



UiT The Arctic University of Norway

Faculty of Biosciences, Fisheries and Economics

## **FISHERIES COLLECTIVE ACTION IN THEORY AND PRACTICE**

A study of the Dutch brown shrimp fishery

N.M. (Noor) Visser

Master's thesis in International Fisheries Management, FSK-3910, May 2021.



## **Abstract**

Inspired by Ostrom's *Governing the Commons* (1990), this thesis examines fisheries collective action in the Dutch brown shrimp fishery. The study was conducted as a qualitative case study, with semi-structured interviews and an analysis of literature and secondary sources as the main research methods. Taking the perspective of the appropriators, the main collective action problem turned out to be related to market stabilisation, instead of resource conservation. Parallel to state regulation, two collective self-governance mechanisms were observed in this fishery: the MSC plan for resource conservation and the Production and Marketing Plan (PMP) for market stabilisation. One of the findings of the study is that the competition of the multiple producer organisations on the favour of the fishers currently hinders the operation of the PMP, as the producer organisations are responsible for monitoring and sanctioning of their members. The thesis challenges the fisheries paradigm that resource conservation will automatically create a stable income for fishers, as in this case, market stabilisation posed a separate collective action problem next to the collective action problem of resource conservation. Furthermore, it encourages fisheries scientists to take a more critical approach towards the application collective self-governance in fisheries management, as well as to discuss fisheries collective action in the light of market competitiveness, as collective action has the potential to create a 'monopoly fishery', but that this does not necessarily has to be the case.

## **About**

This document is written as a Master Thesis in the discipline of International Fisheries Management. A preparatory course was taken in Autumn 2020 (FSK-3551 Mini Research Project, 10 ECTS), the main course was taken in the spring semester (FSK-3910 Master Thesis IFM, 30 ECTS). The thesis was supervised by prof. Peter Arbo and Maaïke Knol-Kauffman PhD.

## **Acknowledgements**

During the process of writing my thesis I have received a great portion of support and assistance. I would like to thank my supervisors, prof. Peter Arbo and Maaïke Knol-Kauffman PhD, for guiding me through the process and for always encouraging me to step up. Thank you, Luc van Hoof, for your support and your sharp and funny comments on my drafts. Thanks to the participants of the interviews, for taking the time to show me around in the world of brown shrimp fishing. Thanks to Wageningen Economic Research for sharing data on the economics of the Dutch brown shrimp fleet. I'm also grateful for having colleagues around who are always in for an informal brainstorm, thank you Arie Mol, Pieke Molenaar and Nathalie Steins amongst others. Finally, thanks to my dear family, friends, and Moritz, for support and cheers during this journey.

## **Abbreviations**

ACM – Netherlands' Authority for Consumers and Markets

APO – Association of Producer Organisations

CFP – EU Common Fisheries Policy

CMO – EU Common Market Organisation in Fishery and Aquaculture products

CPR – Common Pool Resource

EC – European Commission

EU – European Union

FAO – United Nations Food and Agriculture Organisation

GK licence – Shrimp fishing licence for the Dutch Wadden Sea and North Sea coastal zone

GV licence – Shrimp fishing licence for the Dutch North Sea coastal zone

HRC – Harvest Control Rule of the MSC plan

ICES – International Council for the Exploration of the Sea

LPUE – Landings Per Unit Effort

(Ministry of) LNV – Netherlands' Ministry of Agriculture, Nature and Food Quality

MSC – Marine Stewardship Council

NB licence – Licence to fish for brown shrimp in N2000 protected areas

NMa – Netherlands' Authority for Competition (after 2013 merged into ACM)

NSD - Norwegian Centre for Research Data

NVWA – Netherlands' Food and Consumer Product Safety Agency

PMP – Production and Marketing Plan

PO – Producer Organisation

TAC – Total Allowable Catch

TFEU – Treaty on the Functioning of the European Union

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# 1 Introduction

## 1.1 Fisheries management and the case of brown shrimp

Fisheries are often named as one of the settings in which a ‘Tragedy of the Commons’ is conceivable to occur (Hardin, 1968; Ostrom, 1990; Steenbergen et al., 2017). The Tragedy of the Commons concept refers to the situation in which all appropriators act in their personal short-term interest and try to gain as much from a resource as possible, notwithstanding that this will lead to great inefficiency in the resource use and potentially resource depletion in the long run. Effective fisheries management is seen as the key to conserve and rebuild fish stocks (FAO, 2020; Hilborn et al., 2020), which in turn will also benefit the fishers (King, 2007, p. 273).

Several scientist have stressed the importance of including the fishers in the management of the fishery as a form of stakeholder participation (Arbo et al., 2018; Jentoft, 2000; Johannes et al., 2000). ‘Fisheries co-management’ refers to a management scheme in which government agencies and fishers, through their organisations, are sharing responsibility in the management of the fishery (Jentoft, 1989, p. 143). Co-management is thought to increase the legitimacy of the fisheries management, both because the regulative process is perceived to be more fair, as well as improved quality of the regulations (Jentoft, 1989). Furthermore, co-management has been described as a form of empowerment of fishers and fishing communities, as they are included in a process from which they were previously excluded (Jentoft, 2005).

Some scholars have even argued that (fisheries) communities can be capable of effectively managing resources without state interference (Ostrom, 1990; Leal, 1998). Ostrom reported several successful cases of what she called ‘collective self-governance’ in managing resources, for example communities in Japan that sustainably shared common land for centuries and communities near Valencia, Spain, that shared irrigation systems to supply the Huertas. Ostrom suggested ‘eight design principles’ that could give an indication of the potential for collective self-governance in a specific setting (Ostrom, 1990, p. 90). Regarding fisheries, Leal reported both historical and contemporary cases of what he called ‘community-run fisheries’, for example a lobster and herring fishery where the fishers established a system of fishing rights at Matinicus Island, Maine (USA), and a mixed-species fishery where the fishers established fishing zones to manage the fishery in Valensa, Brazil. After studying several cases of fisheries collective self-governance, Leal concluded: “*Given the failure of*

*government to regulate fishing successfully, a self-regulated fishery is an idea whose time has come” (Leal, 1998, p. 244).*

Despite the scholarly efforts on forms and methods of fisheries management and the widespread implementation of fisheries management schemes, not all fisheries have settled with an effective and sustainable fisheries management system. Around 2016, Steenbergen et al. have studied the management of the Dutch brown shrimp fishery in the coastal zones of the North Sea (Latin name: *Crangon crangon*). The authors concluded that despite the presence of regulations limiting access to the fishery and regulations imposing technical measures, the existing fishing pressure was possibly causing growth overfishing (Steenbergen et al., 2017; Temming & Hufnagl, 2015). At the same time, the shrimp fishing industry showed interest in implementing a self-management system to keep the fishing pressure within bounds, but this was not implemented, as the Netherlands’ Authority for Consumers and Markets (ACM) considered such a system as an attempt by the fishing industry to abuse their position to influence the market (Steenbergen et al., 2017). The authors concluded that as a result, a Tragedy of the Commons situation could become reality in this fishery (Steenbergen et al., 2017, p. 2008).

This thesis will follow up on the work done by Steenbergen and colleagues, and report on status of the management of the Dutch brown shrimp fishery anno 2021, five years later. Much has happened in the Dutch brown shrimp fishery since 2016, as two collective self-governance mechanisms have been established and implemented. This thesis will focus on the collective action problem as perceived by the Dutch brown shrimp fishing industry and the mechanisms in place to overcome it.

## **1.2 Research questions and scope**

This thesis will focus on collective action within the Dutch brown shrimp fishery: *How is the Dutch brown shrimp fishery currently handling their collective action problem(s)?*

Three sub questions have been formulated to structure the process:

- 1. What characterizes the Dutch brown shrimp fishery and how is it regulated?*
- 2. What is the main collective action problem as perceived by the fishing industry?*
- 3. How is the collective action functioning in practice?*

By answering these questions, a thorough description of how the Dutch brown shrimp fishery is currently handling their collective action problem(s) will be given.

It must be noted that this study focuses on the *Dutch* brown shrimp fishery, contrasted to the complete brown shrimp fishery that is taking place in the coastal zones of the North Sea. Although both the shrimp fishing grounds and the shrimp market are shared internationally, the institutional setting of the brown shrimp fishery of the Netherlands, Belgium, Germany, and Denmark differ. For reasons of the background and the interest of the student (which will be elaborated in the methodology chapter), the Dutch fishery for brown shrimp is chosen to be the focus of this study. The Dutch fleet of shrimp fishers consist of approximately 200 vessels, which operate in the North Sea coastal zone from Dunkirk (France) to Esbjerg (Denmark), including the Wadden Sea area. A description of the Dutch brown shrimp fishery will be given in Chapter 4.

Inspired by Ostrom's work, this study takes the perspective of the appropriators: the Dutch brown shrimp fishing industry. During the investigation of the fishery, it turned out that the fishery in fact has two self-governance mechanisms to establish collective action: one aiming at resource conservation (the MSC plan) and one aiming at market stabilisation (the PMP). To give focus to this thesis, the collective action on stabilising the market (the PMP) will be explored. The collective action through the MSC plan can be an interesting topic for further research.

## 2 Fisheries collective action in theory

This chapter will give a theoretical background on collective action, especially in relation to fisheries. To begin with, the concept of the ‘invisible hand’ will be introduced, together with some basic economics on the free market and sources of market failure. Second, the concepts of Common Pool Resources and the Tragedy of the Commons will be introduced. Afterwards, two methods of overcoming a Tragedy will be discussed: state regulation and collective action. Then, I will introduce Ostrom’s theory on conditions for collective action, also called the design principles. Lastly, I will link the concept of collective action to competitiveness and the economics of ‘monopoly fisheries’.

### 2.1 The free market and the ‘invisible hand’

The ‘invisible hand’ is a central concept in economics, which was first proposed by Adam Smith in 1776 (Perman, 2009, p. 5). Smith explained that though each individual acting in their best self-interest, the society is served, since the mechanisms of the free market will steer towards efficiency. As such, we are guided by the ‘invisible hand’ of the free market, which leads us towards efficiency on a societal level. The concept of the invisible hand still is one of the most influential ideas in modern economics (Perman, 2009).

The steering mechanism of the free market (or ‘the invisible hand’) will work best if eight conditions are met. These conditions are listed in Box 1 (Perman, 2009). For instance, all goods and services must be traded on the market, all markets must be competitive, the actors have full information, and all actors are trying to maximise their utility. Furthermore, all goods, services, resources, and commodities must belong to some actor, no public

#### Conditions for a well-functioning free market

1. Markets exist for all goods and services produced and consumed.
2. All markets are perfectly competitive.
3. All transactors have perfect information.
4. Private property rights are fully assigned in all resources and commodities.
5. No externalities exist.
6. All goods and services are private goods. That is, there are no public goods.
7. All utility and production functions are ‘well behaved’.
8. All agents are maximisers.

*Box 1 Conditions for a well-functioning free market. Source: Perman 2009, p. 124.*

goods exist. This last point is exactly where difficulties with fisheries and other common pool resources arise: private property rights are often not fully assigned. If the free market does not lead to efficient outcomes, this situation is referred to as ‘market failure’. Therefore, these conditions are also referred to as ‘sources of market failure’.

