded by individual countries.¹⁵⁶

The second source of trade statistics are individual country trade datasets, as recorded and filed by national customs authorities. These datasets are generally available to (and accessible by) the general public under various (non-harmonized) forms and levels of aggregation, often using expanded and/or more detailed national commodity coding systems that go beyond the six-digit harmonized coding system of the World Customs Organization – but not in all cases.¹⁵⁷ Relying on trade datasets of individual countries to reconstruct global supply chains and analyse trade flows for individual species and commodities originating from any specific RFMO is laborious and time-consuming, given the non-harmonized nature of codes, and the almost endless permutation of country linkages that may exist. In cases where important countries participating in the trade of a CDS-covered species are not applying the CDS (e.g. Hong Kong SAR for toothfish), country-level and international trade datasets are the only avenue to

¹⁵⁶ A relevant example of such comparisons – establishing the existence of misreporting (and hence IUU fishing) – is provided by Sancho Andrade, Ortiz - Von Halle and Naranjo Cuvi (2002) as follows: “In relation to Antarctic Toothfish *Dissostichus mawsoni* there were no catch reports of this species by Uruguayan vessels in either 1999 or 2000. However, the United States recorded imports of this species from Uruguay of approximately 131 tonnes in 1999 and 375 tonnes in 2000. These imports represented over 40 per cent of the total imports of Antarctic Toothfish by the United States. In the first six months of 2001, the United States again recorded imports of Antarctic Toothfish from Uruguay of 377 tonnes. Uruguay reported only 40 tonnes of catch of the species in that year.”

¹⁵⁷ An example of the non-harmonized codification of trade data between countries hails from Sancho Andrade, Ortiz - Von Halle and Naranjo Cuvi (2002), who report: “Uruguay’s national export statistics do not discriminate between different toothfish products, nor between exports of Patagonian Toothfish and Antarctic Toothfish.” The same paragraph establishes that United States import statistics allow distinguishing between both species – which allowed establishing the discrepancy in Uruguay’s reporting referred to in the above footnote. With regard to Peru, it is reported: “There is no Customs nomenclature specific to Patagonian Toothfish in Peru. [...] The lack of species-specific Customs codes for toothfish makes it difficult to carry out a proper analysis of trade of this species from Peru.”

analyse these flows.¹⁵⁸ However, country-level customs codes (and the datasets based on these) generally present major challenges for identifying and tracking trade of DSF commodities. Regarding these datasets, Lack, Short and Willock (2003) illustratively report that:

“Few countries involved in the catch and trade of Orange Roughy have specific customs codes under which to record their import, export and re-export of this species. The main consumer market, the USA, and the main producer country, New Zealand, do have customs codes for Orange Roughy. Chile, also a small producer country, introduced one commodity code for Orange Roughy in 2002. However, Australia, Canada, the EU, Japan and Namibia do not have customs codes or record trade information for Orange Roughy, despite being producers and/or consumers of the product. Significantly, no trade information is available from China, which has emerged as a major exporter/re-exporter of Orange Roughy to the USA in recent years, and is identified in FAO’s Capture Production database as having caught Orange Roughy in recent years.”

While some country-level custom codes are bound to have been upgraded since, this remains an issue regarding the analysis of trade in DSF commodities.

Finally, there are the international trade datasets such as those hosted by the United Nations Conference on Trade and Development¹⁵⁹ and UN Comtrade,¹⁶⁰ being submitted by individual countries in a recurrent manner. These datasets are compatible by virtue of adopting the HS classification of the World Customs Organization,¹⁶¹ some detail in country-level statistics is generally lost by reducing national codes to their harmonized six-digit roots – in order to make all hosted sets compatible. The following section discusses these datasets and their underlying classification.

5.1.2 HS classification and DSF

The question that arises is whether international trade statistics – and the underlying HS classification – provide a resolution that is sufficient to distinguish either individual DSF species, or generic DSF species as a group within the general headings covering fish and fish commodities.¹⁶²

The latest version of the HS classification (HS-2017) entered into force on 1 January 2017. The number of fish products it accommodates remains far below the number of commercially harvested and traded fishery species, but it marks a net improvement over the earlier version (HS-2012). With regard to fish products, the 2017 version underwent 85 agriculture-related amendments – including fisheries. Within the limits of the available codes, the classification was restructured according to main groups of species of similar biological characteristics. Amendments aim, *inter alia*, to cater for species and/or product forms that require better monitoring for the purpose of better

¹⁵⁸“Thus, while the CDS allows for the tracking of trade between those countries that participate in the scheme, it does not cover trade by non-Contracting, non-participating countries, and nor does it cover toothfish not accompanied by CDS documentation, i.e. IUU toothfish catch. Therefore, to conduct a more complete analysis of global trade in toothfish products, it is necessary to examine the trade databases of the individual countries known or suspected to be involved in the trade of toothfish.” (Dent, 2016)

¹⁵⁹See: <http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx>

¹⁶⁰See: <https://comtrade.un.org/data>

¹⁶¹The “Harmonized Commodity Description and Coding System” is generally referred to as “Harmonized System” or simply “HS”. It is a multipurpose international product nomenclature developed by the World Customs Organization.

¹⁶²Lack, Short and Willock (2003) called for efforts to be made in this domain, as follows: “In order to maximise the effectiveness of conservation and management measures for deep-sea species: [...] (c) States involved in the trade of deep-sea species must implement, as a priority, harmonised trade codes for these species, noting the need for an adequate breakdown of codes by product form, in order to provide for meaningful trade analysis.”

fisheries management, and in particular for the conservation of potentially endangered species (Fugazza, 2017).¹⁶³

TABLE 10
Major DSF species in the HS-2017 classification

Species	Individual species listing	Within a group (genus, family, etc.)	Commodity type(s)
Antarctic toothfish	no	genus	various at genus level
Redfish	no	no	no
Orange roughy	no	no	no
Splendid alfonsino	no	no	no
Argentine shortfin squid	no	order ¹	yes – fresh, frozen & other
Longtail southern cod	no	no	no
Hoki Roundnose grenadier	no	several families in same group incl. both species ²	various for several families
Greenland halibut	no ³	family	yes – fresh & frozen
North Pacific armourhead	no	no	no
Red crab	no	order	yes – fresh, frozen & other

¹ Placed under HS Codes 0307.42, 0307.43 and 0307.49 in a group called “cuttle fish and squid”, of which the vast majority of commercial species are pelagic and non-DSF.

² Most families in this group of cod-like fishes (under HS Codes 0302.59, 0303.69, 0304.49, 0304.53, 0304.79, 0304.95, 0305.32 and 0305.53) contain a number of DSF species, but are not limited to these.

³ HS Codes 0302.21 and 0303.31 list the species with two other species within a group of three, and of which *Hippoglossus stenolepis* (Pacific halibut) is typically continental-shelf associated and generally not considered a DSF species.

Source: Author's own elaboration.

Table 10 provides an overview of some of the most important commercial deep-sea species harvested today, and how these are identified in the harmonized nomenclature of the new HS-2017 classification under Chapter 3.

The species listed in Table 10 represent the greater part of global DSF harvests by volume. The table shows that no single DSF species is individually codified, while important species, such as alfonsino, orange roughy or North Pacific armourhead, fall entirely beyond the grasp of the HS-2017 classification. A range of other species, including southern bluefin tuna (*Thunnus maccoyii*) – also under CDS management – is listed under species-specific HS codes (e.g. 0302.36). Toothfish, the only set of two DSF species under CDS management, are also the only two DSF species that are currently recorded at the genus level in the HS classification.¹⁶⁴ All other DSF species (including molluscs and crustaceans) are either grouped in larger sets of families, in sets regrouping several families, or in orders, or are simply not listed at all and fall generically under “others” and “not elsewhere specified”. Overall, it is fair to state that the HS classification and the related datasets, with one or two notable exceptions, are

¹⁶³ “Due to the importance of the HS in the collection of trade statistics, the HS-2017 amendments for fish and fishery products are to further enhance the coverage of species and product forms which need to be monitored for food security purposes and for better management of resources. The split by more detailed product forms for crustaceans, molluscs and other invertebrates is motivated by the importance of trade and consumption of these species in the various product forms. The subdivisions enable a better correspondence between the HS and the United Nations Central Product Classification (CPC). The amendment for cuttlefishes and squids is to extend the coverage of the present codes, in order to have all those species grouped. At present, a significant share of cuttlefish and squid trade is recorded under residual codes for molluscs.” See: <http://www.wcoomd.org/en/topics/nomenclature/instrument-and-tools/hs-nomenclature-2017-edition/amendments-effective-from-1-january-2017.aspx>

¹⁶⁴ In order not to convey a false sense regarding the relationship between HS codes and species falling under a CDS, it should be noted that Atlantic bluefin tuna (also covered by a CDS) is actually grouped with Pacific bluefin tuna (not covered by a CDS and occurring in a different set of oceanic basins altogether). This renders impossible a trade analysis of the CDS-covered species (i.e. Atlantic bluefin tuna) based on international trade datasets. In the case of toothfish, the same analysis is possible, as the two species that are regrouped in the HS nomenclature also fall under the same CDS. In the case of toothfish, it is the limitation of CCAMLRs jurisdiction, and toothfish catches in other RFMO RAs, that would create potential challenges in data interpretation.

ineffective as tools to inform the trade analysis of DSF commodities, let alone control trade flows.

