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Monitoring Fishing Mortality Compliance in Norwegian Offshore Fisheries

by

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Abstract

Sustainable management of wild fish stocks by means of catch quotas requires reliable data on fishing mortality. Norwegian authorities have attempted to ensure the reliability of this data through catch report procedures and a ban on dumping. The reliability of data on fishing mortality depends on the fishers' compliance with these regulations. This article outlines the main factors that govern compliance and non-compliance in the Norwegian pelagic fisheries. Data was generated during fieldwork in the offshore pelagic fishing fleet.

Keywords: Management, compliance

1. Introduction

A continuous growth in the human fish harvesting capacity has paved the way for attempts to regulate human extraction from wild fish stocks by means of scientifically-based catch quotas. The efficiency of this management strategy depends on adequate monitoring of fishing mortality¹ in order to estimate stock size accurately and properly restrict harvesting [1]. This data must be provided by the fishing industry itself, and its reliability depends on fishermen's compliance.

Today's fisheries management regimes are young, and so is the research on fishermen's compliance. Early studies of compliance in fisheries were inspired by neo-classical economics, regarding fishermen's choices as results of individual calculations of risks, costs and expected benefits [2,3,4,5], while more recent surveys have included normative factors [6,7,8,9]. A few qualitative studies have also addressed fishermen's perceptions of the causes of compliance [10] and the role of morality and informal social control in inshore fisheries [11,12]. However, qualitative data on the factors influencing compliance in the offshore fishing fleet is still scarce.

This article addresses Norway's experience with the monitoring of fishing mortality in the pelagic offshore fisheries. I will start with a review of the regulatory regime set in place to ensure valid data on fishing mortality, and will subsequently outline the main explanatory factors in terms of compliance and non-compliance with these regulations. I will address cognitive factors, such as social norms and knowledge, and the specific conditions for action that create incentives for compliance or non-compliance. I will finally suggest some lessons for fisheries management and research.

2. Methodological Approach

The causal chains influencing compliance with the regulations addressed here are often complex, closely related to the practical aspects of fishing, and have not been explored systematically in empirical research. The aim of this study is to provide in-depth knowledge on this issue, and I have consequently generated data through fieldwork on board five offshore purse seiners in 2003 and 2004, covering their main fisheries: herring, mackerel and blue whiting. The study's concern with normative factors and social control suggested focusing on a social network of fishermen. All vessels consequently come from the same community, and interact with each other frequently. The five vessels are thus studied as a single case: a group of professional fish harvesters subject to government regulations. Most of the data consists of repeated semi-structured and informal interviews with

skippers and net bosses and, to some extent, other crewmembers, in addition to observations of fishing and interaction practices. Individuals, companies and vessels were guaranteed confidentiality, and as a minor addition to this I have given their home community the fictional name of “Seaborn Hills”.

3. The Regulatory Regime

The major Norwegian fisheries, including herring, mackerel, capelin and most cod fisheries, harvest from stocks that are managed by total allowable catches (TACs)² set in bilateral or multilateral negotiations, based on quota advice provided by the International Council for the Exploration of the Sea (ICES) [14]. The Ministry of Fisheries divides Norway's share of the TAC into group quotas for the various fleet sectors. In most major fisheries, including cod, saithe, herring, mackerel and capelin, the Ministry of Fisheries also sets quotas defining the maximum catch of individual vessels.

The regulatory measures that aim to provide adequate data on fishing mortality can be divided into two main groups. First are regulations requiring fishermen and fish buyers to report all fish landed. Whenever and wherever a Norwegian fishing vessel lands fish, the buyer and the fisherman are required by law to weigh the fish, and subsequently complete a sales note containing correct information on the quantity of each species landed, the size range, the time and place of the catch, and the gear type [15]. Abstaining from this procedure or falsifying data is illegal and subject to legal prosecution.

The sales note is sent to the fishermen's sales organisations immediately after the fish has been landed, and the sales organisation subsequently pays the fisherman. The sales organisations have been granted a legally-protected monopoly on first-hand trade of fish in Norway since 1938, and Norwegian fishermen can only land fish to buyers that operate through sales organisations and are registered by Norwegian authorities. The sales organisations also regulate Norwegian vessels' landings abroad [16,17]. This means that data on all fish landings is processed through a central system that provides government agencies with data.