## **2.2 Common pool resources and the ‘invisible hand’**

In his famous article of 1968, Hardin predicted that all ‘commons’ (or ‘common pool resources’) will eventually be overexploited, since it is in everybody’s short term personal interest to gain as much from the resource as possible, notwithstanding that this will lead to great inefficiency in resource use on the long run. Hardin concludes (Hardin, 1968, p. 1244): *“Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all.”* Hardin pointed out that in the case of common pool resources, the ‘invisible hand’ is not guiding towards efficiency, but instead to over-use.

In economics, ‘goods’ are generally classified as being ‘rivalrous’ vs. ‘non-rivalrous’, and ‘excludable’ vs. ‘non-excludable’ (Eide, 2019; Perman, 2009). Rivalrous goods are goods for which the consumption by one, eliminates the consumption of it by someone else. For instance, a meal is a rivalrous good, since my consumption of the meal, means that anyone else cannot eat it. The weather forecast announced on the radio on the other side is a non-rivalrous good: me listening to it, does not exclude others from listening to it. Excludability refers to the capacity to exclude others from using the good. For instance, I cannot exclude my neighbours from looking at the flowers that I planted in front of my house, but I can exclude my neighbours from standing in my garden.

The distinction between ‘rivalrous’ vs. ‘non-rivalrous’, and ‘excludable’ vs. ‘non-excludable’ goods gives four categories of goods: pure private goods, (pure) open-access resources, congestible resources, and pure public goods (Perman, 2009, p. 126), see Table 1. Perman notes that these categories are ‘polar cases’ and intermediate cases exist (ibid.).

Table 1 Categorisation of goods in economics. Adapted from: Perman, 2009, p. 126.

	<b>Excludable</b>	<b>Non-excludable</b>
<b>Rivalrous</b>	Pure private goods	Open-access resources, (Common pool resources)
<b>Non-rivalrous</b>	Congestible resources	Pure public goods

Eide (2019, p. 136-137) notes: “Usually fish stock resources are common goods, belonging to all the people living in a specific region (country) with legal access to the resources.”

Technically, by solely allowing the people living in the region to fish for this resource the majority of people on the planet are excluded from using it, and therefore considering the good as a pure open-access resource seems incorrect. However, within the group of people living in the region, the resource is non-excludable: community members (or ‘appropriators’<sup>1</sup>) cannot exclude each other from harvesting. Therefore, it is worthwhile to make a distinction between ‘common pool resources’ (also called ‘common goods’) and ‘open-access resources’: both are rivalrous, the former being non-excludable within a specific group of people, the latter being purely non-excludable: available to be harvested by anyone.

As Hardin theorized, the ‘invisible hand’ will not lead to efficient outcomes in respect to ‘common pool resources’ (as well as ‘open-access resources’). Therefore, some other mechanism than the market should guide the users of these resources to a more efficient outcome. In the following paragraphs, two mechanisms are discussed: state regulation and collective action through collective self-governance. The following two paragraphs will focus on fisheries resources, instead of common pool resources in general.

## 2.3 State regulation to prevent a Tragedy

A common way of avoiding over-use of a fisheries resource is through establishing limitations to the fishery through state regulation. A general distinction is made between state regulation in the form of input measures and state regulation in the form of output measures.

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<sup>1</sup> ‘Appropriators’ is the term used by Ostrom (1990) for referring to the people that use or subtract from the resource.

Examples of input measures are: limitations on the amount of fishers/fishing vessels through a licencing system, seasonal closures, limitations on the efficiency and types of fishing methods (also referred to as ‘technical measures’), such as minimum mesh sizes and escape gaps for unwanted catches (King, 2007). Output measures regulate the output of the fisheries, for example the quantity of output through a Total Allowable Catch and allocating quota, or by establishing a minimum size for landing fish (idem). Additionally, measures might be in place to protect the ecosystem, such as marine protected areas and closed fishing zones (idem). Input, output, and conservation measures are often combined. As mentioned before, stakeholder participation in fisheries management is considered beneficial (Arbo et al., 2018; Jentoft, 1989, 2000, 2005; Johannes et al., 2000).

A general legitimisation of state control in fisheries can be linked to Thomas Hobbes’ social contract theory on the legitimacy of state power (Ostrom, 1990). Hobbes theorized that individuals voluntarily sacrificed some of their freedoms and accept state power, since they gain physical protection and protection of their rights in return. In a similar way it could be argued that the state is legitimized to control the use of a fishery, since the fishers will gain that they have averted a ‘Tragedy of the Commons’ or other forms of inefficient use of a resource.

## **2.4 Collective action to prevent a Tragedy**

Although limiting fishing to sustainable levels will eventually benefit the fishers themselves, it has often been assumed that fishers are not in the position to act collectively to do so (Hardin, 1968), referring to the ‘free rider problem’. This concept was first introduced by Olson (1965) and explains that in a situation where one actor cannot be excluded from the benefits that others provide, each person is motivated to not contribute to the collective effort, but rather ‘free ride’ on the efforts of others (Ostrom, 1990, p. 6).

The ‘free rider problem’ in turn can create a ‘collective action problem’: the actors refrain from acting collectively (although it would give them collective benefits), since all actors are either waiting for their possibility to free ride or are afraid the benefits of their collective

effort will be taken by free riders. On the other side ‘collective action’<sup>2</sup> refers to the situation where actors act collectively, notwithstanding temptations to free ride. Collective action problems and free rider problems are connected to non-excludable goods in general and also appear outside the setting of common pool resources and fisheries.<sup>3</sup>

## 2.5 Ostrom’s design principles for collective action

As noted earlier, Ostrom (1990, p. 15) disputed Hardin’s thesis and stated that - in some settings - collective action is possible. She had observed that in various regions of the world, appropriators had found a method of overcoming the collective action problem, through which she called ‘collective self-governance’. She described cases where - without state regulation or privatisation of the resource – communities had founded institutions to sustainably share the benefits of a common pool resource (CPR).

After studying numerous cases, Ostrom listed the general characteristics of institutional settings that have shown robustness in overcoming the collective action problem in the setting of a common pool resource. These characteristics are referred to as ‘the eight design principles’ (Ostrom, 1990, p. 90), which I will discuss in the following.

‘*Clearly defined boundaries*’ (design principle 1) refer to the capability of the group of the appropriators to exclude others from access and appropriation rights (Ostrom, 1990, p. 91). Ostrom poses this design principle as a prerequisite to collective self-governance: “*So long as the boundaries of the resource and/or the specification of individuals who can use the resource remain uncertain, no one knows what is being managed or for whom*” (ibidem). The clearly defined boundaries also form the distinction between ‘shared’ resources and pure ‘open access’ resources, as mentioned earlier.

With ‘*congruence between appropriation and provision rules and local conditions*’ (design principle 2), Ostrom expresses that ‘well-tailored’ rules which correspond with the specific

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<sup>2</sup> ‘Collective action’ in some settings also means *not* doing something or decreasing effort, such as limiting fishing effort to fish sustainably.

<sup>3</sup> For instance, in the sphere of international agreements on efforts to reduce the emissions of greenhouse gasses. States that do not sign the agreements and act to reduce their emissions, still benefit from the efforts of others.

conditions of the CPR increase the likelihood of a functional collective self-governance and the robustness of the setting. This statement opposes a one-size-fits-all approach for collective self-governance.

The presence of ‘*collective-choice arrangements*’ (design principle 3) is according to Ostrom important for the reason that the appropriators themselves have the best knowledge of the CPR and therefore have the best position to tailor the rules to the local conditions (design principle 2).

Ostrom found that in all cases of robust collective self-governance systems, significant effort was dedicated to *monitoring* (design principle 4) and *sanctioning* (design principle 5). Ostrom stresses that this is the ‘crux’ of the collective action problem. The problem of mutual monitoring (appropriators looking after each other on compliance) lays in the reality that individuals usually prefer to not act when they observe non-compliant behaviour of others. Elster (1989, p. 40-41, in: Ostrom, 1990, p. 45) described the dilemma as follows: “*What’s in it for him? True, it may be better for all members if all punish non-members than if none do, but for each member it may be even better to remain passive. Punishment almost invariably is costly to the punisher, while the benefits from punishment are diffusely distributed over the members.*” Therefore, the problem of mutual monitoring can be considered a collective action problem in itself, thus, a second order collective action problem.

Ostrom refers to the theory of Margeret Levi (1988) on ‘*quasi-voluntary compliance*’, i.e. appropriators choosing to comply, without a direct threat of a sanction for non-compliance. According to Levi, appropriators are willing to comply if they observe that both the collective goal is being reached and the others are also following the rules. On the contrary, Levi wrote: “*No one prefers to be a ‘sucker’*” (in: Ostrom, 1990, p. 94), in the sense that no one likes to be the only one that is sticking to the rules, while the others are breaking them. Ostrom elaborates this case for the situation in which the appropriator is at the same time responsible of monitoring compliance: “*By monitoring the behaviour of others, the appropriator-monitor learns about the level of quasi-compliance in the CPR. If no one is discovered breaking the rules, the appropriator-monitor learns that others comply and that no one is being taken for a sucker. It is then safe for the appropriator-monitor to continue to follow a strategy of quasi-voluntary compliance*” (Ostrom, 1990, p. 97). On the other side, Ostrom states that when the appropriator-monitor learns about appropriators that repeatedly break the rules, quasi-

voluntary compliance is threatened. In that case, the strategy of quasi-voluntary compliance is no longer ‘safe’ for the individual appropriator.

Ostrom stresses the importance of ‘*graduated sanctions*’ (design principle 5), for instance to make a distinction between incidental non-compliance and repeated non-compliance. Again, the severity and the form of the sanctions imposed should correspond to the local conditions (design principle 2).

‘*Conflict resolution mechanisms*’ (design principle 6) should be in place to resolve conflicts among appropriators and/or other actors. Access to resolution mechanisms should be low-cost and timely. Ostrom notes that collective self-governance systems cannot exist without a conflict resolution mechanism, since applying rules is never unambiguous and conflicts will inevitably arise.

The ‘*minimal recognition of rights to organize*’ (design principle 7) relates to the relationship with external governmental authorities. Ostrom poses that if the external government does not recognise the collective self-governance system, the likelihood of effective self-governance is very low, since this gives appropriators the option to bypass the self-governance system through the external government.

Lastly, Ostrom notes that self-governance mechanism that are part of larger systems should be ‘*organized in multiple layers of nested enterprises*’ (design principle 8). Ostrom notes (Ostrom, 1990, p. 102): “*Establishing rules at one level, without rules at the other levels, will produce an incomplete system that may not endure over the long run*”. As such, collective self-governance systems do not operate in a vacuum, on the contrary: systems are often be interlinked and dependent on each other.

## **2.6 Collective action and competitiveness**

In the last paragraphs we have seen that if collective action can be established, the potential over-use caused by the lack of private property rights and a potential ‘tragedy of the commons’ could be averted. However, collective action to avoid the over-use, might possibly at the same time endanger another condition for a well-functioning free market: perfect competition (see Box 1 on page 4). If the actors find a method to act collectively to conserve the resource, they could as well establish collective action to make use of their market power

in the form of a cartel. In that perspective, it has been stated that “*a monopolist is the conservationist’s friend*” (Manning & Uchida, 2016, p. 142).