The latest HS classification still does not allow distinguishing between aquaculture and wild-capture fisheries products, in the same vein as it quite naturally does not allow distinguishing between ABNJ- and EEZ-harvested products. The RFMO- and CDS-related datasets and the more detailed country-specific datasets remain the default options for DSF trade analysis.

5.2 DSF SUPPLY-CHAINS AND TRADE

This section explores the little formal knowledge available on supply chains and trade in DSF commodities. Toothfish play a central part in this.

5.2.1 Toothfish trade

Following the adoption of CCAMLR's CDS, studies covering toothfish trade multiplied rapidly (e.g. Lack, 2001; Lack and Sant, 2001; Cajal and Garcia Fernández, 2002a and 2002b; Contreras, 2002). One of the most recent trade reviews was commissioned by CCAMLR in 2016 (Dent, 2016). Dent notes that the combined harvest of France, Chile, Argentina, the Republic of Korea, Australia, the United Kingdom, and New Zealand accounts for some 90 percent of global capture production.

Dent also reports that an average annual volume of 25 054 tonnes of toothfish (*Dissostichus* spp.) was imported globally between 2009 and 2013. Given that the overall annual TAC (in live weight) was of the order of 15 000 tonnes (or less) in those years, and that fish is primarily traded in frozen, headed and gutted form (i.e. equating to a higher live-weight equivalent), it can be surmised that every unit of catch is traded at least twice before reaching its consumer end-market. The overall picture arising from this analysis – probably the only highly detailed trade analysis currently available for any DSF – is that trade in toothfish products, following their first landing, is a very important component of the full supply chain.¹⁶⁵

Following landing, toothfish is generally exported to a number of countries, mainly in North America, Europe, and East and Southeast Asia. The United States of America is the largest market for toothfish, with its imports in the period 2009–2013 representing 47 percent of the global total in volume terms, at an average of 11 683 tonnes per year, and 56 percent of the global total in value terms. An earlier report also identified the United States market as the global main consumer end-market of another DSF species, orange roughy (Lack, Short and Willock, 2003). In Asia, the major importers of toothfish are Japan, Singapore, China, Hong Kong SAR, and Thailand. Singapore, Hong Kong SAR and China re-export a relatively large proportion of their imports – indicative of their importance as processing hubs. In Europe, the large Mediterranean seafood markets, Italy, Spain and France in particular, in addition to the United Kingdom, account for the majority of European toothfish imports (Dent, 2016).

5.2.2 DSF trade in general

Much of what is formally understood about DSF trade and supply chains is grounded in the more detailed trade analysis efforts that have focused on toothfish – summarized in the preceding section. Based on the above, other publications (e.g. Lack, Short and Willock, 2003), and direct discussions held with industry representatives

¹⁶⁵“The supply chains conveying toothfish catches to the consumer, as is often the case for globally traded seafood products, are complex and will often involve multiple border crossings. In a typical case, after unloading from the harvesting vessel, the catch will likely be exported, either prior to or after processing, and be possibly re-exported once again to the country where it is consumed. This inevitably complicates the task of mapping trade flows [...]” (Dent, 2016)

during the research done for this paper, the following characteristics can be derived for DSF in general:

- The vast majority of DSF harvests do enter trade, either by virtue of being landed in foreign ports,¹⁶⁶ and/or by being re-exported from those port states to end-market states (either directly or via processing states and further re-exportation).
- The trade component of DSF supply chains is both important and complex, with units often being traded through multiple territories before reaching the consumer end-market.
- The bulk of DSF products is traded to affluent developed-country markets in North America, Europe and Asia that pay high unit prices for DSF products. Secondary and emerging so-called “boutique” markets are developing in other affluent places such as the United Arab Emirates.
- The absence of CDS – combined with the almost complete absence of DSF-specific harmonized customs codes – renders broader DSF trade analysis very cumbersome, while country datasets continue to present weaknesses and/or full-blown gaps, impairing the analysis of trade in given DSF species.¹⁶⁷
- Given the ubiquitous importance of international trade as a component of global DSF supply chains, trade-based tools – such as CDS – emerge as a potential asset in managing and controlling these fisheries.

5.3 CUSTOMS AND BORDER INSPECTIONS

The final major issue that needs to be highlighted in this chapter focuses on practical and logistical implications of trade-based tools, and their enforcement, at the border. “The border” is the line that a traded good crosses when exiting a territory, or conversely, when entering a territory. While tariffs applying to commercial traffic are traditionally the core business of border agencies (i.e. customs) managing the inward- and outward-bound traffic in goods, the enforcement of rules other than those relating to tariffs also requires attention. The border is often thought of as the “first line of defence” in deflecting, *inter alia*, unwanted goods entering a territory, in the same way as fishing ports under the PSMA are the first line of defence against IUU fish to be landed, to enter markets, and to be exchanged against cash. Customs agencies are thus as important to a CDS as port state authorities are to the PSMA – with the important and challenging difference that customs are not a fishery-related agency in the way that port state authorities under the PSMA are.

Tariffs, in and by themselves – including in the domain of seafood – are a complex matter, and therefore often compete for attention with other technical concerns. This is especially true in places where high volumes of traffic in diverse goods are being processed (and cleared), and where human and financial resources to operate border agencies may be limiting. As a government revenue-generating agency,¹⁶⁸ and as a market protection agency, the correct application of tariffs remains the primary

¹⁶⁶From a trade perspective, the landing of product by a fishing vessel flying a flag other than that of the port state is also considered an exportation, and hence the first trade transaction in the trade data, even if, from a fisheries and PSMA perspective, this is regarded as an exclusive fisheries transaction with no trade part. (For this reason, the PSMA 2009 does not construe the denial of a landing authorization as a trade sanction, but as a fisheries- and fishing-related law enforcement action.)

¹⁶⁷This remains true even for toothfish in 2016. Dent (2016) notes: “Trade recording practices differ between countries. While the vast majority of customs authorities base the structure of their databases on the Harmonized Item Description and Coding System (HS) [...], there still exist a number of issues with toothfish trade statistics that will need to be identified, elucidated and adjusted for.”

¹⁶⁸By way of an example, in the European Union, import duties collected by customs in 2013 amounted to €15.3 billion (equivalent to roughly USD20.4 billion the same year), representing 11 percent of the EU’s budget for the same year (EU, 2014).

business of many customs agencies. However, there are considerable differences in customs business cultures across the globe, and, generally speaking, customs have developed and now focus on other core business areas also, such as: the smuggling of endangered animals, plants, and dangerous goods; illegal traffic of all sorts; and fraud, terrorism and organized crime.¹⁶⁹

With the unrelenting increase in international trade volume,¹⁷⁰ border-control and customs agencies have developed and modernized their processes. This saw the avenue of automation systems for documentary controls in the 1980s, the development of the first e-customs platforms in the 1990s, and the development of single windows and e-business systems, technology and platforms as of the new millennium.¹⁷¹ The development of these systems should eventually allow for the integrating of rules and standards from outside the traditional customs preserve (such as sanitary and phytosanitary [SPS] rules and CDS in fisheries, or trade in endangered species under CITES) within the global trade control system.¹⁷² The United States of America, when developing the SIMP, was aware of the critical importance of the customs dimension and the trade control requirements of the system, and embedded the SIMP within the electronic single window system (called International Trade Data System – or ITDS) operated by United States Customs and Border Protection (CBP).^{173,174} In the European Union, only a few member countries (e.g. Spain) have developed such a system at the national level, while no overarching equivalent system exists. This means that the integration of this organization's CDS with national customs and trade control systems remains largely unachieved.

