What Do We Know about Compliance in Fisheries?

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Contents

Executive summary

The report investigates what information on compliance is available in the public domain through a review of i) 50 selected MSC assessment reports; ii) the websites of and reports from national management authorities; and iii) the academic literature on compliance in fisheries.

40 % of the MSC assessment reports have quantitative data on inspections and infringements. The data are at a very general level, most often the total number of inspections/infringements within a jurisdiction. They are not separated by the parameters used to define MSC Units of Assessment (UoAs): target stock, fishing gear and vessel type. This indicates that official statistics are of limited use in documenting compliance in a specific UoA (or even a 'fishery') although they can serve as supporting evidence. The use of triangulation in the sample is limited, usually restricted to having inspection data confirmed by management agencies at interviews during the site visit. However, a few assessments provide more active and comprehensive triangulation of sources, including inspection statistics, interviews with different stakeholders, governmental reports, independent reviews and academic literature.

In the European sample of management/enforcement agencies, there is more information publicly available than used in MSC assessments, especially in the EU through the European Fisheries Control Agency (EFCA). Information is provided on number of inspections (separated by inspecting member state) and number and types of infringements (separated by inspected flag state) in the five Joint Deployment Plans (JDPs). However, this information is not UoA-specific either. Information from European non-EU members is sparser, usually limited to the total number of inspections and infringements without details on type of infringement or separated by gear or fleet segment. In North America, Asia and Oceania, there is a tradition of publishing lists of infringements or convictions, while information on number of inspections is more scattered, if publicly available at all. Based on information in MSC assessment reports, enforcement agencies in several countries provide MSC assessment teams with more detailed inspection data on request. This is especially the case in Canadian and US fisheries.

Compliance data from regional fisheries management organisations/arrangements (RFMO/As; hereafter referred to as just RFMOs) are not studied in detail here, but the main takeaway is that compliance reports from RFMOs are mostly about states' compliance with RFMO obligations and not about fishers' compliance with regulations. Observer programmes are mostly scientific schemes, not mechanisms for assessing compliance.

Survey data from academic studies is believed to provide more valid and reliable data on fisher compliance than inspection statistics, but even though the number of such studies is growing, there is still not sufficient survey data available to supply MSC assessment teams with relevant data to any significant extent. Some surveys cover one or more existing UoAs, but most don't. Again, academic studies can support findings in MSC assessments. e.g. non-UoA-specific studies from the same region/jurisdiction as the UoA in question, or similar fisheries in other jurisdictions. Two empirical takeaways from the academic literature are that i) actual non-compliance is much higher in an average fishery than reflected in official statistics (typically 30-60 % rather than 5-10 %); and ii) high infringement rates in official statistics may be more reflective of high-quality enforcement (capable of detecting infringements that will invariably exist) than low compliance (as compared with other fisheries). This shows the pitfalls of using inspection statistics as the only source is assessing compliance in a fishery.

This points to the conclusion that *more active triangulation of sources* should be used in evaluating compliance in MSC assessments, for two reasons: i) Currently, the information potential available is not fully utilised; and ii) There is no one single source of information which alone provides reliable information about compliance (as it is hardly ever UoA-specific and is of highly uncertain reliability). In an MSC context, inspection statistics are often mistakenly perceived to be the golden standard of information about compliance in a fishery. Bespoke, independent evaluations of compliance in a fishery could be considered a golden standard, but it will seldom be available to assessment teams. The 'pragmatic golden standard' would be systematic triangulation of different sources of information, which together can provide a relatively valid understanding of compliance in the fishery.

Based on insights from the academic literature on compliance, the Evidence Requirement Framework (ERF)/MSC approach to assessing compliance should move away from the pure deterrence model which has been the basis for evaluating compliance in MSC assessments so far (although less explicitly in v3 than in v2). There is scientific convergence in the literature that the 'basic deterrence model' does not capture reality well. With its focus on personal moral, legitimacy, norms and internalised behaviour (habit) as sources of compliance – in addition to deterrence – the 'enriched model' is better positioned for this purpose. Issues that are assessed elsewhere under P3 – such as the general effectiveness of the management system, the availability of consultation mechanisms and mechanisms to secure the rights of people dependent on fishing – become part of the equation also in the assessment of compliance, as does the existence of robust enforcement. Hence, the evaluation of compliance becomes a *holistic exercise* where inspection data (if available) are corroborated in interviews with *different* stakeholders and seen in light of the *overarching* management system and *fundamental* principles underlying fisheries management. The *legitimacy* of the system and regulations is at the heart of such an analysis. The basic assumption is no longer that compliance can be *documented*, but that *reasonable assumptions* can be inferred from a *multitude* of sources.

Introduction

The objective of this report is to identify what information is available in the public domain on compliance in fisheries. The first question is what kind of information sources there are on compliance, and the second question is what they can tell us about actual compliance.

The purpose of the study is to identify what information on compliance can reasonably be expected to support scoring in MSC assessments. While the main focus is on information as such, we also touch upon compliance outcome. Compliance information and outcome are separate Scoring Issues (SIs 3.2.3c and 3.2.3d) in the MSC Fisheries Standard v3.1, and it is only SI 3.2.3c which is covered by the Evidence Requirements Framework (ERF). However, the question of what kind of information on compliance should be considered adequate cannot be viewed in complete isolation from the question of how much compliance as such is sufficient, and the ERF can be used for the assessment of other SIs than those for which it is obligatory.

We start with an overview of compliance information used in 50 MSC certified fisheries, selected by the MSC to ensure representativeness with regard to geography and types of fisheries. Then we investigate what information on compliance is publicly available from national management authorities/enforcement agencies and international coordinating bodies such as the European Fisheries Control Agency (EFCA). Further, we provide a summary of information used in 75 academic journal articles on compliance in fisheries, selected on the basis of assumed relevance from the authoritative journal database Web of Science (webofscience.com). In the concluding section, we single out questions of particular relevance for the further ERF review work.

Importantly, at issue here is fisher compliance, i.e. compliance by individual fishers with laws and regulations issued by national management authorities and/or international management bodies – i.e. not state compliance with international obligations, which is the main issue in, e.g., RFMO compliance reports. Compliance can follow from enforcement/deterrence, but it can also be present without it. Fishers may follow the rules based on personal moral; because they think the rules are fair and good (legitimate); because of peer pressure (social control) or habit (standard operating procedures) – and/or simply because, for any other reason, it is not in their interest to violate them. This will be further elaborated in the section on the academic literature below.

Throughout the report, a large number of data (typically the percentage of inspections leading to the detection of an infringement) are listed. It does not make any sense to calculate more general compliance levels based on this very diverse information; nor is this listing of numbers and percentages particularly readable. But taken together, this information allows us to infer some general conclusions on compliance in fisheries.

MSC assessment reports

The sample

50 fisheries were selected by the MSC to ensure representativity with regard to geography and type of fishery. 17 of the fisheries have clients/flag-states in Europe (Denmark, Faroe Islands, France, Germany, Iceland, Italy, Netherlands, Norway, Russia, Spain and the UK – in addition to the EU), 15 in the Americas (Argentina, Bahamas, Canada, Chile, Ecuador, Mexico, Panama, Suriname and the US), 10 in Asia (Indonesia, Japan, Maldives, Philippines, Russia, South Korea and Vietnam), 4 in Oceania (Australia and New Zealand) and 4 in Africa (Namibia, Senegal, South Africa and St. Helena, Ascension and Tristan de Cunha).

15 of the fisheries are RFMO-managed, of which 12 are tuna fisheries, managed by the Western and Central Pacific Fisheries Commission (WCPFC) (5 fisheries), the International Commission for the Conservation of Atlantic Tunas (ICCAT) (4), the Indian Ocean Tuna Commission (IOTC) (2), the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) (2), the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) (1) and the South Pacific Regional Fisheries Management Organisation (SPRFMO) (1).

The last Public Certification Report (PCR) for each fishery was used for the review. 30 of the fisheries achieved an SG80 score, concluding that 'some evidence exists' that fishers comply. 13 achieved an SG100 score, with the conclusion that there is 'a high degree of confidence' that fishers comply. 7 of the fisheries did not reach an unconditional pass but still met SG60, concluding that fishers are 'thought to' comply.

10 conformity assessment bodies (CABs) were represented in the sample: CUUK (11 assessments), GTC (8), LRQA (7), MRAG Americas (6), SCS (5), BV (4), DNV (3), UCSL (3), q.inspecta GmbH (1) and OIA (1).

Compliance information

Quantitative information about inspections and infringements, enabling us to say something about compliance *rates* in the fisheries, are provided in 20 of the assessments. Quantitative information on infringements, but without any accompanying information on inspection numbers, is provided in 7 additional assessments.

Compliance rate is the golden standard against which to assess compliance; information about infringements but without total number of inspections is only anecdotal evidence. As follows, we have information about compliance rates in 40 % of the fisheries in the sample. Two comments should be made to this. First, the compliance rates are seldom Unit of Assessment (UoA)-specific. In most cases, inspection and infringement data are provided for a larger fishery, typically for the entire Exclusive Economic Zone (EEZ) in which the fishery takes place, which includes fisheries for other species, with other gears and/or by other fleets (e.g. from other states) than the UoA. Second, the information presented is generally not very detailed. In most assessments, only one set of figures is provided: total number of inspections and infringements, for one or several years. Some assessments have information on inspections both at sea and on land, but most have only one of these. Notably, none of the assessments provide information separated by types of infringement.