In fisheries, this situation is referred to as ‘monopoly fisheries’ (Manning & Uchida, 2016). Although a single owner in fisheries is rare, collective action by multiple actors can make the group behave as a single actor (idem, p. 142). Therefore, monopolies (single actor) and cartels (multiple actors) are closely related. Fishery monopoly models have been studied in economics since 1990 (idem).

The central idea is as follows: if no regulations, cooperation, or market power exists, then harvesting will take place at the open-access level, the level to which Hardin referred as the commons. At this open-access level, no resource<sup>4</sup> rent is obtained. A monopolist harvester (or a cooperative group) can decrease the level of harvesting to a sustainable level of harvesting, therewith creating resource rent. Additionally, to maximise profits, the monopolist harvester could decrease the level of harvesting even more, to obtain both resource rent and monopolist rent<sup>5</sup>.

Anecdotal evidence suggests that collective action by fishers can lead to benefits from monopoly management, while at the same time cases of collective action have been found where the cooperation did not lead to monopoly benefits or raised prices through market power (Manning & Uchida, 2016, p. 159)

Monopolies are considered an abuse of market power and therefore commonly prohibited through antitrust law. Regarding antitrust law in the US, Manning and Uchida (2016, p. 142-143) note that antitrust law can also have consequences for initiatives of collective action to conserve the resource (without abusing market power), as coordination by the actors is seen as violation of antitrust law from a legal standpoint.

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<sup>4</sup> ‘Resource rent’ is the economic surplus after all costs and normal profit have been accounted for, that can be traced back to the resource.

<sup>5</sup> ‘Monopolist rent’ is the economic surplus after all costs and normal profit have been accounted for, that is obtained through the use of market power.

## **3 Method**

In this section I will describe the research design and methods used. First the general research design will be spelled out, followed up by a more detailed description of the elements of the research design.

### **3.1 Research design**

The study has been designed as a qualitative case study, which investigates the case of the Dutch brown shrimp fishery in the light of collective self-governance. As briefly explained in the introductory chapter, the management of the brown shrimp fishery forms an exception within EU fisheries management, by not being regulated through the common output measure of the Total Allowable Catch (TAC). Furthermore, the fishery is aiming at establishing collective self-management. Therefore, the case of the Dutch brown shrimp fishery can be considered an ‘unique case’ within EU fisheries (Bryman, 2012, p. 70; based on Yin, 2009).

The main method for obtaining results has been semi-structured interviews, where the respondent’s point of view was at the centre of attention. An interview guide was used to introduce some topics to the table, while at the same the interview remained flexible to include the topics that the interviewee considered essential. The interviews were complemented with secondary sources and scientific literature. These could verify and give some background on the information given in the interviews.

### **3.2 Position and motivation of the researcher**

The researcher has worked with the Dutch fisheries organisations, and specifically the Dutch brown shrimp fishery, prior to writing this thesis. These activities included:

- Writing a bachelor thesis on the Dutch flatfish fishery including interviews (twice),
- Working for a Dutch umbrella organisation of producer organisations that represents Dutch demersal fisheries, including the flatfish fishery and the brown shrimp fishery (about one year),
- A 5-day fishing trip on a Dutch brown shrimp vessel,

- A project on exploring the options for private control on closed areas for the Dutch brown shrimp fishery, commissioned by the Netherlands' Ministry of Agriculture, Nature and Food Quality (two months).

These prior activities have influenced the thesis in several ways, such as:

- The choice of the Dutch brown shrimp fishery as the topic of the thesis. From my experience with this fishery I knew that writing about this fishery in relation to collective action problems could be interesting. I also knew that the fishery holds a great complexity regarding ecology, organisation and legal framework, thus giving me enough to write about.
- Prior knowledge on the functioning of the brown shrimp fishing industry. This fishery is not often described in literature, therefore having some prior know-how on the fishery was a great advantage (especially in the light of COVID-19 travel restrictions).
- Acquaintances in the field of the Dutch brown shrimp fishery gave me access to resources (such as data on the fleet) and made it more easy to arrange interviews.

### **3.3 Sampling of respondents**

Bryman (2012) works with the concept of 'purposive sampling' for selecting respondents in qualitative research. He describes purposive sampling as a non-random form of sampling in which the research question is used to strategically select the respondents/cases to be considered, based on relevance.

'Theoretical sampling' is a form of purposive sampling which is described by Glaser and Strauss as "*the process of data collection for generating theory whereby the analyst jointly collects, codes, and analyses his [her] data to collect next and where to find them, in order to develop his [her] theory as it emerges*" (1967, in Bryman, 2012, p. 419). The concept of 'theoretical saturation' is used as a criterion for deciding when enough data is collected, or a new field can be entered (ibid.). Another form of purposive sampling mentioned by Bryman is 'opportunistic sampling', in which the researcher makes use of the opportunities available.

This study took a 'purposive approach' to sampling, which indicates that the research question was leading in whom to invite for an interview. Since the study has as a focus on the perspective of the fishing industry, active fishers, and representatives of Producer

Organisations (POs) were the first categories to be sampled. A list of respondents can be found in Appendix I.

Based on previous experience I knew that it could be difficult to active fishers motivate fishers to take part in an interview, especially when going to the fisheries harbour to ask them directly would not be an option (for reasons of COVID travel restrictions). Therefore, regarding the category 'active fishers', I relied on two fishers that I already knew from previous work. A bias created by this approach could be that the exact reason I knew them was for their outstanding interest in fisheries management, compared to other shrimp fishers. Another bias might have been arisen by the situation that both of these active fishers were more or less the same 'type' of shrimp fisher, looking at their fishing pattern: both had a licence to fish on the Wadden Sea (only 89 out of 226 shrimp fishing licence holders are allowed to fish in the Wadden Sea (Steenbergen et al., 2017)), whilst at the same time their vessels also allowed to fish in the deeper waters of the coastal zone (some shrimp vessels on the Wadden Sea do not have this opportunity), and both were full-time fishing for brown shrimp (a section of the shrimp fleet switches to other target species seasonally). Both invited fishers were willing to do an interview, and both interviews lasted longer than expected for the reason that the fishers had much to tell.

From previous activities, I knew that the POs have a key role in the organisation of the shrimp fishery. The representatives of the POs I had all met at least once, and many of them more often over the last years. Therefore, it was relatively easy to get in contact and arrange interviews. I knew that the POs showed some divergence in the approach of the management of the fishery, and therefore I wanted to speak to several PO representatives. All of the fisheries and PO representatives that I invited for an interview, six in total, accepted the invitation.

A category that I had in mind that might be important to speak with was the environmental NGOs that are active in the protection of the Dutch coastal zone. However, during the first interviews with fishers and PO representatives, their importance for the self-management of the browns shrimp fishery seemed to be less significant than anticipated, and therefore I decided to focus on other categories.

During the interviews, the role of the state in the brown shrimp fishery and eventually self-management gained importance. Therefore, I invited both a representative of the Netherlands'

Ministry responsible for fisheries (LNV) and a representative of the Netherlands' Food and Consumer Product Safety Agency (NVWA), whom I both knew from previous activities, and both agreed on participating.

Another category that gained importance during the interviews were the shrimp trading companies. Unfortunately, I didn't know any representatives of those companies personally. Therefore, I sent invitations to the general information email addresses of the two big trading companies, which both did not replied to.

This approach of sampling respondents has its limitations. Bryman (2012, p. 418) notes that purposive sampling does not allow to generalize for a population. Thus, as mentioned before, the two fishers that I have spoken with, obviously cannot represent the full group of Dutch shrimp fishers. Regarding the representatives of producer organisations, I have spoken with representatives of five out of six producer organisations that are active in the Dutch brown shrimp fishery. Not having spoken with the trading companies and the environmental NGO's remains a limitation of this study. Including those perspective could be an interesting topic for further research.

### **3.4 Rights of the respondents**

For reasons of analysing the interviews, the interviews were preferably audio recorded. According to the Norwegian/EU data protection law, audio-recordings are considered 'personal data' and thus processing the audio-recording is bound to the data protection law. The data processing plan for this project was notified to the Norwegian Centre for Research Data (NSD). On October 30<sup>th</sup>, 2020, the NSD confirmed that the data processing plan was compliant to the relevant data protection legislation.

The data protection plan included the following elements:

- Participants received an information and consent sheet before the interview was held. The information included the purpose of the study, the method of processing the personal data, the risks associated to participation, the rights of the participant (including transparency, information, access, rectification and erasure). The voluntary character of participation was stressed, and participants were informed that they could withdraw their participation at any time without any explanation. The information

sheet also included the details on how to file in a complaint. The information sheet and consent form for respondents (in English) can be found in Appendix II.

- Participants should give written consent for participation and the audio-recording. Written consent was obtained through a small consent-form which was included in the information sheet. (During the process of interviewing, it appeared that written consent turned out to be impractical since it required the respondent to print, sign, scan and email back the form. Therefore an alternative method of obtaining consent was used: oral consent recorded at the beginning of the audio recording of the interview. This was done by having the interviewer read out loud the form in the form of a question, and the interviewee replying to it.)
- The interview was recorded through the 'Nettskjema-diktaphon' application, which is developed by the University of Oslo to provide extra security for research data. The Nettskjema-diktaphon application does not store the recording on the (personal) device itself, but instead stores the data in the form of a 'Nettskjema' form, which can only be accessed through the secured Feide-system.
- Only the listed supervisors (i.e. Peter Arbo and Maaïke Knol-Kauffman) and the student could access the recordings.
- All personal data will be erased after the project is finished, i.e. in June 2021.
- Changes will be notified to the Norwegian Centre for Research Data.

All participants of the interviews have given written or oral (recorded) permission for both the interview and the audio recording thereof. Thus far, no complaints or withdrawal of consent have been received.

### **3.5 The interview style and form**

Bryman (2012, p. 471) described a semi-structured interview as an interview style where a list of specific topics or questions is used in a flexible way, for instance by changing the order of the questions, or adding unforeseen questions to respond to the answers given by the interviewee. Still the list of topics or questions is used as the base of the interviews and will be asked in relatively similar wording from interview to interview to allow for some comparison between respondents. Bryman (ibid.) contrasts the style of 'semi-structured' interviewing to 'structured' or 'quantitative' interviewing on the one side, and 'unstructured'

interviewing on the other. In an unstructured interview, the interviewer might just ask one broad opening question and subsequently follows up on the topics mentioned by the respondent.

The interview guide used in this study is published in Appendix III. After an introduction to the interview, the interviews were set off with a fairly open question: “*If you would describe the Dutch brown shrimp fishery to someone who is not familiar with this fishery, how would you describe it?*” This question invites the respondent to focus attention to the matters that the respondent regarded as important. The wording “*to someone who is not familiar with this fishery*” was used to make sure that the respondent did not adapt his/her answer to the existing knowledge of the interviewer. In general, the topics mentioned by the respondent to that first question were covered by follow up questions. The interview guide was used to introduce topics that were not spontaneously brought up by the respondents themselves. Therefore, the style of interviewing can be considered in-between ‘semi-structured’ and ‘unstructured’ interviewing.