Currently, typical sets of trade documentation covering single consignments through international trade cover some 30 parties (i.e. parties claiming some regulatory stake in the trade), include about 40 different documents, and amount altogether to some 400 pages on average. The paperwork currently generated in international trade amounts to more than 8 billion documents, which are published on some 80 billion pages, annually.¹⁷⁵

In seafood trade, as in the trade of other agricultural commodities for human consumption, sanitary and phytosanitary (SPS) rules are also applied at the border, and play a major part in the clearing of seafood consignments bound to leave or to enter a territory. A CDS, once implemented, becomes a third seafood-specific official element to verify at the border, and has thus to be added to tariff and SPS risk-management and verification procedures.

¹⁶⁹See for example: EU (2014).

¹⁷⁰For the European Union, trade with the rest of the world doubled between 1999 and 2010.

¹⁷¹“Launched in 2003, the modernisation of the customs union towards a paperless environment is well under way and some EU customs administrations regularly rank among the best in the world. More than 98 % of customs declarations submitted in the EU are electronic. Continuous efforts are necessary to meet future challenges.” (EU, 2014)

¹⁷²CITES is planning to automate permit processes, facilitating electronic information exchange for collaboration between parties, and to integrate CITES into the global system of trade control and electronic risk management. Once achieved, CITES will become embedded as an integral constant of international trade and controls – rather than remaining an add-on requiring special treatment at the documentary level for given consignments.

¹⁷³For operational details, see: https://apps.cbp.gov/csms/viewmssg.asp?Recid=23181&page=&srch_argv=&srchtype=&btype=&sortby=&sby

¹⁷⁴Note that the United States of America developed a set of specific customs codes to identify species falling under the requirements of the SIMP. NOAA informs that: “The criterion to judge whether a specific fish product is included under the initial phase of SIMP is the Harmonized Tariff Schedule (HTS) Code used to file an electronic entry for the import shipment. NOAA Fisheries will provide to CBP a list of required data elements for each species under the HTS codes covered by SIMP. An updated list of HTS codes subject to SIMP will be posted soon under the message set implementation guide for NOAA Fisheries at: <https://www.cbp.gov/trade/ace/catair>” (source: <https://www.iuufishing.noaa.gov/Portals/33/SIMPComplianceGuide2017rev.pdf>)

¹⁷⁵This equates to 2 537 pages – or 253 documents – per second.

Taking the European Union as an example, 4 200 tonnes of goods are imported or exported into/from its territory every minute, involving an average of 500 customs declarations (EU, 2014). Fishery imports in 2016 were about 14.1 million tonnes (EU, 2017), implying that fisheries product imports represent an estimated 1.3 percent of all goods imported into the EU. With DSF representing far less than 1 percent of global marine harvests, and an important part of that being landed by EU vessels in EU ports, it is safe to assume that DSF imports into the world's most important seafood market represent less than 0.005 percent of all inbound trade.

It is useful to bear in mind all of the above numbers and processes when evaluating the development of a trade-based tool for DSF, as these will add a party, and a set of documents to the overall documentation covering consignments in international trade.

5.3.1 DSF CDS in the global trade control system

From a fisheries management perspective, the suggestion that each RFMO covering DSF stocks ought to develop a CDS to ensure that harvests derived from IUU fishing be denied market access seems intuitively sound. ICCAT's experience suggests that an effective CDS can bring back a stock from the brink of collapse, and given the similarities in modest TACs, limited markets, high product value, and vulnerability of stocks to overfishing, applying the same tool to the trade of DSF species appears plausible. The potential options generally considered from this perspective are mostly limited to:

- developing several CDS per RFMO, covering a number of individual species; or
- developing a single CDS per RFMO, covering multiple species.¹⁷⁶

However, from the perspective of the global trade control system, the option of adding – potentially – 8 new CDS to an existing pool of 3 multilateral and 2 unilateral CDS, to cover far less than one additional percent of global seafood harvests and trade, the same suggestion makes no sense at all, given the implementation burden that the additional regulatory requirements would exert on this system. This is true even in situations where fisheries and customs authorities have developed close and formalized working relationships to handle these instruments at the level of border inspections.¹⁷⁷

It is in this context that it is necessary to highlight that, while CITES (which federates almost all states globally under a single certification scheme covering 36 000 species of animals and plants) is actively working towards integrating a single harmonized e-scheme within the global trade control system, the world of fisheries is moving in the opposite direction. More and more individual, non-harmonized trade-based schemes are being championed and implemented. This will ultimately require border-control authorities to develop an intimate understanding of an ever-increasing number of aquatic species and their fisheries, covered by species-specific non-harmonized trade-based rules and instruments. This approach is altogether unsustainable from the perspective of the global trade control system – at both national and international levels.

In summary, and from the perspective of the global trade control system, the ideal CDS configuration would respond to the following criteria:

¹⁷⁶With CCAMLR and the European Union as examples to follow, it is assumed that opting for a single CDS per RFMO, covering multiple species, could rapidly gain understanding and support.

¹⁷⁷Sancho Andrade, Ortiz - Von Halle and Naranjo Cuvi (2002) note: "There is a lack of co-ordination between the various government agencies responsible for scientific research and management of Patagonian Toothfish, as well as with Customs. This has resulted in poor exchange of information relevant to the management of the toothfish fishery". This highlights the importance of customs, and how fisheries management and customs must work together to ensure the monitoring and control of trade – where this is being pursued through a CDS.

- There is only a single CDS, with a single e-portal to consult the validity of submitted certificates/documents.
- The technical specifications of the e-CDS are designed for the system to be integrated with the global trade control system and national electronic single windows platforms.
- Any species covered by the CDS is covered in its global distribution – regardless of RFMO origin.
- Any species covered by the CDS is added to the next iteration of the HS classification,¹⁷⁸ so that the commodity can be confidently identified at the species level via its six-digit customs code.¹⁷⁹

It is useful to close this chapter with an example focusing on an RFMO with low catch levels and to examine it from a trade perspective. One can imagine SEAFO implementing a CDS covering alfonsino. In 2017, the total catch of alfonsino in SEAFO's RA was 670 kg – and it was traded internationally in an estimated total of one single consignment out of the port state where the landing (or landings) took place. Owing to the low volume of catches, this SEAFO CDS for alfonsino would probably face an uphill battle to become established and to be integrated into the global trade control system. Most border inspection posts worldwide would be unlikely to ever come across a single consignment covered by a SEAFO alfonsino catch certificate. Moreover, whenever a consignment of alfonsino passes any border, it is likely that the SEAFO CDS does not apply, as the majority of alfonsino harvests fall under the purview of other RFMOs not having opted to cover the same species by a CDS – in this hypothetical example.

On the other hand, if flag states involved in the harvesting of alfonsino, and/or port or market states participating in the landing and trade of the species – individually, collectively and/or through an RFMO¹⁸⁰ – decide to apply an established, and operational central CDS to all alfonsino, then no alfonsino, regardless of its origin, may pass the border of the state (or states) applying the CDS to the species in the absence of validated paperwork.¹⁸¹ While the rule is a fisheries management mechanism aiming to protect the species from illegal fishing, the tool is applied in a manner compatible with the global trade control system, thereby ensuring seamless integration and effective performance.

¹⁷⁸The HS classification is reviewed every five years. The next iteration (HS-2022) will enter into force on 1 January 2022.

¹⁷⁹This does allow for grouping of species covered by one CDS under the same customs code, as it is currently done for the two species of toothfish – as the CDS requirement applies to both species in exactly the same way. Therefore, from this perspective, it is conceivable to create a DSF/CDS customs code and group, per product form, of which “species membership” is expanded whenever it is decided to subject a new species to the strictures of a CDS.

¹⁸⁰See section 3.6.1.

¹⁸¹The notion of “validated paperwork” is a figure of speech that encompasses all forms of electronic validations and certificates that would be submitted and issued via an electronic platform, and that could be verified and cleared electronically in a paperless environment.