This also means that in nearly half of the assessments, no quantitative information about inspections or infringements is presented in assessment reports. The main source of information appears to be

interviews with management authorities/enforcement agencies during the site visit, but it varies to what extent this is made explicit in the assessment reports. In some reports, statements such as 'compliance is good' are presented without elaboration on information sources that support the claim, and one can only infer (or speculate) that this is based on information obtained at stakeholder meetings. In others, there is explicit reference to specific interviewees. In most cases, that would be representatives of enforcement or management agencies, but some assessments present a positive conclusion about compliance with information from the client only. A few (less than a handful) assessments also use other sources of information, such as academic literature or official reports, e.g. from offices of national auditors general or specifically commissioned compliance reports.[1]

There is sporadic evidence of triangulation of methods, mostly in a simplistic form where compliance levels inferred from inspection data are 'confirmed' at interviews during the site visit. In a few assessments, there is more active triangulation using inspection data, interviews and other available sources.

One takeaway is that there is a great variance in what information base is used to justify the same score, which is typically 80: 30 of the 50 fisheries achieved an SG80 score, 13 an SG100 score and 6 an SG60 score. In some assessments, there is inspection and infringement data to support the SG80/SG100 score; in others there is no quantitative information, but just a confirmation from the management authorities that compliance is good. Furthermore, for the fisheries that failed to reach SG80 the rationale is not always clear, as in this example: 'The team estimates that the fishers comply with the management system, therefore the SG60 level is met, but there is not sufficient evidence to demonstrate that the fishers comply with the SG80'. In this case, the compliance rate is actually calculated as inspection and infringement numbers are available; nevertheless, the team concludes that the SG80 requirement 'some information exists' is not met, while in the large majority of cases where such information is *not* available, it is concluded that the requirement *is* met.

A specific challenge arises with RFMO compliance reports, which are used to score many RFMO-managed fisheries: these are generally not about fisher compliance (which is scored in PI 3.2.3), but about state compliance (member states' compliance with conservation and management measures (CMMs)). This will be further commented on in the chapter on compliance information from RFMOs below.

Compliance outcome[2]

The information provided comes in different forms and is not directly comparable across fisheries. Inspection data typically gave evidence of an infringement rate in the region of 5-10 %, although as said it gives little meaning to calculate more accurate averages since the data from different fisheries are not necessarily directly comparable. But taken together they give us a general picture of the situation – although the reliability of the numbers can be questioned; see the discussion of the academic compliance literature below.

[1] For example, in the Nordic countries the offices of the auditors general (reviewing the working of the executive branches of government on behalf of national legislatures) occasionally carry out performance reviews of fisheries management, which may contain information also on fisher compliance. In other fisheries, ministries or fishery clients had commissioned consultancy reports on compliance, one even a 'socio-anthropological study on IUU fishing'.

[2] A detailed list of reported compliance rates in each fishery (where available) is on file with the author.

Information from enforcement agencies

This section provides information about what inspection and infringement data are available from international organisations and national authorities.

As with the MSC assessment report presented above and the academic literature discussed below, both information on sources and outcome is provided. Outcome information, such as compliance rates, is given for illustrative purposes mostly, to show what specific information can be drawn from the sources. It goes beyond the scope of this report to study compliance levels in detail, e.g. over time; hence, only information from the last year or whichever recent period is readily available with the relevant management authority is presented.

It also lies beyond the remit of the report to study compliance within RFMOs. As mentioned above, RFMO compliance reports mainly deal with *state* compliance with obligations towards the RFMO, not *fisher* compliance with regulations, which is at issue in the MSC Standard's PI 3.2.3 on enforcement and compliance.[3] RFMOs typically have illegal, unreported and unregulated (IUU) vessel lists ('black lists') which show vessels that have engaged in serious or repeated non-compliant action. This is not irrelevant for an understanding of compliance in the fishery – a very large number of vessels on the IUU list gives evidence of a compliance challenge – but it does not amount to detailed information on compliance, not to speak of compliance rates. Many RFMOs have observer programmes, but in most cases these are scientific observer schemes, not mechanisms for assessing compliance. That said, there is also occasional information on infringements in RFMO compliance reports, but it is rudimentary and rarely suitable for inferring compliance rates.

EFCA

The European Fisheries Control Agency (EFCA) publishes comprehensive information about inspections and infringements in the EU in its annual reports and quarterly reports from Joint Deployment Plans (JDPs) under the Specific Control and Inspection Programmes (SCIPs) in the Baltic Sea, the Black Sea, the Mediterranean, the North Sea and the Western Waters.[4]

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[3] Information from RFMO compliance reports is therefore not well suited to inform the scoring of PI 3.2.3, noting it may be more relevant elsewhere (e.g., for the assessment of PI 3.2.2 on decision-making procedures and the responsiveness of the fishery-specific management system.)

[4] EFCA has been prioritised above national management bodies in the individual member states as source of information on compliance in the EU. But as an example, the situation in the Nordic EU countries is as follows: In **Sweden**, the annual reports of the Swedish Agency for Marine and Water Management (SwAM) provide information on the number of infringements the last three years, separated into guidance, warnings, (different types of) fines, penalty points (EU regulations), and prosecution. However, the total number of inspections is not given. In **Denmark**, the Fisheries Agency produces separate annual reports on fishery control, with quite some detail. The number of inspections for the last three years is given separately for demersal, pelagic and reduction fisheries, as well as for fisheries for certain species (eel, mussels and oysters), regions (the North Sea and Skagerrak) and regulations (the landing obligation and area closures). However, no numbers are provided on infringements except the total number of 'serious infringements' and the share that have led to EU penalty points. Hence, neither information from Denmark nor from Sweden enables us to say anything about compliance *levels*. In **Finland**, the Ministry of Agriculture and Forestry's mentions in passing the total number of inspections and infringements by the Game and Fisheries Wardens in its last annual report, but this appears to relate to recreational fisheries only. No information on inspections or compliance in commercial fisheries seems to be available at least on the English- and Swedish-language websites of Finnish management authorities. References to these annual reports are found in the reference list.

In the annual reports, there are tables for each JDP with figures for i) deployed control means, including patrol days at sea, number of vessel patrol days at sea and number of flights with aerial surveillance; ii) total number of inspections and suspected infringements, in total and separated by inspecting member state; iii) total number of inspections and suspected infringements, separated by flag state; iv) percentage of suspected infringements relating to up to 26 categories of specific infringements (varying between the JDPs), grouped into non-compliance with the landing obligation and associated misreporting; conservation measures; recording and reporting obligations; and other types of non-compliance. As an example of outcomes, a summary of the reported results of inspections under the five JDPs in 2023 is provided, drawn from the EFCA Annual Report for that year.

For the **North Sea** JDP, 987 land-based inspections were carried out in 2023 (ranging from 510 performed by Denmark to 2 by France), with an average share of inspections leading to the detection of a suspected infringement at 5.9 % (ranging from 100 % in France to 0 % in Germany). 382 inspections were carried out at sea (ranging from 158 by Denmark to 0 by France), with an average suspected infringement rate of 9.2 % (ranging from 28.9 % in Belgium to 6.1 % in Sweden). When it comes to the flag states of the vessels suspected of infringement, for the land-based inspections 100 % of French vessels inspected were suspected while at the other end of the spectrum we have the UK with 0 %. For at-sea inspections, the figures vary from 16.7 % of Belgian vessels to 0 % of French and Norwegian vessels inspected. As for type of infringement, the largest group is 'Non-compliant gear' (13 %), followed by 'Not equipped or not operational AIS/VMS' (9 %), 'Difference between catch reported and landing exceeding the legal margin of tolerance' (9 %), 'Other [suspected infringement] related with fishing vessel recording and reporting obligations operations' (9 %), 'Not submitted, not submitted on time or submitted incorrectly the PNO' (8 %), 'Fishing in closed area/period/depth' (5 %), 'Marketing for direct human consumption of undersize fish subject to LO' (5 %) and 'Absence or Incorrect stowage plan' (5 %). The inspection and infringement data are not broken down by specific fisheries, but the results of risk assessment for different types of violations in different ICES areas, for different gears/target species and in different fisheries (demersal and pelagic) are provided with the colour codes green, yellow and red. For the demersal fisheries, green is given for most gears, with a few yellows, while reds are given for only one category: beam trawlers fishing for sole with mesh size 80-120 mm. For the pelagic fisheries, yellow is given for most categories.

For the **Baltic Sea** JDP, 2842 land-based inspections were carried out (ranging from 791 performed by Poland to 151 by Denmark), with an average share of inspections leading to the detection of a suspected infringement at 3 % (ranging from 6 % in Sweden to 0.2 % in Latvia). 494 inspections were carried out at sea (ranging from 115 by Denmark to 8 by Estonia), with an average suspected infringement rate of 2.6 % (ranging from 4.7 % in Sweden to 0 % in Estonia, Latvia and Lithuania). When it comes to the flag states of the vessels suspected of infringement, for the land-based inspections 6.2 % of Swedish vessels inspected were suspected while at the other end of the spectrum we have Latvia with 0.2 % of vessels. For at-sea inspections, the figures vary from 6 % of Polish vessels inspected to 0 % of Estonia, Finnish and Lithuanian vessels inspected. The most common type of suspected infringement is 'Difference between catch reported and landing exceeding the legal margin of tolerance' (34 %), followed by 'Not recorded, misrecorded, not reported or not reported in due time of catch declaration' and 'Absence or non-conformity with fishing gear/device identification' (6 %).