The interviews were conducted digitally through the application Microsoft Teams. Both audio and camera were used. The initial reason for conducting digital interviews were the COVID-19 travel restriction, but on the way, there seemed to be some other benefits from conducting the interviews online too:

- Scheduling the interviews worked out well: all interviews could be planned within the next one or two weeks. This could be a result of not having to be in the same physical location, as the respondent and the interviewer would have for an in-person interview.
- Not having to travel to the respondents created some time efficiency for the interviewer, and also allowed the interviewer to have more than one interview per day.
- Often both the interviewer and the respondent were participating from their home, which might have created a less formal, more personal atmosphere.
- The digital connection created some delay in answers (compared to in-person speaking), and thus some extra silence from the side of the interviewer. Allowing a silence in the conversation is a known tool for interviewing. A silence gives respondents some time to reflect or elaborate on their answers (Bryman, 2012). In this case, some extra silences might thus have been created unintentionally because of the delay of the connection.

On the other side, technical difficulties and poor connections did not help the interviews. Luckily, no serious complications did occur, and all interviews could be held.

The interviews were held in the native language of the respondents (and interviewer): Dutch. The interviews were scheduled to last 45 minutes, but in some cases lasted up to two hours, depending on the motivation and available time of the respondent.

### **3.6 Processing and analysing**

All ten audio recordings have been transcribed manually and in full (except for obvious non-related or personal comments and conversations). The transcriptions stick to the actual wording of the respondents. Transcribing took approximately 2-4 hours per hour of interview. The transcriptions counted 3000 to 10.000 words per interview.

The next step was to structure and organise the data. After some investigation of digital programs to code/label the digital transcriptions, it turned out that manually labelling printed transcriptions would be the most practical option. The interviews have been coded by topic (following the topics of the interview guide), by both marking the relevant phrase in the text and attaching a similar coloured label to the side of the paper. The colour-coding list can be found in Appendix IV. By using colour-labels, I was able to connect all the respondents' perspectives per topic, and to see whether these perspectives were congruent or divergent. A difficulty in coding laid in the point that many of the topics are interconnected, which created very colourful pages. Still, the colour-labelling system helped me in structuring the bulk of data.

### **3.7 Secondary sources and literature**

The interviews were complemented with a search for secondary sources and scientific literature. These sources could verify and give some background on the information given in the interviews. When topics were described in scientific literature, these sources were preferred. However, many topics have not been described in scientific literature and in these cases secondary sources, like the Dutch fisheries newspaper, have been used.

### **3.8 Overall strengths and limitations of the approach**

For assessing the strengths and limitations of qualitative research, Bryman (2012, p. 390-393) discusses ‘alternative criteria for evaluating qualitative research’, contrasted to criteria for evaluating quantitative research. Bryman (ibid.) refers to the criteria developed by Guba and Lincoln (1985, 1994), who have suggested two main criteria for assessment: trustworthiness and authenticity.

‘Trustworthiness’ consist of four themes: credibility, transferability, dependability and confirmability (Bryman, 2012, p. 390). ‘Credibility’ (or ‘internal validity’) questions whether the results and conclusions of the researcher correspond to the understanding of others that (would have) studied the same and/or the subjects of the study itself. Methods to increase credibility named by the above-mentioned authors are respondent validation (having the findings of the study confirmed with the subjects of the study) and data triangulation (using various methods to confirm the outcomes of those methods with each other to increase the level of confidence). ‘Transferability’ (or ‘external validity’) questions whether the study could be repeated, or whether the findings of this study hold in the same or a slightly different context, at the same moment in time or at a later point (ibid.). In this context, the authors also promote ‘thick descriptions’ in qualitative research: rich descriptions of the specific situation investigated, for other researchers to be able to distil the relevant findings of this research to transfer to other studies. ‘Dependability’ (also ‘reliability’) refers to the possibility for an external auditor to go over all the phases of the research process and thus keeping records of all steps (Lincoln and Guba, 1985, in Bryman, 2012, p. 392). Lastly, ‘confirmability’ (or ‘objectivity’) examines the good faith of the researcher and demands the researcher to keep an objective approach (as far as possible), and where personal values have not overtaken the process and the findings (ibid.). Confirmability may be one of the points for consideration when the study is being audited (ibid.).

‘Authenticity’ deals with the wider impacts of the publication of the study and the impact thereof to the participants (Lincoln and Guba, 1985, in Bryman, 2012, p. 393). It questions for instance whether the study has helped the participants (or ‘members’) understand their own situation, and whether it has empowered them to take action (ibid.). Therefore, this criterion addresses ethical considerations.

Strengths of the methodology include:

- Using various sources of data ('triangulation') has increased the credibility of the results.
- Having a semi-structured style of interviewing, including many open questions, gave space for the respondent to address topics of importance to them, which, hopefully, has avoided some bias towards the preoccupation of the interviewer.
- Recording and transcribing all interviews in full was a time consuming process, but has increased the transferability of the study: another researcher could go over the (anonymous) transcripts, to check whether he/she would come to the same conclusions.
- The unique position of the researcher (being more or less familiar with the fishery and the organisation thereof) could bring authenticity to the study. This might already be shown by the fact that both organisations within the Dutch fishery and the Dutch Ministry have already shown interest in the results of the study.

Weaknesses of the methodology include:

- Not having carefully logged all steps in the research process, which would have increased the dependability of the study.
- Respondent validation could have increased the credibility of the results.
- A low number of fishers interviewed certainly creates some limitations in the generalisations that can be made at the level of the Dutch fleet.
- Not having interviewed parties apart from the Dutch brown shrim industry and Dutch government has treated this fishery in relative isolation. Having interviews with for instance environmental organisations could have given other perspectives on the fishery. (This was also a choice, to give focus to the study and stick to the perspective of the appropriators, as Ostrom did in her studies.)

## 4 The setting of the brown shrimp fishery<sup>6</sup>

This chapter is aiming to answer sub question 2 by giving a description of the species brown shrimp, the fishing practice, the organisation of the fishery and the regulatory framework in which the fishery takes place.

### 4.1 The species brown shrimp

Brown shrimp (*Crangon crangon*) is a relatively small species of shrimp that lives on the seabed of the shallow coastal waters of the North Sea. The species is born as a larva (~1.4 mm) and after growing relatively fast, it settles at the benthic seabed when it reaches the length of 5 mm (Steenbergen et al., 2015). When the shrimp reach the size of 25 mm in length, they move to relatively deeper waters (ibid.). The shrimp reach sexual maturity as male when they are about 30-55 mm long, and afterwards change sex to female (Boddeke, 1989). Mature females (around 60 mm) carry their eggs for 4-13 weeks, depending on the water temperature (idem). This breeding care results in the larvae being in a relatively advanced stage when hatching (idem). The species has two reproduction peaks per year: a summer cohort is added in mid-June and a winter cohort in late November (Steenbergen et al., 2015). The summer cohort is bigger in numbers, whilst the winter cohort grows faster (ibid.; Boddeke, 1989). Brown shrimp can reach a maximum length of around 80 mm at the maximum age of 2 years (see Steenbergen et al., 2015). Boddeke (1989) notes that shrimp are constantly on the move to find the right place for their stage of life.

For juvenile shrimp, the main predators are swimming crab (*Liocarcinus holsatus*) and sand gobies (*Pomatoschistus minutus*) (Boddeke, 1989). Brown shrimp, both the juveniles as well as the mature individuals, are an important source of food for gadoids, such as whiting (*Merlangius merlangus*) and cod (*Gadus morhua*) (ibidem). In 1979, ICES (in: Boddeke, 1989) estimated that the natural mortality of brown shrimp was significantly higher than the mortality caused by fishing. Tulp et al. (2016) have noted that this pattern has changed: the fishing pressure has increased and with the disappearance of the larger gadoids in the North

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<sup>6</sup> Parts of this chapter have been submitted as a draft version for the term paper of the course 'FSK-3551 Mini Research Project', which I took as a 10-ECTs extension of my thesis.

Sea, the levels of predation have decreased. Nowadays the fishing mortality of mature shrimp (>50 mm) is estimated to be 3 to 5 times higher than the natural mortality (Tulp et al., 2016).

Because of the short life span, two reproductional seasons, varying growth rates and varying natural mortality, the stock assessments that are commonly used to describe fish stocks are not appropriate to describe the brown shrimp stock (Steenbergen et al., 2015; Tulp et al., 2016). Therefore, the 'swept-area' estimates have been performed since the 1970s in Dutch, German and Danish waters. Swept-area estimates make use of survey data to estimate densities of shrimp at various locations and at various depths, to then extrapolate these estimates to the full area of shrimp abundance (Tulp et al., 2016). These estimates show high year to year variation of total annual biomass, see Figure 1 (by Tulp et al., 2016, p. 2544). Tulp et al. note however that these estimates show great uncertainties since many factors could not be accounted for, such as the catch efficiency of the gear used in the surveys.

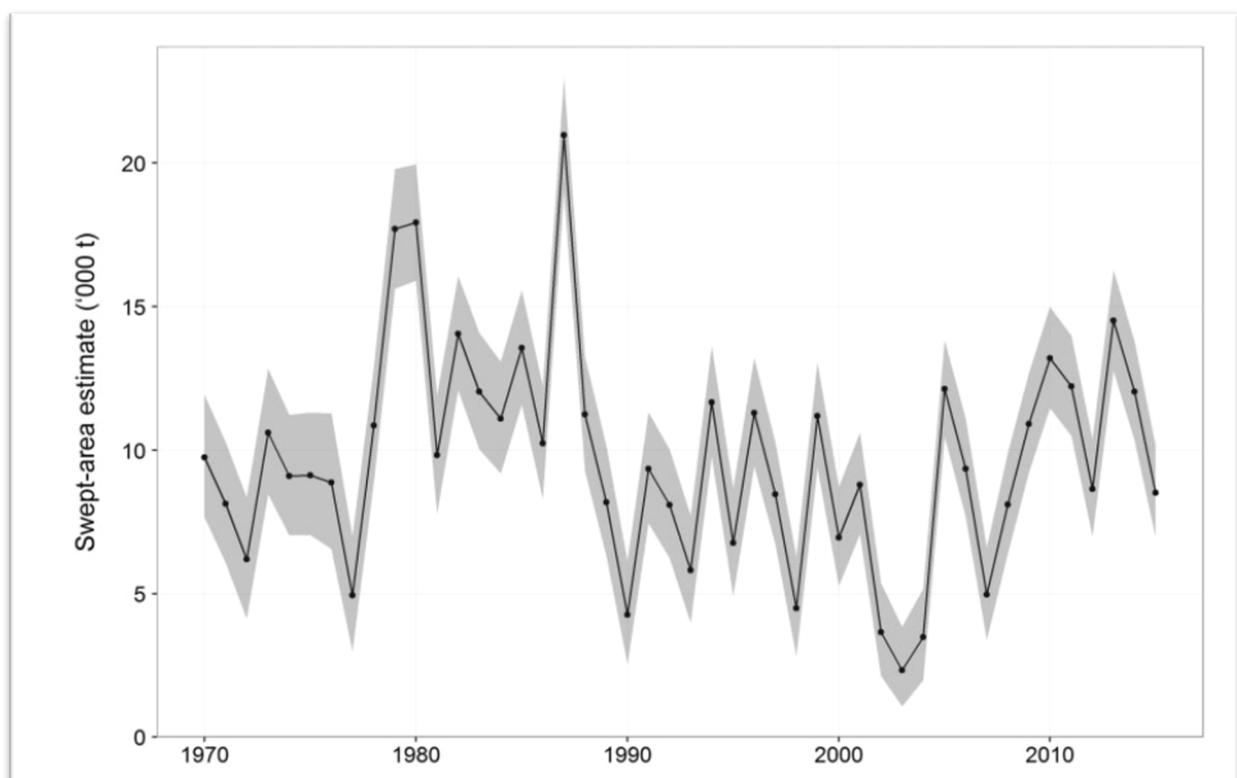


Figure 1. Estimation and confidence limits of the annual total biomass of mature brown shrimp (>50 mm) along the Dutch, German and Danish North Sea coast, based on the swept-area method, by Tulp et al., 2016, p. 2544. These swept-area estimates show high fluctuation in annual biomass, ranging from around  $<5 \times 10^3$  tonnes in the early 2000s to  $>20 \times 10^3$  tonnes in the late 1980s.