6. Discussion and conclusions

This paper has covered: the description of DSF resources and their fisheries in the ABNJ; CDS and their capacity to implement specific types of fisheries management rules and combat certain forms of IUU fishing; the current management frameworks of DSF from a CDS perspective; and global trade in DSF products and trade-related considerations that must be considered during the development of CDS for fisheries in general – and DSF in particular.

The question that this paper set out to answer is whether the adoption of CDS for DSF in ABNJ is viable; and if it is viable, in what form such CDS should be implemented.

This paper does not answer the question of how a CDS works – in terms of design and operational support at the country level. Those questions have been covered in two separate and recent FAO publications on the topic of CDS, and fully apply to DSF, their dynamics and also “CDS potential”.

What follows will fundamentally challenge the ways in which CDS have been conceived of, and implemented, up to now. In a nutshell, these “ways” can be summarized as being both mono-specific and RFMO-centric. Both these characteristics are not viable in the vast majority of future CDS applying to DSF, and a new and broader approach to CDS implantation is needed. The following discussion and recommendations will provide the rationale for this assertion, drawing on the previous chapters and their findings.

6.1 THE VALUE OF CDS AS A MANAGEMENT IMPLEMENTATION TOOL

This paper introduces the notion that a CDS can be applied to a given fisheries management regime, to implement given rules “mechanically”, and to impose compliance with rules in an automated fashion. The benefit of this mode of action is that important savings in more active – and significantly more costly – forms of monitoring and surveillance may be scaled back to a certain degree. The paper shows that while port-state inspection schemes, such as those in place in the North Atlantic, can (and still do) regularly fail to detect misreporting of catches, a CDS would automatically eliminate the practice for the same catches to a large extent, when legally traded into the same markets.

The paper finds that a CDS can support the implementation of certain management rules mechanically and effectively, either as a stand-alone tool, or in combination with other technologies – VMS in particular – while other management rules fall beyond the direct “reach” of a CDS. In the latter case, other forms of more active monitoring and surveillance are required to ensure compliance. These latter types of management measures concern rules on discards, the conformity of fishing gear, etc.

The example of ICCAT’s CDS is provided to highlight, how following the adoption and implementation of its CDS to Atlantic bluefin tuna, the management rules on TACs and quotas became automatically enforced, leading to the onset of a dramatic (and ongoing) stock recovery within a few years.

Finding 1

A CDS is a tool of choice to support the implementation – in a cost-effective and automated manner – of a range of critical management rules as they are generally applied in DSF. This is achieved by binding such rules into the operation of the CDS, and by implementing a system where catch certificates can only be issued and validated

for harvests derived from operations for which it is established that such rules were complied with.

Finding 2

The implementation of management rules that may be supported in an automated manner through a CDS, either as a stand-alone tool or in combination with VMS, include: (i) limiting operations to authorized fishing vessels; (ii) TACs and quotas; (iii) reporting obligations (entry/exit reporting, logbooks, landing and trans-shipment declarations, etc.); (iv) certain types of operational rules (e.g. carrying of an on-board observer, functional VMS); and (v) time-based and geographical location rules (i.e. closed seasons and/or areas). In particular, the potential for the automated enforcement of TACs and VME protection areas come to the fore as CDS capabilities that would critically benefit DSFs.

6.2 THE VALUE OF CDS TO COMBAT IUU FISHING

This paper finds that the IUU fishing profile of DSF fisheries globally is broad, and that it varies as a function of management frameworks applied to DSFs. It is noted that in TAC- and quota-managed fisheries, under-reporting is an obvious issue, while other important forms of IUU fishing, such as poaching or fishing in closed VME protection areas, are other major issues affecting DSF. The two major infractions detected and reported in the SEAFO RA in 2017 reflect this profile.

The paper establishes the notion that the action of a CDS – as a trade-based tool – is naturally limited to the group of compliant states that actively apply the CDS to their fleets, ports and markets. If a combination of important flags, ports and markets of non-compliance allow harvests otherwise subjected to a CDS to be traded and monetized in defiance of the scheme, then the scheme's potential to protect the stock (or stocks) from illegal fishing is undermined. Therefore, the putative effectiveness of a CDS to protect stocks is considered from the perspective of full implementation by all involved state parties along international supply chains.¹⁸²

Finding 3

As a stand-alone tool, a CDS allows for the effective deterrence and elimination of the following types of IUU fishing, by denying legal market access for products harvested under the following types of infringements: (i) fishing without a licence; (ii) under-reporting or otherwise misreporting of catches (flouting of TAC and quota allocations); (iii) non-compliance with reporting obligations; and (iv) non-compliance with operational obligations tied into the CDS (e.g. landing in designated ports or carrying VMS).

Finding 4

A CDS, when combined with a VMS, is able to effectively deter and eliminate the following types of infringements: (i) non-compliance with days-at-sea limitations; (ii) non-compliance with temporal and spatial fishing closures; and (iii) non-compliance with trans-shipment rules.

Finding 5

Deterrence is achieved by making the issuance of a catch certificate conditional on verified compliance with rules. Owing to the fact that harvests not covered by a catch certificate cannot enter trade legally, the mechanism is extremely effective when consistently applied.

¹⁸²The effectiveness of denying IUU products legal access to markets is invariably achieved, regardless of state non-compliance with the scheme.

Finding 6

Responsible and compliant port and market states actively seeking to eliminate IUU fishing are generally limited in their ability to gauge the legality of a landing, or an inbound consignment of fishery products, in the absence of CDS-related catch certificates. It is the existence of a CDS that unleashes the power of port, processing and end-market states to apply stringent control measures, as much as it exacts due diligence from less prepared port and market states that would otherwise play a more important part in facilitating the monetization of IUU-derived products.

Finding 7

A minimum level of deterrence is needed in all fisheries to achieve and maintain compliance. Given a CDS' ability to directly monitor, detect and deter very serious types of infringements, the benefits of adopting a solid CDS are always a given – also in DSF. These benefits are set to increase with the proliferation of former port, processing and end-market states of convenience closing their markets to non-certified product. This process will be driven by the pressure generated through the simple existence of a CDS.¹⁸³

6.3 CDS OPTIONS FROM AN RFMO COMPETENCE AND CAPACITY PERSPECTIVE

This paper establishes that the current *modus operandi* on which multilateral CDS are based is not fit for purpose for most DSF. The bulk of DSF species present wide distributions, many of which span the globe, and most of these occur throughout the RAs of multiple RFMOs. Few DSF species fall under the exclusive competence of single RFMOs. In addition to this, some species also occur in areas not covered by RFMOs, while being subject to RFMO competence in other areas of their distributional range.

The operational CDS setup that needs reviewing relates to the currently practised approach of one CDS per RFMO, with a more favoured option being a globally applicable CDS-per-species approach – in the way CITES as a single trade permit system applies to international trade of many designated species of both plants and animals – globally. The currently existing tuna CDS apply to two species whose global distribution range falls under the competence of the single RFMO operating the scheme.¹⁸⁴ The distribution ranges of Patagonian and Antarctic toothfish are not entirely, but largely, limited to the CCAMLR's RA, and CCAMLR has assumed a de facto position as the certifier of the legality of virtually all catches.

For these same reasons, Hosch (2016a) concluded that future CDS covering the remaining major commercial tuna species, including Pacific bluefin and yellowfin tuna, would fail if not done on the basis of a single harmonized CDS adopted and operated by the pool of tuna RFMOs sharing the global management mandate for these species – none of these species being limited in distribution to any single tuna RFMO.

Finding 8

From a trade monitoring and control perspective, it is incongruous for the same species to be covered by a CDS when originating from one RFMO RA, but not being covered when originating from another RFMO RA. It must be remembered that the lion's share of CDS action and effect – following catch certification – emerges in the supply chain, resting in the ability of the CDS to prevent laundering of non-originating

¹⁸³In this context, the example of Hong Kong SAR is noted, poised to join CCAMLR as a cooperating non-member in the near future, and to apply the CCAMLR CDS to its toothfish trade.

¹⁸⁴With regard to southern bluefin tuna and CCSBT, this success owes much to the fact that CCSBT has a species of competence, rather than an area of competence, and therefore naturally covers all of the species, which straddles several oceanic basins.