For the **Western Waters** JDP, 3161 land-based inspections were carried out (ranging from 1442 performed by Spain to 0 by Denmark, with an average share of inspections leading to the detection of a suspected infringement at 4.9 % (ranging from 25 % in Belgium to 0 % in Denmark and the Netherlands). 532 inspections were carried out at sea (ranging from 174 by Spain to 0 by Denmark),

with an average suspected infringement rate of 11.7 % (ranging from 75 % in Belgium to 0 % in Germany and the Netherlands). When it comes to the flag states of the vessels suspected of infringement, for the land-based inspections 12.2 % of Belgian vessels inspected were suspected while at the other end of the spectrum we have Germany and Norway with 0 %. For at-sea inspections, the figures vary from 100 % of German vessels (only one vessel was inspected) to 0 % of Norwegian and Polish vessels inspected. The main types of suspected infringements are 'Difference between catch reported and landing exceeding the legal margin of tolerance' (27 %), followed by 'Not recorded, misrecorded, not reported or not reported in due time of catch declaration' (8 %), 'Non-compliant gear' (6 %), 'Not equipped or not operational AIS/VMS' (5 %), 'Not submitted, not submitted on time or submitted incorrectly the PNO' (5 %) and 'Failure to facilitate safe access of inspectors' (5 %). In the risk assessment for different gears/target stocks and areas in the North Western Waters, red is given for non-compliance with the landing obligation and misreporting in demersal fisheries for vessels using trawl with mesh size at or above 120 mm and beam trawl with mesh size at or below 120 mm, as well as for illegal gear for the two latter categories. Otherwise, there is a mix of green and yellow. In the South Western Waters, few risks are identified, with the exception of bottom trawls targeting mixed species using 55-70 mm mesh size. For the pelagic fisheries, few risks are also identified.

For the **Mediterranean** JDP, 15,114 land-based inspections were carried out (ranging from 4890 performed by Greece to 74 by Slovenia), with an average share of inspections leading to the detection of a suspected infringement at 6 % (ranging from 14.6 % in Spain to 0 % in Malta). 8502 inspections were carried out at sea (ranging from 3942 by Greece to 8 by Portugal), with an average suspected infringement rate of 6.9 % (ranging from 18.3 % in Spain to 0 % in Portugal). When it comes to the flag states of the vessels suspected of infringement, for the land-based inspections 50 % of German vessels (only two vessels inspected) were suspected while at the other end of the spectrum we have a number of countries with 0 %. For at-sea inspections, the figures vary from 100 to 0 % for a number of countries. The by far largest type of suspected infringement is 'Absence or incorrect labelling/information impairing to track the origin of the fishery product' (46 %). This reveals that unlike for the other JDPs, traceability-related controls are included in the figures for the Mediterranean, which also explains the high number of inspections here compared to other areas. Of fisheries-related suspected infringements, the largest categories are 'Fishing in closed area/period/depth' (7 %), 'Non-compliant gear' (5 %) and 'Fishing without valid authorisation / licence' (4 %). The greatest risk areas are considered to be non-compliance with the landing obligation, misreporting and non-compliance with technical and management rules (marked with red) fishing with bottom trawl in the Eastern Atlantic and Mediterranean Sea. The other fisheries are marked with yellow and light red, with very few greens.

For the **Black Sea** JDP, 1208 land-based inspections were carried out (958 by Bulgaria and 250 by Romania), with an average share of inspections leading to the detection of a suspected infringement at 0.2 % (0.3 % of the inspections carried out by Bulgaria and 0 % of the inspections carried out by Romania). 113 inspections were carried out at sea (65 by Bulgaria and 48 by Romania), with an average suspected infringement rate of 4.4 % % (1.5 % in Bulgaria and 8.3 % in Romania). When it comes to the flag states of the vessels suspected of infringement, for the land-based inspections 0.6 % of Bulgarian and 0 % of Romanian vessels were suspected; and for at-sea inspections 5.8 % of Bulgarian and 2.3 % of Romanian vessels.[5] Far fewer categories of suspected infringements are listed

[5] There is some uncertainty about these numbers as it is not quite clear in the EFCA table whether they refer to all or just a segment of at-sea inspections. They are nevertheless included here as they do provide some insight about compliance levels (or, more precisely, levels of detected suspected infringements).

in this JDP than in the others, with the largest being 'Fishing in closed area/period/depth' (42 %), 'Not onboard or not updated paper logbook' (21 %) and 'Absence or incorrect transport documentation' (16 %). Bottom set gillnets targeting turbot is the only red-flagged risk area identified, with a high risk for most categories of non-compliance.

The number of inspections and percentage of inspections resulting in the detection of a suspected infringement are summed up in

Table 1.

Table 1: Inspections and infringements in the EFCA JDPs in 2023

JDP/inspections and infringements	total number of land-based inspections	percentage of land-based inspections revealing suspected infringement	total number of at-sea inspections	percentage of at-sea inspections revealing suspected infringement
North Sea	987	5.9 %	382	9.2 %
Baltic Sea	2842	3 %	494	2.6 %
Western Waters	3161	4.9 %	532	11.7 %
Mediterranean*	15114	6 %	8502	6.9 %
Black Sea	1208	0.2 %	113	4.4 %

* As noted in the text above, the number of inspections in the Mediterranean is much higher than in the other JDPs because they include traceability-related controls.

The average percentage of land-based inspections revealing suspected infringements across all JDPs is 4 % and the median 4.9 %. For at-sea inspections, the average is 7 % and the median 4.4 %. This is within the typical range presented in the MSC assessments above, or slightly lower. Notably, these are *suspected* infringements, so the number of documented infringements is invariably lower. Also, these figures provide inspection and infringement data for the entire ocean areas, not broken down geographically or by types of fisheries that might correspond with UoA. However, inspections/infringements are attached to both inspecting and flag state, and the infringements are separated into different categories of violations. Some patterns can be drawn from this, such as underreporting being by far the most prevalent infraction in the Baltic Sea and the Western Waters, while non-compliance with area and depth restrictions are the most widespread infringements in the Black Sea and the Mediterranean. Infringements are more diverse in the North Sea. We also note differences between member states; for instance, Belgium tends to have a high percentage of inspections revealing suspected infringements, while for the Baltic states the situation is the opposite. As we will come back to in the section on the academic compliance literature below, however, this does not necessarily mean that actual compliance is low in the Belgium fleet and high in the Baltic fleet. It could also reflect that Belgian enforcement authorities are more effective in detecting violations than their Baltic counterparts are.

The non-EU Nordic countries

In **Norway**, information on compliance is publicly available in the annual reports of the Coast Guard (at-sea inspections) and Directorate of Fisheries (land-based inspections). The Coast Guard published number of inspections and infringements in each of the main fishery zones/areas under Norwegian jurisdiction (the Norwegian EEZ, separated into north and south of 65 degrees, the Fishery Protection

Zone around Svalbard, the Fishery Zone around Jan Mayen, the territorial waters of Svalbard, and Skagerrak) as well as Norwegian inspections in the NEAFC Regulatory Area. Figures are provided for the last four years and there are categories for no remarks, warning, transfer of case to the police (Norwegian vessels) and arrests (foreign vessels). In 2023, 1162 at sea-inspections were carried out in waters under Norwegian jurisdictions, of which 2.6 % revealed infractions that led to prosecution. 7.6 % led to a verbal or written warning. In the most important fishing area, the Barents Sea, 711 inspections were carried out. Here the share of inspections leading to prosecution was 2.3 % and to a warning 7.6 %.

The Directorate of Fisheries' annual reports contain the total number of 'full inspections' (with all fishing and fish quality regulations), inspections of fish-processing plants, document controls and gear inspections in recreational fisheries. The number of reactions is also provided with the following categories: verbal guidance, written guidance, fine and transfer of case to the police. The same numbers for the last seven years are also found in graphic form on the Directorate's website. In 2023, the Directorate carried out 2608 inspections. 441 of these were 'full inspections', 1278 inspections in recreational fisheries, 347 of fish-processing plants and 544 document controls (unclear whether of vessels, plants or recreational fisheries, or all). 6.3 % of the inspections (excluding recreational fisheries) led to verbal guidance, 4.8 % to written guidance, 0.8 % to a fine and 0.3 % to prosecution. Notably, these figures are of limited relevance for assessing compliance in the fisheries (as evaluated in an MSC assessment) as they also include inspections at fish-processing plants as well as compliance with fish quality regulations (on vessels and at plants).

Both the Coast Guard and the Directorate previously produced bespoke inspection statistics to MSC assessment teams (for instance, for individual UoAs where the statistics was fine-meshed enough, e.g. separated by flag state and pelagic/demersal fisheries), but in recent years the references presented are just their annual reports. The Coast Guard has reportedly never prioritised to meet with MSC assessment teams; the Directorate did in the past, but more sporadically in recent years. In addition to this, the Office of the Auditor General from time to time conducts comprehensive management audits of fisheries management in the different ocean areas under Norwegian jurisdiction (i.e. one at a time) with more detailed information, including the number of inspections in different fisheries separated by species; infringements, grouped into infractions of reporting, gear and area regulations; and nationality of vessels. Such figures are provided from both at-sea and land-based inspections. Moreover, a cross-ministerial review of compliance in Norwegian fisheries was carried out by the Government in 2019, with similar information. However, these reports do not come regularly.