## 4.2 The fishery for brown shrimp

The fishery for brown shrimp is performed in the coastal shallow areas of the North Sea as a single species fishery. In 2015, around 550 vessels were active in the North Sea coastal zones, having Belgian, Danish, Dutch and German flags (ICES, 2018). The amount of Dutch commercial vessels active in the brown shrimp fishery has varied between 180-212 in the last ten years (see Figure 2). The total number of licences to fish for brown shrimp is higher (that is 226, based on Steenbergen et al., 2017), since not all licences are in use. A minority of the shrimp vessels

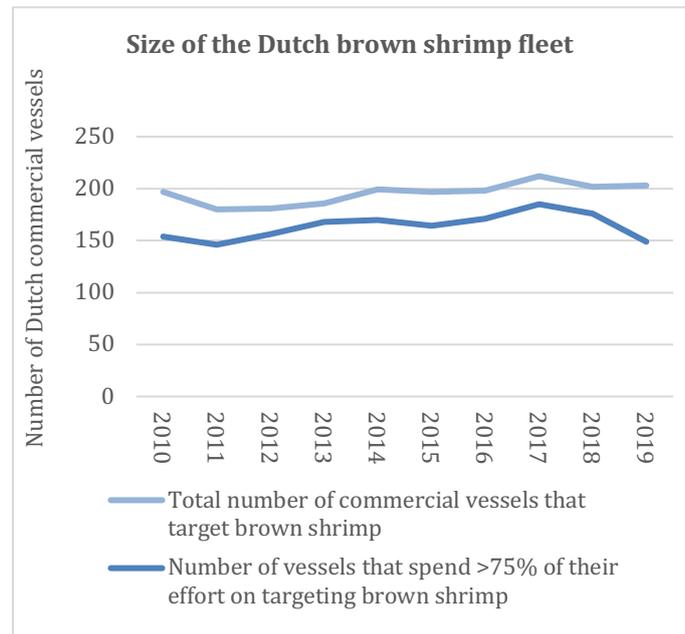


Figure 2. Size of the Dutch brown shrimp fleet over the last ten years. Source: Wageningen Economic Research, unpublished.

(approximately 10-25%) have the option to change their gear to perform other types of fisheries seasonally, such as coastal sole or nephrops fisheries.

The seasonal and geographical dynamics of the Dutch fleet have been described by Steenbergen et al. (2015, p. 17). The main season for fishing shrimp starts in late summer. Around that moment the summer cohort reaches the marketable size, while at the same the market price for shrimp is still high because of the shrimp scarcity of the months before. After autumn, the shrimp move to deeper waters, which are less accessible for the smaller vessel segment of the fleet. Some relatively larger Dutch vessels relocate their activity to the Sylt area in winter, which is located in German waters. The shrimp vessels are in general least active between January and April, after which the shrimp activity starts increasing again awaiting the shrimp peak in late summer.

Demersal beam trawls are used in this fishery, having engines up to 300 HP. Since the shrimp are a relatively small target species, a bottom trawl with a relatively small mesh size is used. Dutch legislation demands a minimum mesh size of 16 mm. Currently, the majority of vessels are voluntarily opting for bigger meshes of 24 mm, to comply with the MSC management

plan (which will be discussed later). Fishing occurs at speeds around 3-3,5 knots and every haul takes around 1,5-2 hours.

Small meshes can lead to high rates of bycatches. For the brown shrimp fishery, Santos et al. (2017) have reported discard rates varying between 20% - 90% of the total catch per haul, depending on the fishing ground and season. Steenbergen and Rasenberg (2012) reported that between 2008-2012 catches on average consisted of: 40% commercial shrimp, 38% undersized shrimp, 2% flatfish, 9% round fish, 11% benthos. Since the survival rates of undersized shrimp are relatively high, it has been suggested that the impact of the bycatches of undersized shrimp are relatively low (ICES, 2007). Bycatches of juvenile fish on the other side do form a concern, as survival rates are estimated to be low (ICES, 2007).

As soon as the catch is collected on board, the marketable shrimp are separated from the bycatches, commonly with a rotating sieving machine. This machine distinguishes between marketable shrimp, undersized shrimp, and unwanted bycatches such as fish and debris. The two latter categories are considered bycatches and are automatically sent overboard, whilst the marketable shrimp are led to an automatic cooking device. After cooking, the cooked shrimp are sieved a second time to sort out the remaining undersized individuals. A last quality check is done by hand, after which the shrimp is stored in a cooled storage space inside the vessel. After landing, the shrimp is sieved a third time at a certified control sieving station.

After being sieved, the majority of brown shrimp goes directly to shrimp traders, only a small fraction (estimated to be less than 5%) will be sold at the auction, which is the common method for selling fresh demersal fish. Most shrimp fishers have an unwritten 'gentlemen's agreement' with a shrimp trading company: the fisher supplies their trader, and the trader guarantees to take his/her shrimp. This mechanism gives stability to the fishers with such an agreement in times of high shrimp abundance and oversupply, since they are guaranteed that their shrimp will be taken. Shrimp fishers without such an agreement might have trouble finding a buyer in times of oversupply.

Figure 3 shows the total landings of brown shrimp per month by the Dutch fleet and the price per kg per month over the last ten years. Based on this figure, we can see that the landings in general follow the life cycle of brown shrimp: a peak of landings in autumn and a high year to year variation. The peak in shrimp abundance (>1,500 tons landed per month) typically lasts

from September till November. The peak of landings creates a drop in the price of the shrimp to the €2-€4/kg level. After the peak landings, the price start to rise again until the next peak of shrimp abundance. Figure 4. gives an overview of the results of the Dutch fleet.

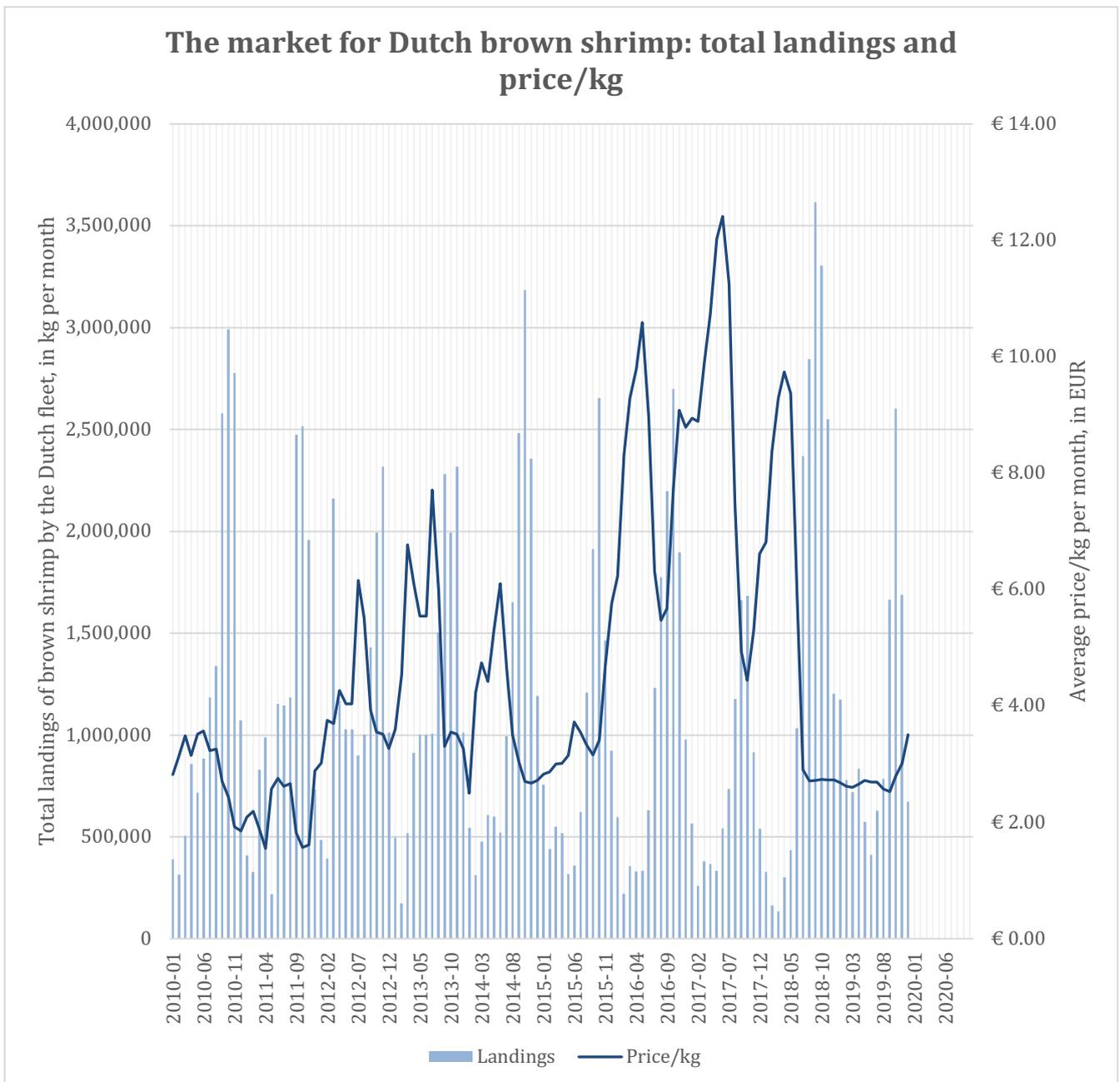


Figure 3. Monthly total landings of brown shrimp of the Dutch fleet and price per kilo. Source: Wageningen Economic Research, unpublished.