^{The}drive to adopting RFMO-centred approaches to CDS generally owes much to too

(IUU) catches into legally certified supply streams.¹⁸⁵ If the latter cannot be achieved, owing to the concurrent legal trade in uncertified (and perfectly legal) products of the same species, the CDS cannot prevent laundering and achieve its goal. When only part of a species is covered, area misreporting of (CDS-covered) IUU catches occurs, and such catches may then “legally” enter the supply chain without certificates. Therefore, species with a distribution beyond single RFMOs should be subjected to a single CDS as a species, covering all of its stocks and fisheries worldwide. The adoption of a CDS to combat IUU fishing in any single one of those fisheries and/or the adoption of multiple, uncoordinated and non-harmonized CDS is not a viable option.

Finding 9

Those RFMOs covering DSF species that also occur in other RFMOs’ RAs, and that are considering the adoption of a CDS, should engage in consultations with other such RFMOs in order to formally establish whether these other RFMOs are also in favour of CDS development, and to foster the idea that a single, shared CDS is the most coherent option to pursue as a group.

Finding 10

The option of developing a single CDS with global DSF coverage, as a technology solution that all RFMOs and their members may adopt and apply to their fishery (or fisheries) over time, emerges as the most viable option to overcome the limitations of RFMO competence, financial and human resource challenges, and the need for a CDS to cover the trade in a species as a whole. This could also allow flag, port, processing and end-market states – regardless of their membership status in any RFMO – to require the application of the CDS to given species caught by their vessels, landed in their ports or traded into or through their markets. This would drastically expand the limited scope of multilateral market-related measures beyond the remit of single RFMOs, and RFMO membership, and respond to the multifaceted constellation of stakeholders participating in global DSF fisheries and supply chains.

Finding 11

A single, shared CDS platform would have to be operated by either a designated RFMO secretariat, on behalf of a group of RFMOs,¹⁸⁶ or by an independent third party, such as FAO, as a service provider. Rule-making, enforcement and sanctioning powers remain unaffected, and vested in RFMOs, their members and/or other participating states. The operation of such a CDS, as a shared technological platform, does not require the negotiation and signing of a new treaty, nor the creation of a new international institution.

Finding 12

Once the shared CDS platform is developed, any species may be added and subjected to the strictures of the scheme – upon the simple decision by members of the group having adopted the CDS.¹⁸⁷ This eliminates or substantially reduces the otherwise

¹⁸⁵The drive to adopting RFMO-centred approaches to CDS generally owes much to too narrow a focus on applying the CDS as a fisheries management tool, and giving too little consideration to its trade-based mode of producing results – these latter going far beyond the immediate certification of legality of catches.

¹⁸⁶This is very much reflected in the dynamic engendered in the Southern Ocean, where CCAMLR’s mandate to manage toothfish as a species, and applying a CDS to it, is being recognized by SEAFO, SIOFA and SPRFMO, and where compliance (or harmonized approaches) with the CCAMLR CDS for all toothfish harvests – regardless of catch area – gradually seems to be emerging as a possible way forward.

¹⁸⁷This does presume enabling design parameters allowing to cover multiple species – following the examples of the CDS of the European Union and CCAMLR.

important upfront single-RFMO CDS development costs, running and maintenance costs, and dedicated staff. These costs embody human and financial resource constraints limiting RFMO CDS adoption and development options today.

Finding 13

A shared CDS platform may also serve the needs of single RFMOs, which – instead of developing stand-alone RFMO-specific schemes for species they fully cover – can opt instead to use a global platform, and subject their members to its use for a given species. This would in no way negatively affect the use of the same platform by other members for other species. A shared CDS platform can thus serve the needs of a variety of single RFMOs, RFMO groups and species, and/or states, and allow the positive realization of economies of scale. This platform is referred to as the global **super-CDS**.

6.4 CDS BURDEN FROM A TRADE AND BORDER MANAGEMENT PERSPECTIVE

This paper shows how, following catch certification and landing (implying verifications by flag and port states), fishery products enter markets and international trade. Transactions in international trade, typically consisting of exportations and importations, are overseen by customs agencies. While flag and port state authorities are generally based within fisheries-related or fisheries-specific government agencies, customs agencies are generally not specialized in fishery matters, and are required to oversee ever-growing volumes of international trade in all types of products.

Regulatory requirements on trade are applied at the border by these agencies. Customs may or may not have put in place collaborative arrangements with national environmental, agricultural, fisheries and/or health authorities for the purposes of implementing rules on trade in endangered species, SPS regulations, and – increasingly – CDS. Regulatory frameworks for given types of commodities generally apply “across the board”, as in SPS rules and related health certificates for seafood products for human consumption, or CITES permit rules applying to the importation of, for example, tiger claws or rhinoceros horns.

The situation for CDS is very different. There are groups of species (e.g. tuna) for which CDS paperwork is required for some species but not for others. For toothfish (a set of DSF species), CDS paperwork is required, but not for other DSF species.¹⁸⁸ If single DSF or tuna RFMOs opted to cover a species with a wider ranging distribution in the future – a very realistic prospect discussed above – the same species arriving at the border might require CDS paperwork under one set of circumstances, but not under another – while those very same circumstances, in the (legitimate) absence of a catch certificate, might be altogether impossible to establish. As an example, while all health certificates covering fish entering the territory of the European Union are based on a single template, the CDS paperwork entering this organization’s market follows non-harmonized CDS-specific templates, of which there are currently four, and which may still vary substantially within a single scheme.¹⁸⁹ This shows that current mainstream CDS approaches are not mindful of, nor consistent with, the global trade control system, and that too little consideration is given to how these rule sets will eventually be applied at the border. Instead of a proliferation of CDS schemes, there is a need for consolidation of schemes.

¹⁸⁸ Customs agents may generally recognize DSF species by their shared monster-like visual properties.

¹⁸⁹ The EU recognises the equivalence of CCSBT, CCAMLR and ICCAT catch certificates for seafood products entering its market. Under the CDS of the European Union, flag states develop their national catch certificate templates, based on the EU’s suggested template. In particular, the catch certificates of countries that have signed a special agreement with the EU under the auspices of its IUU Regulation, such as Canada, New Zealand, Norway or the United States of America, vary substantially from the basic template.

Ideally, and as is the case for species falling under CITES, the question to answer at the border should be limited to whether the species is covered by a CDS; and if it is, whether the certificates are in order and registered on the (single) electronic CDS platform. The question should not be which CDS applies; and if it could potentially apply, whether some or all of the fish in the particular consignment originates from fishing trips to which the CDS does indeed apply.

The absence of HS codes aligning with commodity groups covered by a CDS turns the implementation of CDS by customs agencies into hit-or-miss operations – especially in countries with limited resources for customs, the training of specialized officers, and collaborative arrangements with fisheries authorities.

Finding 14

Notwithstanding collaborative arrangements between customs and fisheries authorities of individual states, customs authorities remain the first – and often primary – implementers and enforcers of CDS schemes for trade transactions following harvesting and landing of CDS-managed fishery products. Given the variable nature of collaborative arrangements between customs and fisheries authorities along supply chains, CDS must be simplified and harmonized in order to be confidently and effectively handled, monitored and enforced by these same agencies.

Finding 15

The further proliferation of RFMO-specific CDS covering single DSF species, notwithstanding their limitations, is not a viable option. Customs authorities under most configurations existing today – including some of those collaborating more closely with fisheries authorities – will be struggling to effectively enforce such schemes.

Finding 16

The harmonized nomenclature of customs codes currently in force (HS-2017) does not allow the distinguishing of DSF species, either as a group, or as individual species – with the exception of toothfish. If a super-CDS were developed, the adoption of a DSF-specific set of HS codes would provide leverage to strengthen the effectiveness of CDS controls and enforcement at the border. In the absence of such codes, both species- and product-specific enforcement will be substantially weakened.

6.5 THE VALUE OF CDS FROM AN RFMO CAPACITY PERSPECTIVE

This paper finds that some of the RFMOs covering DSF do not have DSF featuring among the important fisheries (by volume) that they cover. This is especially true for the North Atlantic, while the reverse situation applies to the Southeast Atlantic (for example), where DSF are the actual focus of the RFMO's mandate.

Finding 17

The development of a CDS in the absence of other important MCS tools – foremost among them a VMS – will limit the potential of the CDS to enforce given types of fishery management rules. Therefore, it is important that the RFMO management framework and the existing suite of MCS tools be aligned and enabling with regard to the development and adoption of a future CDS. Limitations in this basic sense exist in several RFMOs.