In **Iceland**, the Directorate of Fisheries publishes annual reports with figures on infringements broken down by different types of infringements. The Directorate is responsible for land-based inspections, primarily landing controls. In 2023, 230 suspected infringements were identified, the largest types of which were violation of reporting requirements (70 %), discarding (10 %) and weighing scale requirements (6 %). 40 cases were determined to involve an infringement, the largest categories being discards (50 %), violation of reporting (15 %) and weighing requirements (12.5 %). 57.5 % of the cases led to a warning and 42.5 % to confiscation of catch. The total number of inspections is not given, however, so that it is not possible to determine the compliance rate. Only the number of inspections of pelagic landings is provided, which was 1027. In addition, 175 inspections were conducted under the NEAFC Port State Control regime. Of these 1202 inspections, an infraction was determined to have taken place in 3.3 % of the cases. 1.4 % led to a sanction beyond warning (confiscation). As this only included inspections of pelagic landings, the real non-compliance rate (as reflected in inspection statistics) will be lower if also demersal landings were included.

The Coast Guard does not appear to publish annual report on its website, or other inspection statistics, but updated and sometimes bespoke statistics are regularly presented to MSC assessment teams at site visits. At the last site visit conducted for an MSC assessment of Icelandic fisheries, the assessment team was given a presentation by the Coast Guard which showed just below 150 inspections (it was presented as a figure, not in exact numbers) in 2023 up until 20 November, which had revealed 7 apparent infringements, i.e. an infringement rate of 4.6 % (if we assume the exact number of inspections to be 148).

Least information among the Nordic countries is available in Greenland and the Faroe Islands. In **Greenland**, aggregate inspection and infringement statistics are available on the website of Greenland's Fisheries License Control Authority, but it has not been updated since 2021 and can hence be considered dormant. In the **Faroe Islands**, no information on inspections or compliance is available, at least on the Danish or English websites of the Ministry of Fisheries and Infrastructure or the fisheries control authority Vørn. Representatives of both Faroese and Greenlandic enforcement and management authorities regularly meet with MSC assessment teams and provide anecdotal information and qualitative insights on compliance in the fisheries, but no quantitative data.

In sum, infringement rates are available for at-sea (2.6 % in 2023 for prosecuted cases and 10.2 % if warnings are included) and land-based (1 %) inspections in Norway and for at-sea inspections (4.6 %) in Iceland. In the Faroe Islands and Greenland, only qualitative information appears to be available.

The UK

In **the UK**, MCS is taken care of by control entities within the four Fisheries Administrations: the Marine Management Organisation (MMO) in England, the Department of Agriculture, Environment and Rural Affairs (DAERA) in Northern Ireland, Marine Scotland and the Welsh Government.

The most important fishing region in the UK is Scotland. Marine Scotland's website contains updated information about boardings conducted in Scottish waters for each six-months period, divided by flag state of the inspected vessels. 684 fishing vessels were boarded in 2023. There is no overview of reactions (ranging from warnings to prosecution), but a table with the number of fixed penalty notices (administrative fines) given for 15 types of infringements. The total number of fixed penalty notices given in 2023 was 64, which gives an infringement rate (NB: excluding less serious infractions which might have resulted in a warning, and more severe infractions leading to prosecution) of 9.4 %. The most common offenses were statutory returns offenses (2.6 % of inspections), fishing gear offenses (2.5 %) and fishing without authority (1.8 %).

It has not been possible to find inspection and infringement data on the websites of the three other UK Fisheries Administrations. A search through MSC assessment reports for English, Northern Irish and Welsh fisheries shows that quantitative information is not typically presented in assessment reports. It is therefore difficult to draw conclusions on compliance *rates*; however, qualitative information like interviews with management agencies is used in the place of quantitative rates.

North America

In **the USA**, the National Oceanic and Atmospheric Administration (NOAA) publishes information about court cases resulting from infringements of fisheries regulations: Administrative Law Judge Initial Decisions (on average 4.3 cases per year in the period 2015–2024), NOAA Administrator Orders

(on average one per year 2015–2024), District Court Decisions (none registered since 2017; 1-2 per year before that) and Circuit and Supreme Court Decisions (none registered since 2014; less than one per year on average before that).[6] No information on number of inspections seem to be available on the NOAA website, but it follows from MSC assessment reports that NOAA and the U.S. Coast Guard (USCG) share inspection statistics with the Regional Fishery Management Councils. In its report to the Pacific Fishery Management Council in April 2024, for instance, the USCG shared information on inspections and infringements in 2023. 1564 fishery inspections led to the detection of 23 infringements (of area, gear and reporting requirements), which gives a non-compliance rate of 1.5 %.

Likewise in **Canada**, (the Department of) Oceans and Fisheries Canada (DFO) publishes detailed information on convictions under the Fisheries Act for each of its seven regions for the last 2-3 months. For instance, in the Quebec region there were 30 convictions, in the Pacific region 16, in the Newfoundland and Labrador region 10, in the Maritimes region 7, in the Gulf region 3 and in the Arctic region and the Ontario and Prairie region none. Again, information on the number of inspections does not seem to be publicly available on the DFO website, but DFO provides such numbers to MSC assessment teams. For example, Mateo et al. (2024, pp. 233–237) provide detailed information on inspections and compliance in the Atlantic halibut fishery. In the DFO Newfoundland and Labrador Region, 395 vessels were inspected in Canadian waters in the period 2018–2023, leading to 7 warnings and 29 charges laid, which implies a non-compliance rate of 7-8 %, depending on whether you include the warnings or not.

Asia

In **Taiwan**, the Fisheries Agency publishes updated lists of infringements and sanctions for vessels under Taiwanese flag. For instance, in Taiwan's distant water fishing fleet there were 32 infringements in 2024, among which 13 were misreporting or quota overshoot in tuna fisheries; five cases of vessels holding prohibited species; five instances of not disposing of shark fins in the prescribed manner; three instances of misreporting of shark catches; two instances of landing without authorisation; two instances of vessels fishing in the EEZ of other states without authorisation; and one instance of a vessel staying at sea continuously for more than 12 months, and one of not utilising the full catch. In 2023, 54 infringements were reported. The majority of cases were related to misreporting of catches and landing in port without authorisation, but there were also instances of fishing in another state's EEZ without a permit, transshipment without authorisation, and violation of provisions on fin-to-carcass ratio for blue shark.

In **Japan**, the Fisheries Agency does not seem to publish any enforcement information on its website, at least not in English. There is a relatively detailed annual port in English available, but the only enforcement information is on inspections of foreign vessels, of which there were seven in 2023, which resulted in seizure of one vessel and eight cases of confiscation of fishing gear. A spot check of assessment reports of MSC-certified Japanese fisheries reveals that inspection data are not presented in assessment reports for these fisheries.

In the **Republic of Korea**, the Ministry of Oceans and Fisheries does not appear to share information on inspections and infringements on its website, again at least not in its English version. Nor is there

[6] There is reason to believe that the two last lists are not updated.

evidence presented in MSC assessment reports for Korean fisheries that more detailed information has been provided to the assessment teams.

The situation seems to be the same in **China**, although one MSC assessment report pointed to a list of sanctions on the Chinese website of the Ministry of Rural Affairs and Agriculture (note provided link did not work for further investigation).

Oceania

The **Australian** Fisheries Management Authority reported 250 boat inspections in its 2023-2024 Annual Report and 264 in its 2022-2023 Annual Report, but no information was provided on the number of infractions. In the 2021-2022 Annual Report, a compliance rate (defined as the share of inspections that did not require further action) of 95.2 % was reported (201 boat inspections in total), just above the stated goal of 95 %. For 2020-2021, the compliance rate was 89 % (total 344 boat inspections), and in 2019-2020 92 % (total 289 inspections). There is no detailed overview of types of infringements. A spot check of recent MSC assessment reports of Australian fisheries reveals that enforcement agencies tend to share information on specific infringements/sanctions with assessment teams.

In **New Zealand**, information on compliance is available on request by anyone under the Official Information Act, but it appears that this relates only to historical documents: the last report provided is from 2018 and covers the period up to 2013 – information found there also seems to focus on court cases rather than compliance rates. Information on sanctions imposed for infringements is provided in press releases from the Ministry for Primary Industries. In the period from October 2024 to March 2025, there were 1-2 such press releases per month, which might indicate that all sanctions are published, not just occasional instances. Information on inspections does not appear to be available on the Ministry's website, nor on that of the New Zealand Coastguard. Just like for Australia, a spot check of recent MSC assessment reports of New Zealand fisheries indicates that enforcement agencies tend to share information on specific infringements/sanctions with assessment teams, but not necessarily information on inspection numbers and hence compliance rates.

The big picture is similar for the **Pacific Island states**: information on compliance rates is not publicly available on the websites of enforcement agencies, but information on specific sanctions is shared with MSC assessment teams.