As a measure of control, Norwegian vessels over 13 metres are required to keep logbooks containing data on the quantity of each species caught, the time and location of the catch, and the gear type. The logbook must be kept up-to-date, and always completed before the vessel calls at harbour. It must also be kept on board for at least two years afterwards [18,19]. The logbook regulations aim to increase the risk of detection connected with a plan to falsify sales note information. A fisherman can be prosecuted and convicted if he violates logbook regulations intentionally or carelessly [20]. The

principle of due care is enforced strictly by Norwegian courts in relation to the logbook regulations, and borders on a practice of strict criminal liability [21].

Second are regulations that have been established to ensure that all fish killed is also landed. The Norwegian policy of banning dumping started in the late 1980s and has been expanded gradually, covering all major commercial fisheries in waters under Norwegian jurisdiction today. The general principle is that vessels are under legal obligation to land all fish made incapable of survival as a result of fishing. There is consequently a ban on discarding, as well as a ban on releasing dead or dying fish [22,23,24].³ This means that fishermen are required to land and report all catches even when the catch is illegal. In such cases the value of the illegal catch is confiscated, but the fisherman does not risk legal sanctions unless he was obviously careless, and he receives regular pay for the legal part of the catch [20,25].⁴ Neither does he risk the confiscated catch being deducted from future quotas. The purpose of this set of regulations is to remove the incentive to dump, without creating an incentive to fish illegally. In cases where a fisherman is caught attempting to conceal illegal catch by dumping or to make a profit by falsifying sales note and logbook information, the catch value is normally confiscated, as part of regular legal punishment, in addition to a fine. The Directorate of Fisheries has also used the administrative sanction of temporary withdrawal of fishing licenses to some extent in recent years as an alternative to prosecution through the court system [26,27,28].

Enforcement tasks are split between three agencies. The Coast Guard is responsible for surveillance and enforcement at sea. It boards fishing vessels and compares logbook and sales note information as a matter of routine, and is also responsible for detecting and reporting instances of dumping. The Directorate of Fisheries, which is a unit under the Ministry of Fisheries responsible for enforcement and the technical aspects of fisheries management, carries out dockside inspections where it checks logbooks and sales notes. It also carries out random checks of fish buyers' accounts and inspects their warehouses. The fishermen's sales organisations are granted responsibility for monitoring quota regulations and confiscating catch exceeding the vessel quota. They are also required to report detected violations of fisheries law [29].

4. The Purse Seine Fishing Fleet

The catch of the Norwegian fishing fleet, including groundfish, shellfish and pelagic species, amounts to approximately 2.6 million metric tonnes annually. About 75% of this consists of pelagic species, mainly blue whiting, herring, capelin and mackerel. The pelagic fishing fleet lands catch

worth between NOK 3-5 billion annually, which represents around 40% of the total catch value in Norwegian fisheries [30]. The pelagic fisheries are dominated by a little less than 90 offshore purse seiners, which lands approximately 75% of pelagic fish catches [31,32].

The offshore purse seiners thus account for a major part of Norway's fish catches. This fleet participates in a variety of fisheries in an area stretching from international waters west of Ireland to waters off Novaya Zemlya in the Barents Sea. Trawling for blue whiting and seining for herring, mackerel and capelin normally constitute the fleet's main fisheries, but capelin has been of minor importance in recent years due to the poor condition of the Barents Sea capelin stock.

Seaborn Hills is one of Norway's main pelagic fisheries municipalities, with a fleet of 24 modern offshore purse seiners. This community of no more than 4,500 inhabitants is largely built on fisheries, and almost half its workforce is employed in fisheries-related activities. The purse seiners form parts of local, largely family-owned, limited companies, and skippers and net bosses are often family members and shareholders in the companies. Kin or other personal ties, as well as personal reputation, play a major role also in the recruitment of contract skippers and other crew members. It is common for the administrative tasks on shore to be carried out by owners, often retired skippers and net bosses, with relatives on board.