Finding 18

The development of RFMO-specific CDS is a cumbersome undertaking, wrought with substantial barriers to overcome, including financial and human resource limitations

related to development, adoption and operation of individual schemes, but also limitations with regard to how highly complex technical tools such as CDS can be confidently debated and developed through non-specialist RFMO working groups and commissions.¹⁹⁰

Finding 19

The development and implementation of a super-CDS platform with agreed functionalities, capabilities and objective(s) pre-empts all RFMO needs to debate and develop a CDS, redirecting the debates to whether the CDS should be adopted, to which species it should apply, and to how the commission would leverage its capabilities, handle enforcement, sanctions and reporting. It is anticipated with good reason that the cost of applying a super-CDS to a set of species of choice will amount to a fraction of the costs involved in developing a stand-alone system, rolling it out, and operating it. A super-CDS will hence unleash the options of RFMOs regarding CDS, while the *status quo* will continue to stymie adoption of a tool with remarkable enforcement powers. This finding is true for DSF, as well as all other fisheries where products enter international trade.

Finding 20

FAOs International Voluntary Guidelines on CDS fully support the notions for current schemes and new schemes to be **harmonized** and to recognize **equivalence** between schemes. The natural end-point of full harmonization between schemes, and full recognition of equivalence between schemes, is the existence and operation of a single scheme. As for a VMS, existing as a globally available technological solution, CDS will no longer face adoption hurdles owing to RFMO capacity limitations, once a super-CDS – as a globally available technological solution – has been put in place.

6.6 CONCLUSION AND WAY FORWARD

The majority of DSF harvests enter international trade, are of high value, and are traded into affluent markets. These end-market states, including those of the European Union, the United States of America, and Japan, are often seen to be taking a proactive stance in combating IUU fishing, and in putting up barriers to the importation of IUU products. This is one of the critical conditions for a CDS to ultimately achieve its goal, and to succeed. Therefore, it is evident that a trade-based tool in the form of a CDS would prove invaluable in assuring legal origin for DSF products throughout international supply chains, that it would be capable of eliminating damaging forms of IUU fishing in DSF globally, and that improved stock conservation and management outcomes would result from the implementation of effective CDS in DSF.

This paper establishes that a CDS for DSF, in terms of system design and traceability layout, should not have to, or would not need to, differ from the design options outlined in the foregoing two FAO Technical Papers on CDS systems, published in 2016 and 2017, and referred to repeatedly in this paper.

However, it is concluded that the current standard implementation modality of multilateral CDS would not be fit for purpose for monitoring and effectively controlling trade in most current DSF products, but would benefit from much enhanced collaboration between RFMOs covering DSF. The standard implementation modality that is unfit for DSF in general – from a medium- and long-term perspective – refers to the multilateral CDS models currently limited to single RFMOs and covering a single or a couple of species, as currently operated by CCAMLR, CCSBT and ICCAT.

¹⁹⁰The WCPFC process of developing a CDS, which now spans well over a decade, is testimony to these difficulties.

The reason why the existing standard multilateral CDS implementation modality is inadequate in DSF relates to a limited number of critically important factors. These are:

- The geographical distributions of the vast majority of commercially important DSF species are not limited to a single RFMO, and substantial parts of global harvests of given species would fall outside the scope of individual RFMO-specific CDS. When such isolated CDS are implemented, the same species can be traded without CDS certificates when stemming from one set of fishing grounds, while it has to be covered by certificates when stemming from within the RFMO's RA. This situation does not result in an effective trade monitoring and control framework, and any such CDS would fail to meet its objective.
- If RFMOs covering a given same species decided to develop and implement a plurality of RFMO-specific CDS systems to cover such species, the co-existence of several non-harmonized CDS not exchanging data would enable “double-spend” fraud, and the CDS as a group would facilitate the laundering of illegal catches into certified supply streams via this gap – also implying that the CDS would fail to meet their objective, both individually, and also as a group.
- Covering important commercial DSF species through individual RFMO-specific CDS – notwithstanding their incapacity to effectively produce results in most instances (for the above named reasons) – would potentially lead to an explosion in CDS systems and platforms, overburdening the international trade control system, and the agencies tasked with oversight; as well as the private sector operators required to comply with multiplying systems. At the same time, given the modest volumes of DSF as compared with global marine fishery harvests, the combined harvest covered by a potentially tripled number of CDS globally would still fall short of covering a single percent of global harvests. Such an approach is impracticable and unsustainable.

For these key reasons, it is concluded that the only practical way forward to adopting CDS for DSF in the medium term is to develop a single CDS platform with global application, that RFMOs, and single states in their capacities as flag, port and/or market states, can buy into. Such a centralised electronic platform could serve the needs of any and all DSF species, and it does not need to be limited to these. Such course of action would respond directly to many tenets of the FAO Voluntary Guidelines on CDS, notably with regard to “minimising the burden on those affected by CDS requirements”, “not creating unnecessary barriers to trade”, “recognition of equivalence between schemes”, “standardisation”, preference of “multilateral or regional CDS”, and considerations of “cost-effectiveness”. Importantly, it would ensure that the CDS would be implemented in a modality “where it can be an effective means to prevent products derived from IUU fishing from entering the supply chain”.

One of the key questions that needs to be answered is how to reach the point where the development and the implementation of a global super-CDS can be envisaged.

All RFMOs and all states – individually – with an interest in contributing directly to the protection of VMEs, and the effective management and conservation of DSF, may recognize the power of CDS to eliminate important forms of IUU fishing, and the impact these schemes can have on the recovery and/or enhanced management of targeted resources.

This paper concludes that a single, consistent, and harmonized global approach, in the form of a super-CDS scheme covering wide-ranging resources, is the only viable long-term option to progress in the domain of CDS. Therefore, an international body should be tasked with formally studying the question. This body should provide the broader blueprint for a unified electronic system – covering minimum terms for its overall design, its functions, its capabilities, its development, its roll-out, its operation, its legal nature and its funding.

One way forward would be to seek endorsement by the Committee on Fisheries (COFI) for FAO to formally study the feasibility and the nature – both technical and legal – of a super-CDS. On the basis of such study and its findings, the next steps regarding the development and the institutional embedding of a super-CDS could then be explored.

In the meantime, all RFMOs undertaking steps to develop CDS covering species that are shared with other RFMOs should engage directly with such other RFMOs, in order to develop collaborative ties and working environments, aiming to develop systems and platforms that can be effectively shared and operated between RFMOs – avoiding duplication of systems – so that the weaknesses and constraints inherent to isolated systems described in this paper may be overcome practically in the short-term. The bolder vision and solution in the form of a unified super-CDS at the global level may be studied in parallel. Merging existing CDS systems into a global super-system is an option that can then be envisaged at the appropriate time, and on a case-by-case basis.