The academic literature

The sample

The Web of Science, an authoritative database and indexing service for academic journal articles, which only includes journals with high impact factor, was used to identify the most relevant high-quality literature on compliance in fisheries. A search for 'compliance' + 'fisheries' in 'title', i.e. including articles where both words appear in the title, rendered 89 hits.[7] 20 articles that did not provide any empirical information on individual fisher compliance with fisheries regulations were removed from the sample,[8] reducing the number to 69. Then a second search was performed with the same words for 'topic' instead of 'title', i.e. covering articles on the topic which do not necessarily have these words in their title, sorted by 'relevance'. Within the top 100 hits of this search, six additional articles on fisher compliance with fisheries regulations were identified that were not covered in the 'title' search, rendering the total number of articles covered 75.

Most articles are case studies of compliance in a specific fishery, while a few are comparative across two or more fisheries. 8 of the fisheries are recreational and 36 small-scale, 27 mid-/large-scale and 2 RFMO-managed. This means that there is an overrepresentation of recreational/small-scale fisheries (59 % of the sample) and an underrepresentation of RFMO-managed fisheries.[9] The studies of the two RFMO-managed fisheries are also on the margins topically, with only limited information on fisher compliance as such.[10] Finally, two articles are based on laboratory experiments not related to any specific fishery.

Taking into account the relatively small sample, the geographical coverage is fairly good: 21 articles are about fisheries in the Americas (USA: 13, Canada: 3, Brazil: 2, and 1 each for Chile, Peru and the Turks and Caicos Islands), 21 fisheries in Europe (Norway: 7, Sweden: 5, Greenland: 2, Russia: 2, and 1 each for Denmark, Greece, Italy, the EU and the UK), 14 in Africa (South Africa: 7, Lake Victoria (Kenya/Tanzania/Uganda): 5, and 1 each for Ghana and Namibia), 14 in Asia (2 each for the Philippines and Vietnam, and 1 each for Bangladesh, India, Indonesia, Iran, Malaysia, Myanmar, Oman, Russia, as well as the Eastern Pacific Ocean and the Western Pacific Ocean in general), and 5 in Oceania (Australia: 3, and 1 each for New Zealand and the US Pacific islands). Hence, there is an overrepresentation of the Americas and Europe, but with Africa and Asia not far behind – there are fewer contributions on Oceania. Hence, within the Americas, more than half of the studies are from US fisheries, and in Europe there is a strong overrepresentation of the Nordic countries and northwest Russia (17 out of 21 contributions). Africa is dominated by studies of South Africa and Lake Victoria, while there is a good spread between countries in the Asian part of the sample.

[7] The number of articles has grown steadily throughout the period: from 0.1 article per year in the 1980s to 0.7 in the 1990s, 2.5 in the 2000s, 3.1 in the 2010s and 6.25 so far in the 2020s.

[8] This included 5 articles on state compliance with international law; 4 articles that dealt with other topics (such as Hazard Analysis Critical Control Point (HACCP) compliance, toxics in fish products and genetic markers for fish identification); 4 articles on economic modelling without any empirical data; 3 articles on regulations' compliance with basic law or objectives; 2 articles with legal analysis without any empirical data; 1 article on transparency in RFMO information on compliance; and 1 article on organisational compliance within RFMOs.

[9] The middle category 'mid-/large-scale' essentially covers everything that is not clearly small-scale or RFMO-managed.

[10] One is a comparison of RFMOs' use of observers and remote electronic monitoring (REM) for checking compliance; the other is a statistical analysis on the identification of unusual observations/suspect data in observer data from the Inter-American Tropical Tuna Commission (IATTC).

Methods and evidence

The majority of studies (63 %) use some form of interviews (43 %) or surveys (20 %) as their primary data source, often in combination. Most interview/survey studies include fishers, some also representatives of management authorities and/or enforcement agencies, and a few also other stakeholders. The typical method applied is semi-structured interviews, but approaches range from qualitative, open-ended in-depth interviews to quantitatively oriented structured surveys.[11] Quite a few studies use surveys, either written (online or by post) or with questionnaires filled in at in-person interviews, and are then supplement by qualitative interviews with a smaller group of people.[12] Others supplement interviews with focus-group discussions.[13] Whether a qualitative or quantitative interview technique is used, the majority of studies subject the findings (either directly from questionnaires or, for qualitative data, coded by the researcher) to some sort of statistical analysis.

Ethnographic fieldwork (observation or participatory observation) is the main research method in 11 % of the articles, archival studies/document analysis in 5 % of them, fishery observer data in 4 %, logbook data in 3 % and biological sampling in 1 %. 3 % of the studies are laboratory experiments, with fishers responding to questions related to a fictional fishery.

Notably, inspection data from enforcement agencies are used in only 8 % of the studies, which deserves some closer attention.

Lindley and Quinn (2023) use infringement records from enforcement authorities to study non-compliance in recreational fisheries in Southern and Western Australia. However, no information is provided on the number of inspections, which could have told us something about the compliance *rate* in the fisheries, only patrolling time. Al-Quartoubi et al. (2021) use data from enforcement authorities in Oman in combination with a survey among fishers and managers. The infringement data are quite detailed and can be broken down according to type and seriousness of infringements. But again, the number of inspections is not given, only the number of patrols. Likewise, Catedrilla et al. (2012) provide detailed infringement statistics in their study of compliance in a Philippine fishery, but no information about the number of inspections. Also this study combines infringement statistics with interviews with fishers. In their study of compliance in the Gulf of Mexico commercial reef fish fishery, Porter et al. (2013) employ a rich set of infringement data from the National Oceanic and Atmospheric Administration (NOAA) and the US Coast Guard (USCG) as well as other enforcement agencies, also supplemented with interview data, but again without inspection numbers that would have made it possible to infer compliance rates. Only two studies in the sample (3 %) present both inspection *and* infringement data: Hønneland (1998) in his discussion of compliance in the Barents Sea, and King et al. (2009) in their study on compliance in US fisheries, based on data from the Norwegian and US Coast Guards, respectively.

[11] The typical sample is in the range of 50-200 interviewees. The largest sample is found in Näslund et al. (2010), who interviewed 2,576 Swedish recreational fishers over 15 years. The second-largest sample is in Diekert et al.'s (2021) survey among 668 Norwegian commercial fishers and the third-largest in Catedrilla et al.'s (2012) interview survey among 603 fishers in the Philippines.

[12] For instance, Owusu et al. (2023) conducted 200 household surveys supplemented with 17 in-depth interviews in Ghana; Dresdner et al. (2015) used a survey with 301 fishers combined with in-depth interviews with 20 key informants (fishers and managers) in Chile; and Nielsen and Mathiesen (2003) collected questionnaires from 154 Danish fishers and supplemented this with in-depth interviews with 56 of them.

[13] For instance, Ungkakay-Bagsit et al. (2023) conducted interviews with 157 fishers in the Philippines followed by discussions in nine focus groups. Bisack and Das (2015) used observer data and four focus group sessions with 15 invited gillnet fishers from Rhode Island to Maine.

It is also worth noting that the authors of the six studies that do include public inspection data are careful to emphasise that such data do not necessarily reflect actual compliance levels. Tellingly, all but one of them use interviews to supplement and qualify the preliminary findings from the inspection data.[14] And all of them make reservations about the explanatory power of such data. Hønneland (1998) has an entire section on this question and concludes that inspection data can give an indication at best. Porter et al. (2013) characterise inspection statistics as a 'proxy' for actual compliance and show how variation in compliance rate over time can be explained by changes in regulations and enforcement procedures rather than in actual compliance. As noted by King et al. (2009, p. 354), enforcement agencies do not know how many violations they do not detect and hence cannot know the percentage of violations they detect either. A large part of their article is devoted to a discussion of how compliance data should be interpreted: to what extent do they actually tell us anything about compliance at all? *The fundamental dilemma, as pointed out in all the studies that make use of inspection data, is that a low number of infringements might reflect either that i) the number of actual infringements is low; or ii) the inspectors are not able (or willing) to detect (the full range of) infringements.*

Why 92 % of the studies do not use enforcement statistics at all, we do not know. The authors may either view such data as unreliable, or they may not have access to them. In any event, we can conclude that inspection data only play a marginal role in the academic study of compliance in fisheries.

Information on compliance levels

The majority of studies have fishers' *motivations* for compliance/non-compliance as their main focus (see below), not *levels* of compliance. The underlying premise is presumably that it is impossible to document fisher behaviour to a full extent; any evidence would have to be considered a proxy, whether that is inspection records or self-declared compliance or motivations. For the reasons outlined in the last section, declaration of motives in anonymised surveys or interviews may have been considered a more valid indication of compliance than inspection data – or the researchers may not have had access to such data. Since inspection/infringement data are available in many jurisdictions (see previous chapter) but have nevertheless not been used, it seems most plausible that they have considered them to be of limited interest. Moreover, the literature on compliance in fisheries is mainly theoretical in orientation, situated in overarching compliance theories in economics, sociology, criminology and public administration, and this literature is primarily occupied with actors' motivation, with the overarching question: why do people obey the law?

A large number of studies in our sample either take non-compliance as a given without specifying its range, or they provide anecdotal evidence of it. The objective of these studies is to investigate fishers' motivations only, not levels of compliance.