The fisheries are consequently intimately linked to the general social life in Seaborn Hills. Fishing news is exchanged and discussed wherever people meet, and spreads quickly among the community on shore. A fisherman's actions and performances at sea affect his general standing in the community, providing an incentive to comply with behavioural norms.

A purse seiner crew normally consists of eight to ten people, and includes the skipper, net boss or mate, bosun, chief with two assistants, steward and a couple of fishermen. They are all employed on a share basis. The crew members have one share each, normally between 2 - 2.4% of the catch, minus fuel expenses when trawling, and the skipper and the net boss have two shares each. This fleet has constituted the most profitable segment of the Norwegian fish harvesting industry in recent years [33]. The fishing companies of Seaborn Hills are consequently not under great economic pressure, and a regular crew member earns nearly twice the average Norwegian wage.

The skipper is the formal head of the vessel, and is ultimately responsible for the vessel and the crew. He writes the logbook, signs the sales note, and is legally responsible for the actions of the ship. Formally, the net boss leads the fish searching and fish catching operations, but in practice the skipper

and the net boss usually function as a management team that makes most decisions by consensus. The fishing companies play a minor role in terms of decisions made at sea, but there is daily contact between the skipper and the company administration, and dialogue on general issues, such as which fisheries to participate in next. Conflicts are rare, as the skipper and the company have a common interest in fishing as efficiently as possible and in avoiding conflicts with the enforcement authorities. The company runs a great risk of having significant values confiscated when one of its skippers is convicted of an offence.

A Seaborn Hills purse seiner is normally 60 - 70 metres long, and has a loading capacity of 1,200 - 1,800 tonnes. The technical aspects of purse seining and pelagic trawling have been described elsewhere [34], and I will only outline the relevant working operations here. In purse seine fisheries, catchable schools of fish are located by means of sonar and sounder equipment. The vessel circles above the school while estimating its size, direction and speed. The seine, which is about 200 metres deep and 800 metres long in herring fisheries, is shot in a circular starboard manoeuvre around the school, and subsequently pursed up at the bottom forming a large closed bag leaving the fish unable to escape. The gear is non-selective, meaning that e.g. small fish and by-catch are not sorted out during the seining operation. The seine is taken on board using hydraulic winches, until the fish is concentrated in a small bag at the starboard side. A vacuum pump is subsequently lowered into the bag, pumping the fish directly into the vessel's tanks, where it is kept until delivery. The tanks are filled with circulating water kept at freezing point, ensuring maximum quality and, consequently, the best possible price at delivery. During the pumping operation, the fishermen take samples of the fish, estimating the average weight and quality. Data on quantity and quality is subsequently reported to the auction of the Norwegian Fishermen's Sales Organization for Pelagic Fish. The auction is held while the vessel is still at sea, and the sales organisation subsequently directs the boat to the highest bidder.

The pelagic stern trawl used in the blue whiting fisheries is about 600 metres long with an opening of 10 - 20,000 m², and equipped with sensors that roughly indicate the amount of fish caught. The cod end is capable of holding near 600 metric tonnes at the most, but the fishermen generally try to remain below this limit in order to avoid wrecking their gear. There is no gear for sorting out by-catch when trawling for blue whiting today. When heaving the trawl, the cod end floats to the surface due to a fall in pressure. It is then towed along the side where the pump is lowered into the cod end, pumping the catch directly into the tanks, where it is cooled down.

In both seine and trawl fisheries, all operations involving the physical handling of fish are visible from the bridge, and there is no processing on board. This gives the skipper a full overview of all working operations relevant to compliance.

5. Cognitive Factors

Several shared perceptions and behavioural norms are relevant to compliance among this group of fishermen. First, the fishermen are generally concerned with the fisheries' effect on the fish stocks. They regard fisheries regulations and control as necessary, and the common view is that it is not acceptable to deliberately kill fish unnecessarily. Such carelessness is sometimes referred to as an attitude from the old days and the previous generation of fishermen. The fishermen strongly support the Norwegian ban on fish dumping.