References

- Bailey, M. & Egels-Zandén, N. 2016. Transparency for just seafood systems. *The Solutions Journal*, 7(4): 66–73.
- Baird, R. 2005. CCAMLR initiatives to counter flag state non-enforcement in Southern Ocean fisheries. *Victoria University of Wellington Law Review*, 733(36): 733–756.
- Boustany, A. 2011. *Bluefin tuna: the state of the science*. Washington, DC, Ocean Science Division, Pew Environment Group.
- Cajal, J. & García Fernández, J. 2002a. Report on Argentina. *In: Fishery activities and trade of Patagonian toothfish Dissostichus eleginoides in South America*. Quito, TRAFFIC South America.
- Cajal, J. & García Fernández, J. 2002b. Report on Uruguay. *In: Fishery activities and trade of Patagonian toothfish Dissostichus eleginoides in South America*. Quito, TRAFFIC South America.
- Coalition of Legal Toothfish Operators (COLTO). 2016. *Toothfish fact sheet* [online]. [Cited 15 June 2018]. www.colto.org/toothfish-fisheries/iuu/
- Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). 2014. *Implementation of Conservation Measure 10-05 CCAMLR's Catch Documentation Scheme (CDS)*. CCAMLR-XXXIII/BG/13 Rev. 2. 20 October 2014. Secretariat. 12 pp.
- Commission for the Conservation of Southern Bluefin Tuna (CCSBT). 2000. *Action Plan (adopted at the Sixth Annual Meeting –Second Part; 21–23 March 2000)* [online]. [Cited 15 June 2018]. www.ccsbt.org/sites/ccsbt.org/files/userfiles/file/docs_english/operational_resolutions/action_plan.pdf
- Contreras, S. 2002. Report on Chile. *In: Fishery activities and trade of Patagonian toothfish Dissostichus eleginoides in South America*. Quito, TRAFFIC South America.
- Cox, A. 2003. Subsidies and deep-sea fisheries management: policy issues and challenges. Paper presented at “Deep Sea 2003: An International Conference on Governance and Management of Deep-Sea Fisheries”, Queenstown, New Zealand, 1-5 December 2003 [online]. [Cited 15 June 2018]. www.oecd.org/greengrowth/fisheries/24320313.PDF
- Dent, F. 2016. *Overview of global trade in toothfish (Dissostichus spp.)*. CCAMLR-XXXV/BG/35. Hobart, Australia, CCAMLR Secretariat.
- Doulman, D. 2004. Global overview of IUU fishing and its impacts on national and regional efforts to manage fisheries sustainably: the rationale for the conclusion of the 2001 FAO International Plan of Action. *In: FAO. Report of the Expert Consultation on Fishing Vessels Operating under open Registries and their Impact on Illegal, Unreported and Unregulated Fishing, Appendix D*. FAO Fisheries Report No. 722. Rome, FAO. (also available at www.fao.org/docrep/006/Y5244E/Y5244E00.HTM).
- Durán Muñoz, P., Sayago-Gil, M., Murillo, F.J., Del Río, J.L., López-Abellán, L.J., Sacau, M. & Sarralde, R. 2012. Actions taken by fishing Nations towards identification and protection of vulnerable marine ecosystems in the high seas: the Spanish case (Atlantic Ocean). *Marine Policy*, 36: 536–543.
- European Parliament and Council of the European Union. 2016. *Regulation (EU) 2016/2336 of the European Parliament and of the Council of 14 December 2016 Establishing Specific Conditions for Fishing for Deep-Sea Stocks in the North-East Atlantic and Provisions for Fishing in International Waters of the North-East Atlantic*. Brussels.
- European Union (EU). 2007. *Communication from the Commission to the Council and the European Parliament: review of the management of deep-sea fish stocks*. 29.1.2007 COM (2007) 30 final. Brussels.

- EU. 2008. Council Regulation (EC) No 1005/2008 of 29 September 2008 establishing a Community system to prevent, deter and eliminate illegal, unreported and unregulated fishing. *Official Journal of the European Union*, L 286/1.
- EU. 2014. *The EU customs union: protecting people and facilitating trade*. Luxembourg, Publications Office of the European Union. 12 pp. (also available at www.eesc.europa.eu/sites/default/files/resources/docs/customs_en-1.pdf).
- EU. 2017. *The EU fish market*. 2017 edition. European Market Observatory for Fisheries and Aquaculture Products (EUMOFA). (also available at www.eumofa.eu/eumofa-publications).
- European Union Directorate-General for Maritime Affairs and Fisheries (DG MARE).** 2014. *Study on the State of Play Regarding Application and Implementation of Council Regulation (EC) No. 1005/2008 of 29 September 2008, Establishing a Community System to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (IUU Regulation)*. Specific Contract No. 3. Lot 2: Retrospective and Prospective Evaluation on the Common Fisheries Policy, Excluding its International Dimension. MRAG, Oceanic Développement, The Evaluation Partnership, Poseidon ARM Ltd., and International, Lamans Management Services, IREPA ONLUS.
- FAO. 1995. *Code of Conduct for Responsible Fisheries*. Rome. (also available at www.fao.org/docrep/013/i1900e/i1900e.pdf).
- FAO. 2001. *International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing*. Rome. (also available at www.fao.org/3/a-y1224e.pdf).
- FAO. 2009a. *International Guidelines for the Management of Deep-Sea Fisheries in the High Seas. Directives internationales sur la gestion de la pêche profonde en haute mer. Directrices Internacionales para la Ordenación de las Pesquerías de Aguas Profundas en Alta Mar*. Rome/Roma, FAO. 73 pp. (also available at www.fao.org/docrep/011/i0816t/i0816t00.htm).
- FAO. 2009b. *Worldwide review of bottom fisheries in the high seas*. FAO Fisheries and Aquaculture Technical Paper No. 522 Rev. 1. Rome. (also available at www.fao.org/tempref/docrep/fao/012/i1116e/i1116e01.pdf).
- FAO. 2014. *The State of World Fisheries and Aquaculture 2014: Opportunities and challenges*. Rome. (also available at www.fao.org/3/a-i3720e.pdf).
- FAO. 2017a. *Voluntary Guidelines for Catch Documentation Schemes*. Rome. 20 pp. www.fao.org/3/a-i8076e.pdf.
- FAO. 2017. *Globefish Highlights - a quarterly update on world seafood markets*. April 2017 issue, with annual 2016 statistics. 2/2017. Rome. (also available at www.fao.org/3/a-i7332e.pdf).
- Fugazza, M.** 2017. Fish trade and policy: a primer on non-tariff measures. UNCTAD Research Paper No. 7 UNCTAD/SER.RP/2017/7. (also available at www.tralac.org/images/docs/12549/fish-trade-and-policy-a-primer-on-non-tariff-measures-unctad-research-paper-august-2017.pdf).
- General Fisheries Commission for the Mediterranean and Black Sea (GFCM).** 2011. *Performance Review of the General Fisheries Commission for the Mediterranean and Black Sea* [online]. GFCM:XXXV/2011/Inf.8. Rome. [Cited 15 June 2018]. http://gfcmsitestorage.blob.core.windows.net/documents/web/GFCM/35/CAF_II_2011_Inf.5_COC_V_Inf.4_GFCM_XXXV_2011_Inf.8.pdf
- Genin, A. & Dower, J.F.** 2007. Seamount plankton dynamics. In: Pitcher T.J., Morato, T., Hart, P.J.B., Clark, M.R. & Haggan, N., eds. *Seamounts: ecology, fisheries and conservation*, pp. 85–100. Oxford, UK, Blackwell Publishing.
- Gianni, M.** 2004. *High seas bottom trawl fisheries and their impact on the biodiversity of vulnerable deep-sea ecosystems: options for international action*. Gland, Switzerland, IUCN.

- Hosch, G. 2016a. *Design options for the development of tuna catch documentation schemes*. FAO Fisheries and Aquaculture Technical Paper No. 596. Rome, FAO. (also available at www.fao.org/3/a-i5684e.pdf).
- Hosch, G. 2016b. *Trade measures to combat IUU fishing: Comparative analysis of unilateral and multilateral instruments*. Geneva, Switzerland, International Centre for Trade and Sustainable Development (ICTSD). (also available at www.ictsd.org/themes/environment/research/trade-measures-to-combat-iuu-fishing-comparative-analysis-of-unilateral).
- Hosch, G. 2017. The 2017 FAO Voluntary Guidelines on Catch Documentation Schemes. *INFOFISH International Magazine*, 6: 27–30.
- Hosch, G. & Blaha, F. 2017. *Seafood traceability for fisheries compliance: country-level support for catch documentation schemes*. FAO Fisheries and Aquaculture Technical Paper No. 619. Rome, FAO. (also available at www.fao.org/3/a-i8183e.pdf).
- Indian Ocean Tuna Commission (IOTC). 2010. *Resolution Concerning Market Related Measures*. Resolution 10/10.
- Inter-American Tropical Tuna Commission (IATTC). 2006. *Adoption of Trade Measures to Promote Compliance*. Resolution C-06-05.
- International Commission for the Conservation of Atlantic Tunas (ICCAT). 1994. *Resolution by ICCAT Concerning an Action Plan to Ensure Effectiveness of the Conservation Program for Atlantic Bluefin Tuna*. Resolution 94-3.
- ICCAT. 2006. *Recommendation by ICCAT Concerning Trade Measures*. Recommendation 06-13.
- ICCAT. 2015. *Report for Biennial Period, 2014–15*. Part I (2014) – Vol. 2. English version. Madrid, SCRS.
- ICCAT. 2016a. *Study of the eBCD implementation expenses*. Doc. No. STF_207/2016. Madrid, Spain.
- ICCAT. 2016b. *eBCD Working Group (eBCD-TWG) Summary Report – 2016*. Doc. No. PWG-403/2016. Madrid, Spain.
- Jobsvogt, N., Hanley, N., Hynes, S., Kenter, J. & Witte, U. 2014. Twenty thousand sterling under the sea: estimating the value of protecting deep-sea biodiversity. *Ecological Economics*, 97: 10–19.
- Joint Tuna RFMOs. 2007. *Report of the Joint Tuna RFMO Working Group on Trade and Catch Documentation Schemes*. Raleigh, NC, USA.
- Koslow, J.A., Boehlert, G.W., Gordon, J.D.M., Haedrich, R.L., Lorange, P., and Parin, N. 2000. Continental slope and deep-sea fisheries: implications for a fragile ecosystem. *ICES Journal of Marine Science*, 57: 548–557.
- Lack, M. 2001. *Antarctic toothfish: an analysis of management, catch and trade*. Sydney, Australia, TRAFFIC Oceania.
- Lack, M. & Sant, G. 2001. Patagonian toothfish. Are conservation and trade measures working? *TRAFFIC Bulletin*, 19(1).
- Lack, M., Short, K. & Willock, A. 2003. *Managing risk and uncertainty in deep-sea fisheries: lessons from orange roughy*. TRAFFIC Oceania and WWF Endangered Seas Programme. 84 pp.
- Mundy, V. 2018. *The impact of the EU IUU Regulation on seafood trade flows: identification of intra-EU shifts in import trends related to the catch certification scheme and third country carding process*. Brussels, Environmental Justice Foundation, Oceana, The Pew Charitable Trusts, WWF. Belgium. (also available at www.iuuwatch.eu/wp-content/uploads/2018/02/TDA_report_IUUwatch_LQ.pdf).
- National Oceanic and Atmospheric Administration (NOAA). 2015. *Improving international fisheries management: report to Congress pursuant to Section 403(a) of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006*. Washington, DC, US Department of Commerce. (also available at www.nmfs.noaa.gov/ia/iuu/msra_page/2015noaareptcongress.pdf).