In addition to motivations, around half of the survey/interview studies in the sample include information about self-reported compliance among interviewees and their perceptions of compliance among other fishers. This may not be 'hard evidence', but in the literature this seems to be considered a better reflection of actual compliance than inspection statistics, even though one can expect some under-reporting of non-compliance even in anonymised surveys. The information is very

[14] Hønneland (1998) only presents compliance statistics, but it is followed up by a separate article from the same study based on interviews with fishers (Hønneland 2000),

scattered, but taken together we see the contours of a general picture of compliance in fisheries – hence, a few examples:

In a survey among recreational fishers in South Africa, an overall compliance level of 48 % was reported (Bova et al. 2022). Another survey from a similar fishery in South Africa reported self-declared compliance rates at 75-90 % (Bova et al. 2017). In a Greenlandic salmon fishery, self-reported compliance with reporting requirements increased from 33 % in 2017 to 84 % in 2019 (Snyder et al. 2022). In an artisanal fishery in Chile, self-reported compliance the previous year was at 62.5 % (Dresdner et al. 2015). In the Northern California recreational red abalone fishery, survey participants estimated a 31 % compliance rate with daily take limit, 77 % with the minimum size limit, 81 % with the licensing requirements and 85 % with annual take limits (Blank and Gavin 2009). In Hatcher et al.'s (2000) study of a representative sample of skippers in an anonymised region of the UK, 26 % responded that they did not exceed their quotas in the previous year; 43.5 % estimated they had exceeded the quota by up to 10 %, and 29 % by more than 25 %. In Karper and Lopes' (2014) study of a Brazilian small-scale fishery, 56 % of respondents assessed compliance to be 'low'. Among Ungkakay-Bagsit et al.'s (2023) respondents from a small-scale fishery in the Philippines, 60 % report compliance with a seasonal fishery closure. In Porter et al.'s (2013) study from the Gulf of Mexico commercial reef fish fishery, 13 % of fishers report that they routinely violate fisheries laws, and 12 % do so occasionally – respondents on average estimate that only 31 % of violations are detected. Comparing reported catches with reported effort in the Swedish Baltic Sea pelagic fisheries, Hentati-Sundberg et al. (2014) estimate a 57 % misreporting of sprat and 48 % of herring catches. Damalas and Vassilopoulou (2013) deem compliance with minimum catch size in the Greek Aegean Sea demersal fishery to be 'very low', as deduced by the discrepancy between the proportions of undersized fish caught and discarded.

In Eggert and Lokina's (2009) study of compliance in Lake Victoria fisheries, 45 % of the respondents defined themselves as persistent compliers, 47 % as alternating violators and 8 % as persistent violators. This resonates somewhat with Sutinen's (2023) conclusion from many years of studies of compliance in US fisheries, that there tends to be three types of participants in an average fishery:

> (1) chronic, frequent violators (~10 %–20 %) who are driven primarily by financial considerations and violate at almost every reasonable opportunity; (2) dedicated compliers (~10 %–20 %) who are driven primarily by moral obligations and who rarely if ever violate if rules are perceived to be legitimate; and (3) conditional compliers (~60 %–80 %) who are driven by a mix of financial, normative, and situational factors (ibid., p. 292).

Based on survey data from three representative domestic US fisheries, King et al. (2009) along the same lines challenge the USCG's estimations of compliance rates in US fisheries to be ranging from 95.3 % to 98.6 %:

> Fishers and enforcement staff […] estimated, respectively, that 15 % and 31 % of fishers are chronic violators of fishing regulations (higher than the 10 % to 15 % estimated in previous surveys), and that an additional 21 % and 36 %, respectively, are occasional violators of fishing regulations. Based on these estimates, 36 % to 67 % of fishers are frequent or occasional violators of fishing regulations (ibid., p. 357).

A few studies indicate a higher level of compliance. In a Greenlandic salmon fishery, 90-94 % of respondents in a representative sample of license holders say they never engage in underreporting of catches (Snyder et al. 2022). Based on a survey among Swedish commercial fishers, Eggert and Ellegård (2003), estimate that 90 % of all Swedish catches are reported despite limited control efforts (96 % for large vessels and 85 % for smaller vessels). However, industrial fishers suspected that 45 %

of industrial fishers often do not comply. Among small-boat owners, 82 % considered that industrial fishers often cheat, while only 11 % (of all fishers) believe that gillnet fishers cheat. Hønneland (1998) reports infringement rates of 3.7 % with catch reporting requirements, 0.4 % with area restrictions and 11.1 % with gear restrictions in the Fishery Protection Zone around Svalbard in the Barents Sea, but the study is based on Coast Guard inspection statistics alone, not interviews with fishers about their propensity to comply or assumptions about compliance in the fishery in general.

One simple conclusion can be drawn from this: non-compliance will exist in any fishery, and, perhaps more unexpectedly, in very many fisheries it is quite significant.[15] That does not necessarily mean that a fishery is gravely mis-managed – most fisheries can 'live with' a level of non-compliance, and must.

Motivations for compliance

Most articles on compliance in fisheries engage with and make contributions to the ongoing theoretical debate about why fishers obey the law, or not. In brief, early studies of fisheries compliance were situated in what has later been termed the 'basic deterrence model'. This model assumes that fishers comply with the law when it is in their economic interest – potential non-compliant behaviour can only be deterred by a high risk of being detected in violations and penalties severe enough to make non-compliant behaviour non-economical. This early literature was mainly driven by economists and mostly geared towards calculating the appropriate level of deterrence necessary to ensure compliance in a fishery. From the early 1990s, a wave of empirical studies of actual compliance in fisheries set in, mainly situated in social sciences such as sociology, anthropology and criminology, building on long-standing theory building on compliance in these disciplines more widely. These empirical studies forcefully demonstrate that fishers comply with regulations also for other reasons than deterrence, mainly i) personal moral; ii) the legitimacy of the regulations and the management system; iii) the behaviour of others (including social pressure); and iv) habit, when a compliant behaviour has become internalised despite not necessarily being in the economic interest of the fisher. The theoretical foundation built on the basis of these empirical findings has been termed the 'enriched model' of compliance, including moral, legitimacy, norms etc., but also deterrence. A third strand of literature can be identified from the 2010s, which I have called the 'complex' or 'multidimensional models'. A hallmark of this literature is that it views motivations for compliance as less tangible and more dynamic than what the 'basic deterrence model' and the 'enriched model' presuppose. For instance, fishers' basic motivational forces – whether that is economic reasoning, personal morals or perceptions of the law – are modified by the opportunities that present themselves in the actor's immediate surroundings at any time. The inclination to comply is not consistent over time – fishers may comply at one time and not comply at another, even within a short time span. In fact, they may move continuously back and forth between compliance and non-compliance, depending on the circumstances. In the words of Mackay et al. (2020, p. 257): 'Non-compliance can be accidental or deliberate and can occur on a range of scales and frequencies.' Taking this as a premise, it becomes extremely challenging to document whether a fishery is characterised by compliance or non-compliance.

There is one very clear trend in the articles in our sample when it comes to fisher motivation: practically all the empirical surveys in the sample, including those situated in traditional model-based

[15] One main reservation should be made: there is an overrepresentation of small-scale fisheries in the sample and little information about large-scale fisheries. There are indications that compliance may be higher in larger-scale fisheries (Eggert & Ellegård 2003, Diekert et al. 2021), but the evidence is limited.

economics, give broad support to the assumptions of the 'enriched model':[16] compliance emanates from a mix of deterrence, personal moral, legitimacy, social factors and internalised behaviour – the traditional 'basic deterrence model' is a case of the map not matching the terrain.

[16] As an example from a type of regulation that is considered notoriously difficult to enforce, namely the discard ban, Diekert et al.'s (2021, p. 104381) large-scale survey among Norwegian fishers concludes as follows: 'For discarding, only 6 % gave "fear of formal punishment" as the main reason [for compliance], while the vast majority selected either "one should follow the law" (35 %) or "stock development and future income" (48 %) as main reason for their compliance decision.' Mackay et al. (2020) conclude in their laboratory experiment that both deterrence and nudges (positive reinforcement) have a positive effect on compliance, but that nudges are more effective when deterrence is low, less effective when deterrence is high.

Conclusions

Availability of compliance information

MSC assessment reports

Less than half of the MSC assessment reports analysed here contained quantitative information about compliance. These reports mainly base their conclusions on qualitative statements provided by management or enforcement agencies at the site visit. In some instances, conclusions were drawn from client statements, reference to previous assessments or surveillance reports for the same or comparable fisheries, or were presented without citation of a clear source.[17]

40 % of the reports have information that allows us to draw (some level of) conclusions on compliance *levels* (i.e. information about both number of infractions and number of total inspections is available to the assessment team). Notably, this information presented is generally not UoA-specific, and information presented tends to lack detail overall. In the sample of 50 assessment reports, it was not possible to identify any cases of more specific (quantitative) information than *overall* number of inspections and infringements in an area, most often the national EEZ in question; hence, it was not possible to discern compliance rates with specific types of regulations or by specific fleet segments (e.g. separated by nationality, target stocks or gear used).

There is sporadic evidence of triangulation of methods, mostly in a simplistic form where compliance levels inferred from inspection data are 'confirmed' at interviews during the site visit. In a handful of assessments, there is more active triangulation using inspection data, interviews and other available sources. Additional evidence used to support conclusions, in a very few cases, are reports from governmental agencies (e.g. Auditors General), academic literature and independent compliance studies commissioned by the fishery client.