Second, there is a perceived moral obligation to obey the law. Some fishermen express a personal commitment to this norm while others do not, but it is clearly a factor in matters of collective moral judgement. Law-abidingness is an important part of the Norwegian image of the "good citizen", and this sense of moral commitment has also been documented in a previous study of compliance in Norwegian fisheries [11]. It is symptomatic of this identity that Seaborn Hills fishermen perceive themselves and their Norwegian colleagues to be much more law-abiding than foreign fishermen. The law is consequently also perceived as a set of valid rules in terms of competition among vessels. Gaining a competitive advantage through illegal means is generally regarded as unfair play.

Third, there is a pervasive norm of reciprocity. Favours are offered with a tacit expectation that they will be returned on a later occasion. It is quite common for surplus to be given to other vessels. This catch is never exchanged for money, but is tacitly turned into a mutually understood obligation to reciprocate on a later occasion. Surplus catch thus has value as an investment for the future once given to another vessel, greatly reducing the incentive to dump catch. The general norm of reciprocity is accompanied by a general expectation that one shows a certain consideration for others, for instance when there is a surplus.

The skipper's responsibility for the security of the crew and the vessel may occasionally be perceived as justifying violations of fisheries law. For example pumping surplus catch from the seine of another vessel may imply a risk of collision in rough seas, and catch may thus occasionally be dumped for security reasons.

In addition to the normative factors, the fishermen also emphasised the risks and costs of being detected by enforcement agencies. The fishermen generally consider the consequences of detection to be severe. The economic burden of the fine is the main factor in this respect. The perceived risk of detection varies in relation to the regulations governing reporting fishing mortality. Failing to keep a logbook updated is perceived as entailing a genuine risk of detection, while dumping is perceived as implying very little risk.

6. Conditions Influencing Compliance

6.1 Sales Note Regulations

When the vessel arrives at the fish processing plant, the catch is pumped out of the tanks and weighed immediately. The buyer is required to have officially-approved scales with a display at the wharf so that the skipper can remain updated on how much is unloaded. The buyer is required to complete a sales note immediately after the catch has been unloaded, which must be signed by both the buyer and the skipper. In the case of catches landed in Norway, the fisherman and the buyer are jointly responsible for completing the note correctly. When landing catches abroad, the fisherman has sole responsibility for this task [15].

If a fisherman wants to conceal information about his catch, he must cooperate with a buyer to falsify the sales note. One of the most familiar incentives for falsifying sales notes relates to the practice that fishermen used to refer to as delivering “the big hundred”. When fishermen found themselves in inferior bargaining positions vis-à-vis buyers due to competition on delivery, maintaining one’s good relationship with buyers, and thus one’s competitiveness at auction, could be achieved through a willingness to deliver a certain amount of fish for free. Today, there is still an incentive to do deliver “the big hundred” in fisheries that are regulated by vessel quotas. If a fisherman calls a potential buyer prior to the auction and offers him a certain amount of fish for free in return for a better price on the official part of the catch, the buyer may offer a better price than other bidders at the auction, without jeopardising his profit margins, while the fisherman gets more out of his quota by exceeding it with a certain unregistered amount.

However, the current catch-monitoring regime, which was established in 1990, has made it much more difficult for fish buyers to receive and trade in unregistered fish [35,36]. Buyers are now required to weigh and report catches accurately, and the Directorate of Fisheries’ unannounced

inspections and random checks of accounts represent a genuine risk of detection. The fishermen report that during the 1980s, when buyers were not subjected to legal sales note and weighing regulations, buyers normally demanded that they delivered a certain amount for free, but that the practice of delivering the big hundred is now mostly gone. A previous study of inshore fisheries showed that coastal seiners faced this phenomenon to a certain extent in the mid-1990s, but the problem was reportedly diminishing and was at that time no longer something that fishermen felt they were forced to do in order to sell their catch [37]. Interviews and observations of gossip among Seaborn Hills purse seine fishermen show that delivering the big hundred is not generally accepted, but transgressors do not appear to be condemned harshly and they are not likely to be met with sanctions beyond gossip. One possible explanation for this may be that many fishers have a past in terms of delivering the big hundred, and most fishermen recall a time when this was common practice in the fleet.