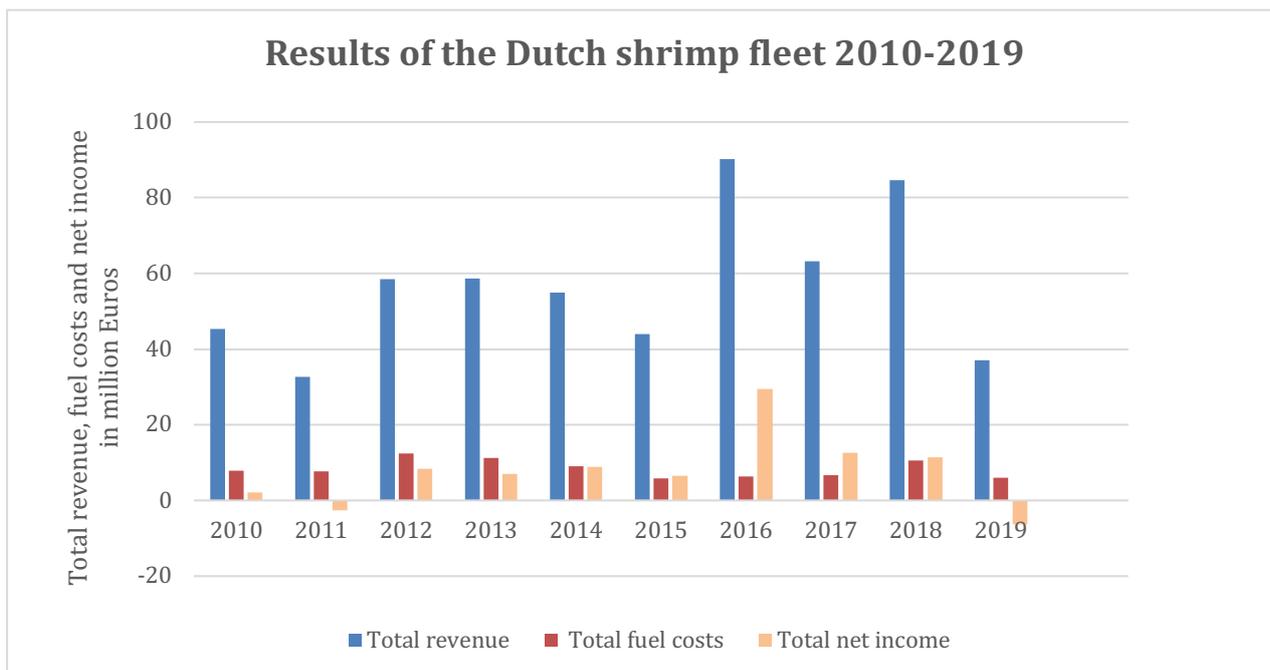


Figure 4. Results of the Dutch brown shrimp fishery. Numbers for 2019 are provisional. Source: Wageningen Economic Resource, unpublished.

In frozen condition and treated with conservatives, the unpeeled shrimp can be stored for months. Peeling shrimp is technically difficult. Currently the majority of shrimp is shipped to Morocco, defrosted, hand-peeled, and shipped back to northern Europe. There have been companies experimenting with shrimp-peeling machines, but at the moment this is not used to treat the bulk of shrimp (Schouten & Verhey, 2016). The consumer product that lays in the supermarkets is a peeled, defrosted shrimp, typically packaged in a see-through plastic box containing 100 grams. Consumer prices in Dutch supermarkets vary between €3,50 and €5,30 per 100 grams and seem to be relatively stable.

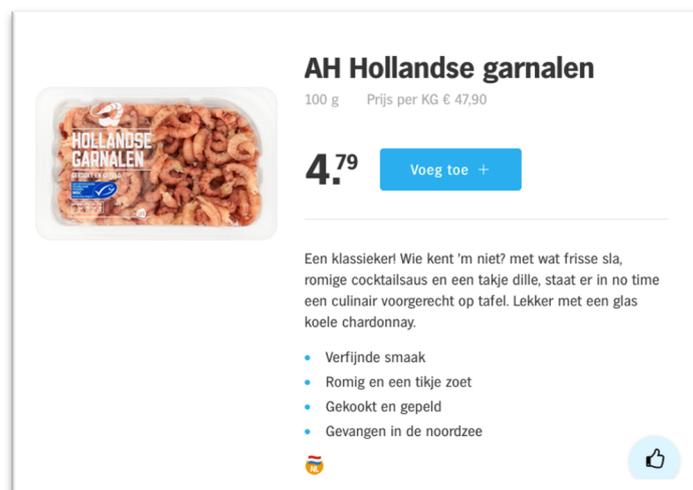


Figure 5, example of the end product offered to the consumer by one of the largest supermarket companies in the Netherlands.

### 4.3 The organisation of the fishery

The Dutch brown shrimp fleet is mainly organised through several Producer Organisations (POs) and an association of producer organisations (APO). In the following we discuss the role of the POs and APO. The legal status of the Producer Organisations will be discussed in the paragraph on the regulatory framework.

The Netherlands counts ten recognized producer organisations (POs) and one association of producer organisations (APO), which are listed in Table 2. Van Hoof (2010) noted that many of the POs were founded around 1990, together with the development of the Dutch co-management system, which was particularly important for the development of the flatfish fishery. This co-management system gave members of the POs (in this respect also called ‘Biesheuvel groups’) certain privileges regarding the number of days-at-sea and the possibilities for trading their individual quota (*idem*). For more details on the development and the role of the producer organisations in the light of the co-management system in the Netherlands, I would like to refer to Van Hoof, 2010.

Although the system of days-at-sea and individual quota does not apply to the brown shrimp fishery, the shrimp fishery and the flatfish fishery do largely share the infrastructure of POs: many of the POs have both members that are active in the flatfish fishery outside the 12 nm coastal zone, as well as brown shrimp fishing members within the 12 nm coastal zone. It must be stressed that the management system for these fisheries and similarly the role assigned to the POs differs significantly.

Name	Status	Stakes	Year established	Number of brown shrimp members in 2020
CPO Wieringen	PO*	Mainly brown shrimp fisheries	1986	30
CPO Nederlandse Vissersbond	PO*	Both demersal fisheries for sole and plaice and shrimp fisheries	1987	103
PO van de Nederlandse Mosselcultuur	PO	Solely industry for mussels	1991	-
CPO Texel	PO*	Both demersal fisheries for sole and plaice and shrimp fisheries	1993	6
CPO Nederlandse Vissersbond IJsselmeer	PO	Small-scale fisheries at the lake IJsselmeer	1996	-

*Table continues on the next page.*

Redersvereniging voor de zeevisserij	PO	Pelagic fisheries	1996	-
CPO Delta Zuid	PO*	Both demersal fisheries for sole and plaice and shrimp fisheries	2003	23
CPO West	PO*	Relatively small PO, both demersal fisheries for sole and plaice and shrimp fisheries	2003	-
Internationale Garnalen PO Rousant	PO*	Brown shrimp fisheries only	2009	60
CPO voor de Visserij Urk	PO*	Mainly brown shrimp fisheries and bottom trawl for sole and plaice	2010	14
<i>Coöperatieve Visserij Organisatie (CVO)</i>	<i>APO</i>	<i>Cooperation of seven PO's, marked with '*'</i>	<i>2014</i>	<i>Accumulated total: 236</i>

Table 2 List of Producer Organisations in the Netherlands. Adapted from Visser (2019, p. 5, unpublished) combined with the EU list of recognised producer organisations (European Commission, 2021) and the list of brown shrimp MSC certificate holders per PO (CVO, 2020) .

The role of the POs within the brown shrimp fishery was one of the topics to be covered in the interviews. The responsibilities of the producer organisations include the following:

- Informing their members about developments, legislation and required certificates;
- Facilitating their fishers in administrative tasks;
- Managing the individual quota for the brown shrimp fishers that switch target species seasonally;
- Represent their fishers in discussions within the APO, the association of demersal producer organisations;
- Monitoring and enforcing the private rules that are agreed upon within the APO, especially the rules of the Production and Marketing Plan (PMP)

The Association of Producer Organisations (APO) is mainly used for affairs that need to be arranged by the shrimp fishery as a collective. The APO comprises the representatives of the Producer Organisations. Regarding the brown shrimp fishery, the main domains of the APO are the MSC certification process and the Production and Management Plan (PMP). The new application for the NB licence might also be organised as a cooperation within the APO in the upcoming years.

Apart from the Producer Organisations, the trading companies are assumed to have significant influence on the brown shrimp fishery (Schouten & Verhey, 2016). The market for brown shrimp is characterized by having only a few large companies that together buy the greater part of the total supply of brown shrimp from the North Sea. This situation of only a few trading companies is assumed to be caused by the technical difficulties of peeling shrimp. However, the large shrimp trading companies have received fines for the infringement of cartels twice in the past; once in 2003, together with the POs, partly for obstructing a new trading company to enter the market (Nederlandse Mededingings Autoriteit (NMa), 2003; Steenbergen et al., 2017), and a second time in 2013 (*Case AT.39633 – Shrimps*, 2013).

## 4.4 The regulatory framework

This section on the regulatory framework will be divided in two parts, first the framework that aims at conserving the resource, second the framework that aims at conserving a competitive market. With ‘regulatory’, rules in a broad sense are referred to, including both legislation and other formal and informal rules.

### 4.4.1 Resource conservation

One of the few exclusive competences of the European Union is the conservation of the marine biological resources under the Common Fisheries Policy (Article 3(1) TFEU, see Box 2). The Common Fisheries Policy (CFP, EU Regulation No 1380/2013) was first established in 1983. Peñas Lado has argued that two principles stand as the backbone of the CFP conservation policy and have remained relatively stable over time, which he names as: “(1) *do not catch too much fish (through the instrument of the Total Allowable Catches) and (2) do not catch small fish (through the instrument of technical conservation measures)*” (2016, p. 49).

#### Article 3(1), Treaty on the Functioning of the European Union:

1. The Union shall have exclusive competence in the following areas:
  - (a) customs union;
  - (b) Establishing of the competition rules necessary for the functioning of the internal market;
  - (c) monetary policy for the Member States whose currency is the euro;
  - (d) the conservation of marine biological resources under the common fisheries policy;
  - (e) common commercial policy.

Box 2 Exclusive competences of the EU

In the EU, Total Allowable Catches have been applied to the main target species and species with a relatively high commercial value (Peñas Lado, 2016, p. 51). Although brown shrimp is fished as a target species (in contrast to a by-catch species) and has relatively high value, no TAC applies to this species. One underlying reason for not establishing a TAC could be that historically the impact of fishing on the brown shrimp stock was considered to have limited impact, since in comparison the shrimp mortality caused by natural predation was estimated to be much higher (Steenbergen et al., 2017; Welleman & Daan, 2001). Another reason could be that the type of stock assessments that are normally used to underpin the TAC, are not appropriate to assess the brown shrimp stock (Steenbergen et al., 2015; Tulp et al., 2016), as was mentioned earlier.

The Landing Obligation (art. 15 CFP) is important measure to reduce bycatches, which was introduced to the CFP in 2013. Currently, a *de minimis* exemption to the Landing Obligation applies to the brown shrimp fishery till at least the end of 2021 (Commission Delegated Regulation, 2018/2035). Therefore, shrimp fishers do have to register their bycatches of the species to which a TAC applies, but do not have to land them, as long as those bycatches do not exceed 6% of their catches.

There are some EU technical measures that apply to the brown shrimp fishery. The nets must have a mesh size of at least 16 mm and a sieve net to avoid unwanted bycatches must be incorporated (EU Regulation no 850/98; Steenbergen et al., 2017). Furthermore, the engine power of shrimp vessels should not exceed 221 kW (~300 HP) (EU Regulation no. 850/98).

Article 20 CFP allows Member States to take non-discriminatory measures for the conservation and management of fish stocks and the maintenance or improvement of the conservation status of the marine ecosystems within 12 nautical miles from the coast, given that the EU has not already done so. Where most EU fisheries are managed through the Common Fisheries Policy itself, the brown fishery is for a large part managed through measures taken by the coastal states.