Information from management and enforcement agencies

The review of information available from management and enforcement agencies shows that at least for some jurisdictions there is more quantitative data available than presented in the MSC assessment reports. In particular, that applies to EFCA with regard to fishing in EU waters (by EU and non-EU vessels). EFCA reports contain information about the total number of suspected infringements within each of the five JDPs, separated by inspecting member state and flag state of inspected vessels, and by a number of different infringement types (with the largest number of categories, 26, in the North Sea JDP). This allows for somewhat more detailed analysis than the data referenced in the MSC assessment reports: notably, it is possible to say something about compliance rates for different national fleets and separated by type of infringement. That said, we still do not get any information about compliance in specific fisheries, like for different target stocks, with different fishing gear or for different fleet segments, in other words: how an MSC UoA is defined. A further weakness is that the numbers are for *suspected* infringements; no information is available on the actual outcome of these cases.

In the non-EU countries in Europe, some inspection and infringement statistics are available in Iceland, Norway and the UK. The level of detail is highest in Iceland, where there is information on types of infringements, but not separated by type of fishery (target stock, gear, nationality etc.). In

[17] Notably, the availability of information seems to affect scores only to a limited extent, even though the v2.01 compliance SI (3.2.3c) is an information SI and not an outcome SI. The majority of fisheries considered in this study scoring 80, despite only some having quantitative information presented in assessment reports.

Norway and the UK, only overall numbers of inspections and infringements/sanctions are available. In the Faroe Islands and Greenland, no information on compliance is publicly available.

In North America, Asia and Oceania, there is a tradition of publishing lists of infringements or convictions, while information on number of inspections is more scattered. Based on information in MSC assessment reports, enforcement agencies in several countries provide MSC assessment teams with more detailed inspection data on request. This is especially the case in Canadian and US fisheries.

Compliance data from RFMOs are not studied in this report, but the main picture is that compliance reports from RFMOs are mostly about states' compliance with RFMO obligations and not about fishers' compliance with regulations.

The academic literature

The academic literature on compliance is almost exclusively based on surveys of different sorts (mostly quantitative, but also qualitative or ethnographic) among fishers, and to some extent stakeholder groups. Only 8 % of the articles in the sample studied here refer inspection and infringement data from public authorities.

Compliance levels

As emphasised above, information about compliance levels in the material reviewed for this report is very sporadic. It does not make sense to calculate average levels based on the scattered information referenced in the MSC assessment reports, by public authorities and in the academic literature. But a few tendencies are discernible.

In the MSC assessment reports, an infringement rate of 5-10 % is typically reported.

In the EFCA annual report for 2023, the average percentage of land-based inspections revealing suspected infringements across all JDPs is 4 % and the median 4.9 %. For at-sea inspections, the average was 7 % and the median 4.4 %. In other words, a similar picture is painted as in the MSC assessment reports, although it should be noted that these are *suspected* infringements, so the number of documented infringements will most likely be lower.

A strength with the information from EFCA is that certain patterns can be discerned with regard to *types* of infringements. For instance, underreporting appears to be the most prevalent infraction in the Baltic Sea and the Western Waters, while non-compliance with area and depth restrictions are the most widespread infringements in the Black Sea and the Mediterranean – and infringements are more diverse in the North Sea. We also note differences between member states; for instance, Belgium tends to have a high percentage of inspections revealing suspected infringements, while for the Baltic states the situation is the opposite. As noted in the section on the academic compliance literature above, however, this does not necessarily mean that actual compliance is low in the Belgium fleet and high in the Baltic fleet. It could also reflect that Belgian enforcement authorities are more effective in detecting violations than their Baltic counterparts are – this is the inherent dilemma in using inspection statistics to assess compliance levels.

In Norway, 2.6 % of inspections at sea revealed infractions that led to prosecution, while 7.6 % led to a verbal or written warning. In the most important fishing area, the Barents Sea, the corresponding numbers were 2.3 % and 7.6 %. 6.3 % of landing inspections led to verbal guidance, 4.8 % to written guidance, 0.8 % to a fine and 0.3 % to prosecution.

In Iceland, an infraction was determined to have taken place in 3.3 % of the land-based inspections, of which 1.4 % led to a sanction beyond warning (confiscation). However, as the total number of inspections used for this calculation only included inspections of pelagic landings, the real non-compliance rate will be lower if also demersal landings were included (since infraction numbers were for *all* landings). At-sea inspections are reported to be 'approximately 200' the last year, with only one infringement being detected.

In the UK, Marine Scotland reports an infringement rate (excluding less serious infractions which might have resulted in a warning, and more severe infractions leading to prosecution) of 9.4 %. The most common offenses were statutory returns offenses (2.6 % of inspections), fishing gear offenses (2.5 %) and fishing without authority (1.8 %).

In the scattered information from the rest of the world – which to a large extent is either information on convictions (without information on inspection rates) or information on number of inspections (without infringement rates) – we have seen a non-compliance rate of 1.5 % reported from the USA and 5-10 % in countries such as Australia and Canada. Again, we see a pattern which largely corresponds to the figures presented in the MSC assessments, and with a level of consistency across different states. The general trend is an overall infringement rate fluctuating around 5-10 %, of which 2-3 % are serious infringements leading to a sanction more severe than warning (fine, confiscation and prosecution).

The academic literature provides a corrective to this general picture. A large number of surveys from a variety of fisheries across the world strongly indicate that actual non-compliance levels are higher than reflected in official statistics, often in the region 30-60 %. While the validity of surveys can always be discussed, there is reason to believe that fishers generally do not *overreport* non-compliance and that surveys provide a more accurate picture than do inspection data by enforcement agencies. A relatively reliable rule of thumb may actually be Sutinen's (2023) conclusion from career-long studies of compliance in fisheries around the world, in particular in the US: 10-20 % of fishers in an average fishery would be persistent non-compliers, 10-20 % dedicated compliers and 60-80 % conditional compliers.

Issues of relevance for the further ERF review work

The following observations may be of relevance for the further review of the ERF, pertaining to PI 3.2.3:

- Most MSC assessment reports present no quantitative information on inspections and infringements, instead basing their conclusions on anecdotal accounts and confirmation from enforcement or management agencies. Where it is provided, quantitative information is typically presented at a very general level, most often the total number of inspections and infringements within a jurisdiction, not separated by the parameters used to define MSC UoAs: target stock, fishing gear and vessel types, or in a 'fishery' as understood by the MSC. This indicates that official statistics are of limited use in pinning down compliance in a specific UoA, but they can provide a piece in the puzzle when trying to understand compliance. The use of triangulation in the sample is limited, usually restricted to having inspection data confirmed by management agencies at interviews during the site visit. However, a few assessments provide more active and comprehensive triangulation of sources, including inspection statistics, interviews with different stakeholders, governmental reports, independent reviews and academic literature. This shows

that there is room for improvement in the large number of MSC assessments that do not include such triangulation and active use of diverse sources of information.

- In the European sample of management/enforcement agencies reviewed here, there is somewhat more information publicly available than used in MSC assessments, especially in the EU through EFCA. Again, there might be room for improvement for MSC assessment teams in actively searching for and referencing inspection/infringement statistics. However, this information is not UoA-specific either but generally refers to inspections and infringements within national jurisdiction (EEZs) or, for EFCA, larger ocean areas (the JDPs). Again, publicly available inspection statistics cannot provide any accurate picture of compliance in a UoA (or fishery), but they can contribute as one of several sources of information of relevance for understanding compliance in the fishery. In North America, Asia and Oceania, there is a tradition of publishing lists of infringements or convictions, while information on number of inspections is more scattered. Based on information in MSC assessment reports, enforcement agencies in several countries provide MSC assessment teams with more detailed inspection data on request. This is especially the case in Canadian and US fisheries.
- Survey data from academic studies presumably provide more valid and reliable data on fisher compliance than inspection statistics do, but even though the number of such studies has grown considerably in recent decades, and continues to grow, there is still not sufficient survey data available to supply MSC assessment teams with relevant data to any significant extent. Some surveys fit MSC assessments in terms of covering one or several specific UoAs, but most don't. Again, academic studies can support findings in MSC assessments. e.g. non-UoA-specific studies from the same region/jurisdiction as the UoA in question, or similar fisheries in other jurisdictions. This opportunity is under-utilised in the MSC assessments reviewed in this report, so there is room for improvement.
- This all points towards the conclusion that *more active triangulation of sources* should be used in evaluating compliance in MSC assessments, for two reasons: i) Currently, the information potential available is not fully utilised in MSC assessments; and ii) There is no one single source of information, e.g. public inspection/infringement statistics, which alone provides reliable information about compliance (as it is hardly ever UoA-specific and is of highly uncertain reliability). In an MSC context, inspection statistics has mistakenly tended to be perceived as the golden standard of information about compliance in a fishery, and lack of information as such in a specific fishery has often been ascribed to a lack of public inspection statistics. Bespoke, independent evaluations of compliance in a fishery could be considered a golden standard, but it will seldom be available to assessment teams*. The 'pragmatic golden standard' would be active, comprehensive and systematic triangulation of different sources of information, which together can provide a relatively valid understanding of compliance in the fishery*. This should be the path to pursue by the ERF Review Panel going forward.
- While the assessment of compliance *outcome* is beyond the remit of the Panel, this question cannot be seen in complete isolation from a review of the availability of compliance *information*. The main takeaway, especially from the academic literature, is that *full compliance in a fishery is an illusion*. Even far higher infringement rates than those found in MSC assessment reports and public statistics might actually not be that worrying; instead of reflecting an unusually high level of non-compliance, it might reflect an unusually high level of competence with the enforcement agency to reveal infringements. This points to the inherent dilemma of using inspection statistics as a measure of compliance and supports the conclusion in the last bullet point that public information statistics is not the golden standard as it is often perceived to be; instead, such numbers should be reviewed with a good pinch of salt and only be used as one of several pieces in the triangulation puzzle.