6.2 Logbook Regulations

The main purpose of deliberate falsification of catch data in the logbook is to conceal falsification of sales notes. The incentive to falsify logbooks has been reduced, as the practice of delivering the big hundred is dwindling in the pelagic sector. However, there is a significant risk of violating logbook regulations unintentionally, and strict enforcement practices mean that fishermen may find themselves criminally liable, even though they never intended to falsify catch data. The enforcement instructions of the Coast Guard and the Directorate of Fisheries are not available to the public, but a number of court cases give a fair indication that a fisherman is normally considered to have shown “due care” if the discrepancy between the logbook and the sales note is under 10%. In purse seine fisheries, it appears that the limit is somewhere around 15%. Greater errors than this entail a risk of being prosecuted and convicted even in the absence of likely criminal intent [21].⁵ The interviewees generally think that a 10 % discrepancy between the sales note and the logbook is their limit for criminal liability.

Inaccurate estimation of the weight of the catch is a major cause of unintended violations of logbook regulations. Fishermen estimate the weight after the catch has been pumped into the tanks. When fishing for human consumption, boats carry loads well below their total loading capacity, as the fish must be cooled down, delivered and iced quickly in order to ensure maximum quality and thus the best possible price. This means that all cooling water can often be kept on board while loading fish. The volume of the catch can consequently be estimated by measuring the change to the water levels in

the tanks. At this stage, water that is pumped into the tanks along with the fish represents the main source of inaccuracy. The weight is calculated by multiplying the change of volume with a factor reflecting the weight of fish relative to water. At this stage, the main source of inaccuracy concerns the choice of factor, as the correct figure will vary according to the fat content of the fish. I observed incidents of miscalculation close to 10% when this method was used. When the loads are too great to keep all the coolant on board, the volume of the catch is estimated by sounding the tanks. The accuracy of this method depends on the fish having sunk properly. This is mostly a problem for herring, which needs about 24 hours to sink. A high fat content and rough seas will increase sinking times, and it is also more difficult to sound tanks with small amounts of fish. Once the volume has been estimated, the weight is calculated by the same use of weight factors as described above. This method is less secure than the first one, as it is harder to generate an accurate figure for catch volume. The fishermen emphasized that sounding tanks required much experience, and that they had often missed by significantly more than 10%. The purse seiners are allowed to correct logbook information until the point when they call at harbour, and the principle of due care requires that they spend the time necessary in calm waters for the catch to sink properly. However, this may imply a significant loss of fishing time, so there is an incentive not to do this.

The second main problem concerns the buyers' scales. The fishermen reported that the scales of the different buyers vary systematically. Some of them claimed that certain buyers misadjust the scales on purpose in order to steal catch, and a fish buyer was prosecuted recently [38]. This means that if a skipper has entered a correct catch estimate in his logbook, the extent to which the logbook squares with the sales note depends on where he lands his catch. The fishermen know which buyers tend to give a poor weight, and some fishermen report that they consequently adjust their logbook according to the place of delivery. This means that skippers sometimes falsify logbook information for the sole purpose of avoiding unjustly being reported for such falsification.

The principle of due care requires that fishermen monitor the weighing procedure personally. If they disagree with the weight, they must add a note to the sales note explaining why they have not signed it. They are also expected to contact the Directorate of Fisheries immediately, automatically triggering a review of the buyer. If these procedures are not followed, the skipper may find himself liable for the discrepancy between the logbook and the sales note [27]. There are two reasons why fishermen hardly ever follow this procedure. First, fishermen are vulnerable to a poor reputation

among buyers, as it affects prices achieved at the auction. No skipper wants to be seen as suspicious or troublesome in any way. Second, fishermen are largely unaware of the procedures involved in avoiding liability.

When asked what regulations cause them the most problems, the fishermen most frequently answered estimating the weight of the catch. The fact that the fishermen have quite clear ideas as to which buyers give a poor weight indicates that they have some confidence in their own catch estimates. However, accurately calculating the weight is difficult under certain conditions, such as when fishing herring with a short distance to delivery.