The conservation measures that apply to the brown shrimp fishery taken by the Netherlands as a coastal state can be traced back to both fisheries law ('*Visserijwet 1963*' and '*Uitvoeringsregeling visserij*') and the general law for nature conservation on land and on sea ('*Wet natuurbescherming*').

Based on the Netherlands' fisheries law, a 'GK' or 'GV' licence is required to fish for brown shrimp. With a 'GV' licence, shrimp fishers can fish in the Dutch North Sea coastal zone (excluding the Wadden Sea). The 'GK' licence grants access to both the Dutch coastal zone as well as the Wadden Sea. The total number of GV and GK licences is limited, currently fixed on 137 GV licences and 89 GK licences (Steenbergen et al., 2017).

The Netherlands' fisheries law also establishes a 'weekend stop': between Friday noon and Sunday midnight, it is prohibited for Dutch brown shrimp vessels to be outside the harbour carrying shrimp fishing gear. This measure only applies to the brown shrimp fishery, and only within the Netherlands' coastal zone. This measure was introduced in 2005, formally as an additional measure to reduce the bycatches of juvenile flatfish (De Minister van Landbouw, Natuur en Voedselkwaliteit, 2005). According to Steenbergen et al. (2017, p. 2006), this rule

was a result of a discussion between the Dutch government and the fishing industry on effort limitations.

Based on the Netherlands general law for nature conservation, brown shrimp fishers require a 'NB' licence to fish in the Natura2000 protected areas. Given that many of the shrimp fishing grounds lie within Natura2000 zones, in practice all active shrimp fishers request and currently possess a NB licence. NB licences are granted for 5 years and require an extensive examination of the ecological effects of the fishery. Therefore, to decrease the administrative burden, the NB licence is requested by the collective of brown shrimp producer organisations, and after admission, granted to the individual fishers. The current NB licence includes several closed fishing zones and the requirement of having a functional 'black box' on board, which logs the activity and location of the vessel at all times.

In Dutch waters, the Netherlands' Food and Consumer Product Safety Agency (NVWA) is responsible for monitoring on compliance to the law.

Based on Article 5 (2) of the Common Fisheries Policy, Member States can restrict access to their 12 nm coastal zones to fishers from another Member State. The complex system of access is specified in Annex 1 of the EU Common Fisheries Policy. Belgian, Danish and German brown shrimp fishers are allowed access from 3 nm from the baseline. On the other side, the brown shrimp vessels that sail under the Netherlands' flag can access the coastal zone of Belgium (from 3 nm from the baseline) and Germany (North Sea coast 3-12 nm). The Dutch shrimp vessels cannot access the Danish and the UK coastal zones.

Apart from EU and national legislation, also a collective self-governance system is in place to increase the ecological sustainability of the brown shrimp fishery: the 'MSC plan', which was implemented to obtain MSC certification for the brown shrimp fishery. The process of obtaining the MSC certificate started around 2006, and was restarted as a trilateral application by the Dutch, German and Danish fleet in 2016 (Steenbergen et al., 2017). In 2017, the MSC certificate was obtained. One of the conditions of obtaining an MSC certification is 'effective management', which was realized by the Dutch, German and Danish brown shrimp fishing industry through the 'Brown Shrimp Management Plan', which is also referred to as the 'MSC plan'. The plan is focusing on increasing ecological sustainability and poses several technical measures that go above EU or national legislation. For instance, the MSC plan

requires a minimum mesh size of 26 mm from May 2020, whereas the EU norm requires a minimum mesh size of 16 mm. Another measure of the MSC plan is the so called ‘Harvest Control Rule’ (HRC). The HRC is set as a precautionary measure to avoid recruitment overfishing and is based on the landings per unit effort (LPUE), as a high LPUE indicates high shrimp abundance and vice versa. Historical data on LPUE is used to estimate a reference LPUE per month. If at a certain moment the LPUE is significantly lower than the reference LPUE for that month, the HCR will be applied to reduce the fishing effort, which means that the number of hours at sea per week per vessel will be limited. An independent private control agency is in charge to control the vessels and the POs on the MSC plan. The PO is responsible for the compliance and sanctioning of their member(s). Penalties can take the form of an effort reduction or a monetary fine.

#### **4.4.2 Market regulation**

Another exclusive competence of the European Union is the establishing of the competition rules necessary for the functioning of the internal market (Treaty on the Functioning of the European Union, Art. 3(1)). The objective of the competition rules is to establish a well-functioning internal market, which would encourage efficiency and innovation, and would reduce prices for consumers. Art. 101 of the Treaty on the Functioning of the European Union deals with ‘agreements between undertakings which may affect trade between Member States, and which have as their object or effect in the prevention, restriction or distortion of competition within the internal market’, i.e. cartels. Agreements that limit or control production are named as especially sensitive in this sense (TFEU Art. 101(1) b)).

After the last revision of the CFP in 2013, the Regulation on the Common Organisation of the Markets in Fishery and Aquaculture Products (Regulation EU No 1379/2013, abbreviated as CMO) was revised accordingly. The objectives for the establishment of the CMO include to “strengthen the competitiveness of the Union fishery and aquaculture industry, in particular producers” (CFP Art. 35 (1) c), which is interesting since competition law in general focusses on benefits for the consumers.

One of the revisions of the CMO comprised the enhancement of the responsibilities of the Producer Organisations (POs) in the day-to-day management of fisheries. The European Union has assigned a special role to Producer Organisations (POs) and Associations of

Producer Organisations (APOs) within the framework of the CMO. The main tasks of the producer organisations as specified on the official EU website are:

- *“guide producers towards sustainable fishing and aquaculture, in particular by collectively managing the activities of their members,*
- *help them match supplies with market demands, and*
- *support them in creating added value.”*

In a guidance document on the implementation of POs, the special position of POs regarding EU competition law is explained: *“Some agreements on setting up a PO, or the internal rules governing its conduct, might involve restricting competition. The Member State must examine this at the recognition stage. This applies, for example, if a PO’s internal rules on fisheries exploitation (Article 17(a) of the CMO Regulation) aim to control production. Under Article 101(1) TFEU, this practice is normally prohibited. However, as these rules are necessary to achieving the objectives of the CFP and CMO (and thus those of Article 39 TFEU), such practice could benefit, under certain conditions, from an exception to the application of competition rules. [...]”* (European Commission, 2016, p. 9).

The instrument for guidance of the POs is the ‘Production and Market Plan’ (PMP), of which the objectives and format are defined in Article 28 EU Regulation No 1379/2013 (see Box 3) and further specified in the Annex of Commission Implementing Regulation (EU) No 1418/2013. Member States are responsible for checking and approving the PMPs, and for controlling the POs on this point (Art. 28 (6-7) EU Regulation 1379/2013).

One of the tools for stabilising the market is the ‘storage mechanism’: if no buyer has been found at the market that was willing to buy the product at the ‘trigger price’, the fisheries organisations can temporarily store the product to reintroduce it to the market at a later stage

*Box 3. Requirements for PMPs.*

**Art. 28(2) EU Regulation 1379/2013**

The production and marketing plan shall comprise:

- (a) a production programme for caught or farmed species;
- (b) a marketing strategy to match the quantity, quality and presentation of supply to market requirements;
- (c) measures to be taken by the producer organisation in order to contribute to the objectives laid down in Article 7;
- (d) special anticipatory measures to adjust the supply of species which habitually present marketing difficulties during the year;
- (e) penalties applicable to members who infringe decisions adopted to implement the plan concerned.

(Art. 30 EU Regulation No 1379/2013). Methods for setting the trigger price are regulated through Art. 31 (idem): the POs should make proposals and the Member State should conclude the trigger price, which can never exceed 80% of the average price over the last three years. Fisheries POs can receive financial support for the storage mechanism.

Regarding the Dutch brown shrimp fishery, such a Production and Marketing Plan was established by the Association of Producer Organisations. The plan was proposed by the APO and sent to the Dutch Ministry of Agriculture, Nature and Food Quality (LNV) for approval. Part 2 of the plan specifies a ‘Supply Strategy’, which is described as follows: *“To avoid the situation of a market flooded by shrimp, which impedes the economic viability of the shrimp fishers, the price of producing shrimp was estimated by Wageningen Economic Research (WEcR). This production price calculation was used to set the trigger price, in order for the CVO [APO] to buy part of the shrimp when the price falls below the trigger price. This trigger price can also be established as 80% of the average price in the last three years. For 2021, the price is set at 300 euro cents [per kilo shrimp]. This amount is lower than the production price calculated by WEcR and lower than the 80% level. [...]”* (PMP, 2021, p. 5). The APO can store the shrimp for 40 weeks maximum, after which the shrimp should be either reintroduced to the market or taken from the market for human consumption completely.

An additional possibility for the APO, described in the supply strategy, is the ability to limit the number of hours at sea per week per vessel, which is described as a *‘temporary extension of the weekend stop’* (PMP, 2021, p. 5). This limitation is introduced gradually: every week the price continues to be below the trigger price, 12-hours are taken from the total number of fishing hours for the next week. The first introduction of a limitation will take 24-hours at once. If the price continues to fall below the trigger price, even with time limitations in place, the APO can announce a full closure of the shrimp fishery. When the price rises above the trigger price again, the effort restrictions are also lifted stepwise.

The plan describes that the monitoring of the fishing vessels on complying with the effort reductions will be performed by the APO, based on the e-logbooks and/or the blackbox data of the vessels. In case of non-compliance, the PO of the non-compliant vessel will have to sanction this behavior. Currently, the penalty for noncompliance is set at €500/hour arriving late at the harbour, plus one hour less fishing (per hour late) in the next week.

### 4.4.3 Conclusion on the regulatory framework

An overview of the most important regulations can be found in Table 3 on page 38. Rules applying to the Dutch brown shrimp fishery can be found on multiple levels (EU regulations, national regulations and established by the APO) and in various fields of law (fisheries law, nature conservation law, competition law). Some types of norms can be found in multiple places, such as the minimum mesh size that is regulated on the EU level and in the MSC-plan. A fishing effort reduction in the form of a limitation of the number of fishing hours per week per vessel can be found in three places:

- The 'weekend stop' is established through the Netherlands' fisheries legislation and prohibits Dutch brown shrimp vessels to be outside the harbour carrying shrimp fishing gear between Friday noon and Sunday midnight.
- Through the PMP, fishing hours per week can be limited if the market price of shrimp is lower than the trigger price, which can occur when the abundance of shrimp is high.
- The Harvest Control Rule of the MSC plan can reduce fishing hours per week if the LPUE is significantly lower than the reference LPUE for that month, thus when the abundance of shrimp is low.

If 'fisheries co-management' is seen as a management scheme in which government agencies and fishers, through their organisations, are sharing responsibility in the management of the fishery (Jentoft, 1989, p. 143), the total regulative framework of the Dutch brown shrimp fishery can be seen as a co-management system, as both the government agencies and the producer organisations have their responsibilities. At the same time, the PMP and the MSC management plan can both be seen as 'collective self-governance' as described by Ostrom (1990).

It must be noted that the PMP and the MSC plan are relatively new, both are implemented after 2016. Regarding the situation before the introduction of the PMP and the MSC management plan, the brown shrimp fishery at the North Sea has more often been characterized as 'unregulated', despite the multitude of regulations (Santos et al., 2017, p. 1; Steenbergen et al., 2015, p. 7; Tulp et al., 2016, p. 2540). As mentioned earlier, at the time,

Temming and Hufnagl (2015) concluded that potentially growth overfishing<sup>7</sup> was taking place. Whether the situation of growth overfishing has changed after the implementation of the Harvest Control Rule of the MSC plan has not yet been reported.