- Based on insights from the academic literature on compliance, the ERF/MSC approach to assessing compliance should move away from the pure deterrence model which to a large extent has been the basis for evaluating compliance in MSC assessments so far (although less explicitly in v3 than in v2). There is scientific convergence in the literature that the 'basic deterrence model' does not capture reality well. With its focus on personal moral, legitimacy, norms and standardised behaviour patterns (habit) as sources of compliance – in addition to deterrence – the 'enriched model' is better positioned for this purpose. (So are possibly also the more recent 'multidimensional models', which might be too fine-meshed for the limited review that it is possible to conduct in an MSC reassessment.) Followingly, issues that are assessed elsewhere under P3 – such as the general effectiveness of the management system, the availability of consultation mechanisms as well as mechanisms to secure the rights of people dependent on fishing – become part of the equation also in the assessment of compliance, as does the existence of robust enforcement, which is assessed in another SI under PI 3.2.3 (3.2.3a). Hence, the evaluation of compliance becomes a *holistic exercise* where whichever quantitative information on compliance exists, must be corroborated in interviews with *different* stakeholders and seen in light of the *overarching* management system and *fundamental* principles underlying fisheries management. The *legitimacy* of the system and regulations takes centre stage in such an analysis, to the extent information on that exists, e.g. in academic literature, or can be drawn from interviews with stakeholders during the site visit. Broader societal factors can also be brought into the discussion, such as the general legitimacy of the country's political system and the level of conflict between the state and non-state actors. Any available information believed to be able to support or provide nuance to an argument should be considered. The basic assumption is no longer that compliance can be *documented*, but that reasonable assumptions about it can be inferred from a *multitude* of information sources.
- The task ahead for the Review Panel with regard to P3 is to produce a methodology for such triangulation of information, whether that would fit into the general procedures of the revised ERF agreed for P2, a separate methodology included in the ERF or instead included in the Fisheries Standard.

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MSC assessment reports

Europe
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Cantabrian Sea purse seine anchovy fishery (Assessments Cantabrian Sea purse seine anchovy fishery - MSC Fisheries)
Curonian Lagoon perch (Assessments Curonian Lagoon Perch - MSC Fisheries)
Echebastar Indian Ocean purse seine skipjack tuna (Assessments Echebastar Indian Ocean purse seine skipjack tuna - MSC Fisheries)
FISF Faroe Islands North East Arctic cod, haddock and saithe (Assessments FISF Faroe Islands North East Arctic cod, haddock and saithe - MSC Fisheries)
ISF Icelandic summer spawning herring trawl and seine (Assessments ISF Icelandic summer spawning herring trawl and seine - MSC Fisheries)
North Atlantic albacore artisanal fishery (Assessments North Atlantic albacore artisanal fishery - MSC Fisheries)
North Sea brown shrimp (Assessments North Sea Brown Shrimp - MSC Fisheries)
Norway North East Arctic cod (Assessments Norway North East Arctic cod - MSC Fisheries)
SARPC toothfish (Assessments SARPC Toothfish - MSC Fisheries)
SATHOAN French Mediterranean Bluefin tuna artisanal longline and handline fishery (Assessments SATHOAN French Mediterranean Bluefin tuna artisanal longline and handline fishery - MSC Fisheries)
Scottish Fisheries Sustainable Accreditation Group (SFSAG) Rockall haddock (Assessments Scottish Fisheries Sustainable Accreditation Group (SFSAG) Rockall haddock - MSC Fisheries)
South Georgia Patagonian toothfish longline (Assessments South Georgia Patagonian toothfish longline - MSC Fisheries)
UK Nephrops - Irish Sea, West of Scotland, North Sea (Project UK | Marine Stewardship Council)
Venetian Wild Harvested Striped Clam (Venus Chamelea gallina) (Assessments Venetian Wild Harvested Striped Clam (Venus Chamelea gallina) - MSC Fisheries)
Wash brown shrimp (Assessments Wash Brown Shrimp - MSC Fisheries)

Western Asturias Octopus Traps Fishery of Artisanal Cofradias (Assessments Western Asturias Octopus Traps Fishery of Artisanal Cofradias - MSC Fisheries)
Oceania
Australia orange roughy - eastern zone trawl (Assessments Australia orange roughy - eastern zone trawl - MSC Fisheries)
Australia southern bluefin tuna purse seine fishery (Assessments Australia southern bluefin tuna purse seine fishery - MSC Fisheries)
New Zealand hake, hoki, ling and Southern blue whiting (Assessments New Zealand hake, hoki, ling and Southern blue whiting - MSC Fisheries)
Western Australia octopus (Assessments Western Australia octopus - MSC Fisheries)
Asia
Bratsk Reservoir perch (Assessments Bratsk Reservoir perch - MSC Fisheries)
Indonesia pole-and-line and handline, skipjack and yellowfin tuna of Western and Central Pacific archipelagic waters (Assessments Indonesia pole-and-line and handline, skipjack and yellowfin tuna of Western and Central Pacific archipelagic waters - MSC Fisheries)
Kochi and Miyazaki Offshore Pole and Line Albacore and Skipjack fishery (Assessments Kochi and Miyazaki Offshore Pole and Line Albacore and Skipjack fishery - MSC Fisheries)
Kyowa-Meiho Japan skipjack and yellowfin purse seine fishery (Assessments Kyowa-Meiho Japan skipjack and yellowfin purse seine fishery - MSC Fisheries)
Maldives pole & line skipjack tuna (Assessments Maldives pole & line skipjack tuna - MSC Fisheries)
Maruto Suisan rope grown Pacific oyster, Okayama fishery (Assessments Maruto Suisan rope grown Pacific oyster, Okayama fishery - MSC Fisheries)
Philippine small-scale yellowfin tuna (Thunnus albacares) handline fishery (Assessments Philippine small-scale yellowfin tuna (Thunnus albacares) handline fishery - MSC Fisheries)
Silla WCPO longline tuna fishery (Assessments Silla WCPO longline tuna fishery - MSC Fisheries)
Tymlat Karaginsky Bay salmon fishery (Assessments Tymlat Karaginsky Bay salmon fishery - MSC Fisheries)
Vietnam Ben Tre clam hand gathered fishery (Assessments Vietnam Ben Tre clam hand gathered fishery - MSC Fisheries)
Africa
Capsen & Grand Bleu Atlantic Ocean purse seine skipjack and yellowfin tuna fishery (Assessments Capsen & Grand Bleu Atlantic Ocean purse seine skipjack and yellowfin tuna fishery - MSC Fisheries)
Namibia hake trawl and longline fishery (Assessments Namibia hake trawl and longline fishery - MSC Fisheries)
South Africa hake trawl (Assessments South Africa hake trawl - MSC Fisheries)
Tristan da Cunha rock lobster (Assessments Tristan da Cunha rock lobster - MSC Fisheries)

Americas
Alaska salmon (Assessments Alaska salmon - MSC Fisheries)
Argentine red shrimp (Pleoticus muelleri) coastal trawling fishery in waters of Province of Chubut (Assessments Argentine red shrimp (Pleoticus muelleri) coastal trawling fishery in waters of Province of Chubut - MSC Fisheries)
Canada Atlantic halibut (Assessments Canada Atlantic halibut - MSC Fisheries)
Cedar Lake Walleye and Northern Pike Fisheries (Assessments Cedar Lake Walleye and Northern Pike Fisheries - MSC Fisheries)
Chile Austral hake (Merluccius australis) trawl and longline (Assessments Chile Austral hake (Merluccius australis) industrial trawl and longline - MSC Fisheries)
Chilean Jack mackerel industrial purse seine fishery (Assessments Chilean Jack mackerel industrial purse seine fishery - MSC Fisheries)
Eastern Pacific Ocean tropical tuna - purse seine (TUNACONS) fishery (Assessments Eastern Pacific Ocean tropical tuna - purse seine (TUNACONS) fishery - MSC Fisheries)
Maritime Canada inshore lobster trap fishery (Assessments Maritime Canada inshore lobster trap fishery - MSC Fisheries)
Small Pelagics Fishery in Sonora, Gulf of California (Assessments Small Pelagics Fishery in Sonora, Gulf of California - MSC Fisheries)
Suriname Atlantic seabob shrimp (Assessments Suriname Atlantic seabob shrimp - MSC Fisheries)
The Bahamas spiny lobster fishery (Assessments The Bahamas Spiny Lobster Fishery - MSC Fisheries)
US West Coast limited entry groundfish trawl (Assessments US West Coast limited entry groundfish trawl - MSC Fisheries)
US Atlantic surf clam and ocean quahog (Assessments US Atlantic Surfclam and Ocean Quahog - MSC Fisheries)
US Gulf of Mexico menhaden (Assessments U.S. Gulf of Mexico menhaden purse seine - MSC Fisheries)
US Atlantic spiny dogfish, winter skate and little skate (Assessments US Atlantic spiny dogfish, winter skate and little skate - MSC Fisheries)