6.3 Dumping Regulations⁶

Fish can be released legally up to a point where it is no longer capable of survival, but where this point is exactly, is subject to discussion. Until recently, the regulations stated that catch cannot be released after pumping has begun under any circumstances. In practice, the Coast Guard only enforced this final limit, and the fishermen perceived releasing fish prior to this point to be legal. This formulation was consequently removed in the mackerel fisheries in 2004, and the enforcement authorities reacted to instances where catch was released after the fish had been concentrated to the point where it began jumping in the seine [27,28].

In fisheries regulated by vessel quotas, there is an incentive to high-grade catches in order to get the best possible price. Sounder and sonar gear do not yield information on fish size and quality, so data can only be provided by bringing samples of fish on board. However, this can normally only be done at the pumping stage, when the fish is severely weakened. If the fish proves to be of poor value, there may be an incentive to release the entire catch, as the loading system of the purse seiners removes the possibility of sorting it. Except for the relatively minor quantities flushed into the sea when the deck is cleaned after loading, dumping usually occurs by releasing dead or dying fish before it is brought on board.

When fishing for human consumption, quality requirements mean that the vessels only have a day or two left on the fishing ground after they have loaded the first catch of the trip. This means that making a small first catch may ruin the entire trip unless the vessel manages to make another catch soon. Such poor catches can be released legally provided that the skipper realises the situation early in the seining operation. However, sometimes the skipper does not have a full overview until the pumping has began.

There is no incentive for high-grading in fisheries without vessel quotas, but these fisheries are often highly competitive, as there is significant prestige associated with being a top ranking boat. When there is much fish, there may also be competition for delivery. Time is a critical factor in both cases, meaning that sometimes there is an incentive to release catch instead of losing fishing time giving away the surplus.

The risk of accidentally having the seine or the cod end torn or lost due to excessive catch is in addition to the reasons for dumping catch deliberately. The principle of due care makes the skipper responsible for the size of his catch in this respect, which means that he may in principle be liable for incidents of unintended loss of catch [22]. However, the concept of due care has not been adequately defined with regard to unintended dumping, and in practice this principle has yet to be enforced.

Acts of illegal dumping are generally difficult to prove. Identifying the transgressor is virtually impossible unless the act is observed directly, and dumping may be hard to detect in the dark even by nearby vessels. This has resulted in an absence of court cases related to dumping of catch in purse seine fisheries [22,27]. The low risk of detection also reduces the risk of informal social sanctions from colleagues on other vessels, and I have no data to suggest that there is a practice among regular crew members to show concern in matters of compliance. This largely makes dumping a matter of the skipper's personal conscience. The fishermen generally believe that they should try not to catch more than they need or are able to give others, but they have diverging practices when they accidentally catch more. Some express a strong personal commitment not to waste resources or break the law by dumping catch, and also display a strict practice on board, while others show a lesser degree of internalised obligation and occasionally release catch illegally.

Social control is more efficient with regard to the norm of reciprocity. The obligation to return favours enables a vessel to turn otherwise useless surplus catch into outstanding debt, ensuring future access to surplus catch and information, as well as smooth organisation on the fishing ground. This creates a significant economic incentive to give away catch instead of dumping it. There is no legal ban on dumping blue whiting in international waters, but observational data and interviews confirm that it is common practice to offer surplus catch to colleagues in these situations as well, which indicates that this informal system of exchange prevents dumping, independently of legal factors.

However, mackerel constitutes a special case in terms of incentives to dump. Norwegian purse seiners mostly land mackerel for the quality-conscious Japanese market, and the prices are extremely

sensitive to quality. This has two consequences whose combined effect sometimes creates an incentive to dump. First, high quality requires that fish is loaded and cooled down quickly on the fishing ground. This means that fish buyers generally are not interested in buying mackerel that has been pumped from the seine of another vessel, as this fish is likely to have spent some time dead in the seine. The system of catch exchange described above is thus practically non-existent in these fisheries. Second, the catch must also be unloaded quickly which means that the vessels will only load moderate amounts of fish. In addition comes the previously mentioned problem of estimating the catch size accurately early in the seining operation. These factors lead to the potential problem of being stuck with catch that one is not keen on loading, as it will affect the price negatively, and that no other vessel is willing to take, as they can hardly sell it. In such situations the incentive to dump catch may be significant. Dead mackerel sinks immediately, and dumping implies less risk of detection than in the herring fisheries. Observations of dead mackerel on the ocean floor have received much public attention in recent years, and the issue has been given increased priority by enforcement agencies. The Coast Guard reported one Norwegian and one foreign purse seiner for dumping mackerel in the autumn of 2004 [28,40].