- NOAA. 2017. Improving international fisheries management: summary of 2017 biennial report to Congress. Washington, DC, US Department of Commerce, NOAA, National Marine Fisheries Service. (also available at www.nmfs.noaa.gov/ia/iuu/msra_page/summary_2017_biennial_iuu_report.pdf).
- Norse, E.A., Brooke, S., Cheung, W.W.L., Clark, M.R., Ekeland, I., Froese, R., Gjerde, K.M., Haedrich, R.L., Heppell, S.S., Morato, T., Morgan, L.E., Pauly, D., Sumaila, U.R. & Watson, R. 2012. Sustainability of deep-sea fisheries. *Marine Policy*, 36(2) 307–320.
- Northwest Atlantic Fisheries Organization (NAFO). 2011. *Performance Assessment Review*. Dartmouth, Canada. (also available at www.nafo.int/Portals/0/PDFs/Performance/PAR-2011.pdf).
- North East Atlantic Fisheries Commission (NEAFC). 2014. *Report of the Performance Review Panel*. London.
- Rayfuse, R.G. 2004. *Non-flag state enforcement in high seas fisheries*. Publications on Ocean Development. Leiden, Netherlands, and Boston, USA, Martinus Nijhoff Publishers.
- Rogers, A.D. & Gianni, M. 2009. *The implementation of UN Resolution 61/105 in the management of deep-sea fisheries on the high seas. Provisional report, North Atlantic: status and recommendations*. International Programme on the State of the Ocean. London, Lenfest Foundation.
- Roheim, C.A. & Sutinen, J. 2006. *Trade and marketplace measures to promote sustainable fishing practices*. International Trade and Sustainable Development Series Issue Paper No. 3. Geneva, Switzerland, International Centre for Trade and Sustainable Development and the High Seas Task Force.
- Sancho Andrade, A., Ortiz - Von Halle, B. & Naranjo Cuvi, N., eds. 2002. *Fishery activities and trade of Patagonian toothfish in South America: a regional perspective*. TRAFFIC South America. 178 pp.
- Sinha, M.K., Anrose, A., Pratyush, D. & Babu, C. 2017. Indian deep sea fisheries - its prospects, issues and challenges. *Journal of Aquaculture and Marine Biology*, 5(2): 00112 [online]. [Cited 15 June 2018]. DOI: 10.15406/jamb.2017.05.00112
- South East Atlantic Fisheries Organisation (SEAFO). 2016. *Report of the Second Performance Review Panel* [online]. DOC/COM/03/2016. Swakopmund, Namibia. [Cited 15 June 2018]. www.seafo.org/media/e3b07ca6-9859-43bc-817a-5b8805e296a9/SEAFOweb/pdf/COMM/open/eng/Performance%20Review%20English%20Report-2016_pdf
- SEAFO. 2016. *Report of the second performance review panel*. [online]. Swakopmund, Namibia. [Cited 15 June 2018]. http://www.seafo.org/media/e3b07ca6-9859-43bc-817a-5b8805e296a9/SEAFOweb/pdf/COMM/open/eng/Performance%20Review%20English%20Report-2016_pdf
- SEAFO. 2017a. *Report of the 10th Annual Meeting of the Compliance Committee (CC) – 2017* [online]. Swakopmund, Namibia. [Cited 15 June 2018]. www.seafo.org/media/b815a441-2c96-4601-9b5b-f92c20fc4609/SEAFOweb/pdf/Meeting%20Files/2017/CC/CC%20Report%202017_pdf
- SEAFO. 2017b. *Annual Compliance Review 2017. SEAFO Secretariat* [online]. Swakopmund, Namibia. [Cited 15 June 2018]. www.seafo.org/media/e4fd243c-3b66-4169-9f4a-70b408daed75/SEAFOweb/pdf/Meeting%20Files/2017/CC/DOC%20CC%2003%202017%20-%20Compliance%20Review%202017_pdf
- Sumaila, U.R., Khan, A., Teh, L., Watson, R., Tyedmers, P. & Pauly, D. 2010. Subsidies to high seas bottom trawl fleets and the sustainability of deep-sea demersal fish stocks. *Marine Policy*, 34: 495–497.
- Szigeti, P.D. & Lugten, G.L. 2015. *The implementation of performance review reports by regional fishery bodies, 2004–2014*. FAO Fisheries and Aquaculture Circular No. 1108. Rome, FAO. (also available at www.fao.org/3/a-i4869e.pdf).

- United Nations General Assembly.** 2004. 57/25. *Sustainable fisheries, including through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and related instruments.* United Nations.
- United Nations General Assembly.** 2006. 61/105. *Sustainable fisheries, including through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and related instruments.* United Nations.
- United Nations General Assembly.** 2009. 64/72. *Sustainable fisheries, including through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and related instruments.* United Nations.
- Victorero, L., Watling, L., Deng Palomares, M.L. & Nouvian, C.** 2018. Out of sight, but within reach: a global history of bottom-trawled deep-sea fisheries from >400m depth. *Frontiers in Marine Science*, 5:98.
- Webster, D.G.** 2015. *Beyond the tragedy in global fisheries.* Cambridge, USA, MIT Press.
- World Trade Organization (WTO).** 2005. *Matrix on Trade Measures Pursuant to Selected Multilateral Environmental Agreements.* WT/CTE/W/160.Rev.3., TN/TE/S/5/Rev.1., 16 February 2005.

This paper discusses the potential value of catch documentation schemes (CDS) in deep-sea fisheries (DSF), and the implementation modalities that have to be envisaged, to ensure the effectiveness of this trade-based tool to combat illegal, unreported and unregulated (IUU) fishing. The paper argues that CDS are indeed capable of directly addressing a number of IUU fishing practices known to occur in DSF, and that their adoption would improve compliance with fisheries management requirements. Key infringements that may be directly detected and addressed through a CDS include – but are not limited to – violations of closed areas harbouring protected vulnerable marine ecosystems (VMEs) in the deep ocean, and quota overfishing. The paper also establishes the notion that partial coverage of given species through a CDS at the level of individual RFMOs is incongruous from a trade monitoring and control perspective, and that CDS should be considered as either/or propositions with regard to species coverage. With most DSF species having broad distributions straddling many RFMOs, the implementation modality that avails itself as the most suitable option, enabling the operation of an effective CDS, is that of a centrally operated electronic CDS platform – called a super-CDS – shared by a plurality of institutional and state players.

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