It may seem paradoxical that some interviewees are willing to occasionally dump catch, while never considering landing fish on the black market. The differences in the risk of detection may explain why, but dumping differs from sales note falsification in morally significant ways as well. Deliberate falsification of sales notes is a premeditated crime, committed in order to increase revenues beyond that which is possible by legal means. Dumping is rarely planned in the purse seine fisheries,⁷ but usually emerges as an ad hoc strategy to prevent revenues from falling below what one attempted to achieve legally. When a moral obligation to obey the law places a limit on the income a fisherman legitimately can pursue, falsification of sales notes signals disrespect of this limit to a greater extent than dumping. Landing fish on the black market may thus easily be associated with greed, while dumping may be perceived as being compatible with morally acceptable economic goals. A study of compliance among Norwegian inshore fishermen revealed that violations committed for the purpose of ensuring a moderate economic outcome were much more likely to be excused than violations perceived as motivated by greed [11].

7. Lessons for Management and Research

More efficient regulations and enforcement have greatly reduced the practice of falsifying data on fish landings in Norway's pelagic offshore fisheries, and it appears there has also been a change in fishermen's attitudes in favour of compliance. On the other hand, the risk of unintentional logbook errors and the courts' strict interpretation of the principle of due care may possibly imply a danger of criminalising fishermen without a criminal intent and who have not been careless by regular moral standards. Maintaining today's level of control, while interpreting the principle of due care more leniently in logbook matters, may arguably ensure adequate data on fish landings while reducing the chance of unnecessarily criminalising fishermen.

As regards dumping, the risk of being detected by enforcement authorities and other fishing boats is negligible today, and vessel quotas and quality conscious-markets potentially provide significant incentives to release catch illegally. Compliance largely depends on the extent to which the skippers have internalised moral norms prohibiting dumping, and the incentives that are created by the informal system of catch exchange that can be found in all fisheries except mackerel. Development of gear for taking catch samples at an early stage in the seining operation would in many cases remove the incentive to dump, as fish of poor economic value may be released while it is still viable. If such gear is supplemented with technology allowing reasonably accurate estimates of catch size early in the seining operation, the Norwegian pelagic fisheries will likely be close to a reliable system for monitoring fishing mortality.

The methodology of this study is suited to description and analysis of the complexities of real life situations, rather than assessing the relative influence of abstract variables such as "deterrence" or "moral conviction". That said, the general findings of this study are in line with those of previous research documenting the importance of rational self-interest as well as normative considerations in matters of fishermen's compliance [6,7]. I want to emphasise that norms and rational self-interest must not necessarily be considered as competing explanatory factors. We have for instance seen that norms of reciprocity in many cases create economic incentives not to dump surplus catch. In that case, compliance results from rational self-interest embedded in a normative system. Theories of rational choice and normative action may not only be fruitfully combined but also integrated in explanatory models of compliance.

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Notes

¹ Fishing mortality is the “mortality imposed on a stock, stock complex or population as a result of fishing” [13].

² The TAC is a catch quota which defines the total amount that can legally be harvested from a certain fish stock.

³ The ban on dumping is supplemented with regulations, such as for instance closed areas, aimed at reducing the risk of getting illegal catch.

⁴ Fishermen in the groundfish sector may receive some compensation (20% of value of the illegal catch) for bringing the catch in, provided the violation was obviously unintended. However, this regulation no longer applies to pelagic fisheries.

⁵ Enforcement tends to be more lenient when the amount is over-estimated in the logbook, as a plan to deliver catch to the black market implies under-reporting catch [27].

⁶ There is no exact knowledge on the extent of dumping in Norwegian fisheries. It is known that it occurs, but quantification has only taken the form of informed guesses [39].

⁷ In groundfish fisheries, high-grading often takes the form of systematically sorting the catch on board and discarding catch of lesser value. It thus does not have the ad hoc nature of dumping in purse seine fisheries.