Steenbergen et al. concluded in 2017 that the initiatives for collective self-governance failed due to a mismatch between the fisheries policy framework and the competition law framework. The ACM was not convinced by the available scientific evidence on the need for (self-)governance for this fishery. This hurdle seems to have been taken now, as the PMP and the MSC management plan are now in place. In the next chapter, the practice of collective self-governance of the Dutch brown shrimp fishery will be discussed.

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<sup>7</sup> Growth overfishing is a form of overfishing where many of the fish/shrimp are caught at a too small size, which hinders the stock to reach the maximum biomass (King, 2007, p. 250).

Table 3 Overview of the regulative framework for the Dutch brown shrimp fishery. The list is non-exhaustive.

Source	Established by	Basic rules applying to the brown shrimp fishery	Objective	Responsibility for monitoring and sanctioning
Common Fisheries policy (CFP)	European Union	<ul style="list-style-type: none"> <li>- Enabling coastal states to establish measures for fisheries within 12 nm zone</li> <li>- Some technical measures</li> </ul>	Protection of the marine resources	The Netherlands' Consumer Product Safety Agency (NVWA)
<i>Visserijwet 1963</i> and <i>Uitvoeringsregeling visserij</i>	The Netherlands	<ul style="list-style-type: none"> <li>- Requirement of a fishing licence ('GV' or 'GK' licence)</li> <li>- Prohibition to fish for shrimp during the weekend ('Weekend stop')</li> </ul>	Protection of the marine resources	The Netherlands' Consumer Product Safety Agency (NVWA)
<i>Wet Natuurbescherming</i>	The Netherlands	<ul style="list-style-type: none"> <li>- Requirement of an additional licence to fish within the N2000 areas; the licence itself can pose additional (technical) measures to mitigate the impact of fishing in those areas</li> </ul>	Nature conservation	The Netherlands' Consumer Product Safety Agency (NVWA)
Competition Law	European Union	<ul style="list-style-type: none"> <li>- Prohibition of the abuse of market power, for instance through monopolies and cartels</li> </ul>	Protection of the competitive market	The Netherlands' Authority for Consumers and Markets (ACM)
Common Market Organisation for Fishery and Aquaculture Products	European Union	<ul style="list-style-type: none"> <li>- Assigning a special role to (Associations of) Producer Organisations.</li> <li>- Some exceptions to the competition rules.</li> </ul>	Strengthen the competitiveness of the EU fisheries, in particular the producers	The Netherlands' Authority for Consumers and Markets (ACM)
Production and Marketing Plan	Association of Producer Organisations (APO)	When the price drops below the trigger price, the number of fishing hours per week per vessel can be limited	Protection of the primary producers	Producer Organisations
MSC Management Plan	Association of Producer Organisations (APO)	<ul style="list-style-type: none"> <li>- Technical measures</li> <li>- Harvest Control Rule: when the catch per unit effort is significantly lower than expected, the number of fishing hours per week per vessel can be limited</li> </ul>	Protection of the marine resource	A private control agency hired by the APO, in cooperation with the POs

## 5 Collective self-governance in practice

In this chapter the second and third research questions will be addressed, being: ‘What is the main collective action problem as perceived by the fishing industry?’ and ‘How is the collective action functioning in practice?’

### 5.1 The collective action problem as perceived by the appropriators

In the interviews, the respondents were asked to describe the fishery as they perceived it. The fishery was described as a small scale, but very complex fishery. The fishing companies often are family businesses. The fishers were described as headstrong, liberated entrepreneurs. Competition between fishers was perceived to be high.

Several respondents indicated that difficulties for the shrimp fishery arise at the moment that the abundance of shrimp suddenly significantly increases. On the other hand, the periods of relatively scarcity of shrimp benefit the economic results of the fleet. One of the representatives explains his experiences of the last years: *“The weird thing about the shrimp fishery is that the times of poor catches (when the supply is lower than the demand) are usually the better periods for fishers economically. [...] Between 2014-2018 the catches were extremely poor. In those years, the shrimp fishery has had a ‘good’ income. [...] At some point in 2019 the catches exploded. At first, the price is still at a high level, at those moments, the fishers will have good results, but at some point, this will turn, and the price will collapse.”* The pattern described roughly corresponds to the pattern of landings, prices and revenues of Figure 3 and 4, notwithstanding the ‘explosion of catches’ seemingly happening in 2018 instead of 2019.

Some of the respondents also noted the consequence of the storage of frozen shrimp in warehouses. If the shrimp fishers are catching more than the traders are processing in the peeling facilities, the shrimp will pile up and be stored in warehouses. At some point, the available warehouse storage will be filled up, which can cause a literal oversupply of shrimp: not only the price drops, but the shrimp might not at all be bought by the traders, as the available space in the warehouses is full. For shrimp fishers, the situation of coming to the auction and not being able to sell their catch poses a real threat, which motivates them to choose for a ‘gentlemen’s agreement’ with a shrimp trader. Furthermore, the storage full of

shrimp will cause low shrimp prices for months or even years, as newly caught shrimp is competing in price with the shrimp that was bought for low prices during the period of surplus. One of the fishers explained: *“A few years ago, there was an overflow of shrimp. We have tried to slow the catches down, but it did not work, there was no unity in the industry. At that moment, we supplied the market until all warehouses were full, and we still face the consequences. The storage finally seems to have evaporated a little.”*

Given the descriptions of the respondents, I would like to define the collective action problem of the appropriators as follows: Brown shrimp has a high seasonal and year-to-year fluctuation in abundance and catchability. Oversupply of shrimp can be stored in warehouses in frozen condition. Normally, there would be an inversed relationship between supply and price of shrimp: when the supply goes up, the prices go down, which keeps the income for fishers relatively stable. However, the abundance and catches of shrimp can in a relatively short time peak to such a level, that the shrimp market is oversupplied for months or even years, creating a low shrimp price even in times of low shrimp abundance afterwards. Frozen storage of shrimp extends the time of the shrimp in the market. All shrimp fishers are highly motivated to fish as much as possible as soon as a peak in shrimp abundance appears: the catch per unit effort is high, while at the same time the price level has not yet dropped. However, all shrimp fishers do also know that if they would reduce the fishing effort during the peak abundance, they would not face the consequences of oversupply by low prices in the months or years after.

The main collective action problem of the Dutch brown shrimp fishery is therefore related to finding a mechanism that stabilises the markets, rather than a mechanism that conserves the resource. The mechanism of collective action works the same: when all cooperate to limit the fishing effort, all fishers benefit from the stable market, notwithstanding temptations to free ride. In the following, the practice of collective action to increase market stability will be examined. Therefore, the focus of the next paragraphs will be on the collective self-governance through the Production and Marketing Plan (PMP), as this plan aims at market stability (in contrast to the MSC Plan that aims at resource conservation).

## 5.2 Current practice of collective action

### 5.2.1 The importance of past experiences with collective action

The Production and Marketing Plan (PMP) was first established in 2016 (Steenbergen et al., 2017). Several respondents stressed the importance of past experiences with the Netherlands' Competition Authority (NMa)<sup>8</sup> in this respect.

In the past, the POs have been collaborating with the shrimp traders to balance the supply and demand for shrimp, which turned out to benefit the fishery as a collective. In the early 2000s, the ACM investigated the situation in the brown shrimp fishery and concluded a 'severe violation of competition law' by agreeing on minimum prices and limiting catches between 1998-2000 and for cooperating in excluding a new trader in 1999. The producer organisations of the Netherlands, Germany and Denmark received fines between €48.000- €909.000 per organisation, and the trading companies receive fines up to €5.090.000, depending on their market share. The total amount of fines counted €13.8 million (Nederlandse Mededingings Autoriteit (NMa), 2003). Afterwards the ACM remained alert on the situation. In 2004, the National Market Authority reinvestigated the brown shrimp market and found no sign of market disruption (Nederlandse Mededingings Autoriteit (NMa), 2004).

Several respondents have referred to this fine of 2003. A PO representative for instance noted that limiting catches to improve the price for the fishers would immediately be reprimanded by the NMa. Steenbergen et al. (2017) note that the producer organisations afterwards took 'extreme caution' in cooperation and self-management. One of the respondents explained how these events are still relevant today: *"Up to today we are dealing with the consequences [of the NMa verdict] in relation to the PMP. For instance, we can't agree nor discuss prices with the trading companies. That is not allowed. So, we don't do that. We can only be informed about the developments of the markets and the supply. That we can use for the PMP, which we can translate to a limitation of the number of hours that the fishers can go to sea. That is the current steering mechanism."* The verdict of 2003 has been interpreted as a prohibition for the POs in interfering in the price of shrimp and the number of kilos caught per week. On the

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<sup>8</sup> In 2013, the Netherlands Authority for Consumers and Markets (ACM) was established through the merger of the Consumer Authority, the Independent Postal and Telecommunications Authority and the Dutch Competition Authority (NMa).

other side, the limitation of the number of fishing hours might be allowed, under specific conditions.

### **5.2.2 The PMP in practice**

As mentioned before, the PMP entails a mechanism to temporarily take shrimp from the market on the one side, and a mechanism to limit the fishing hours per week on the other. Respondents noted that the option of taking shrimp from the market by the APO is currently not practiced. It was explained that the funds for taking shrimp were limited and furthermore financial losses had occurred when the shrimp were reintroduced to the market at a later stage, as cost had been made for storage.

The option of limiting fishing hours is being applied by the APO and POs. In an interview, it was explained that the PMP-committee, typically the representatives of the POs, decide on the time limitations, which then have to be monitored by the POs. Many respondents have referred to compliance issues in this respect, as the temptations for fishers to free ride are considerable. The underlying issue however seems to occur at the level of the POs rather than the fishers. Several respondents indicated that some POs are competing on the favour of the fishers by applying the rules and sanctions less strictly. One representative for instance explained that three members of his PO left to move to another PO of which the fishers believed that the rules were applied less precisely. Another feared for losing members to other POs when applying the rules correctly. A fisher noted strong leadership by the POs as a prerequisite for proper application of the PMP, which currently not all POs were showing. Both fishers and PO representatives expressed their frustration and unhappiness regarding the current application of the PMP time limitations.

Respondents noted that have been attempts to merge the POs into one organisation, which would resolve the issue of competing POs and would therefore benefit the fishery. However, past attempts have not been successful. As noted earlier, the shrimp fishery and the flatfish fishery do largely share the infrastructure of POs, which might make a merge of organisations more complicated as more interests are at stake. Furthermore, respondents noted that there are ideas to relocate the responsibility for monitoring and sanctioning of the PMP time limitations from the POs to an independent agency, as is currently the case for the MSC plan. This

alternative might also mitigate the issue of competing POs and improve the functioning of the PMP.

Some trading companies seemed to currently play a role in the stabilisation too. As many of the shrimp fishers have a ‘gentlemen’s agreement’ with a trader, the traders could reinforce the PMP time limitations to the fishers they have informal connections with. Although the traders have no formal mechanism to monitor or sanction, the influence was estimated to be significant. However, not all traders follow this pattern. Some smaller trading companies enter the market especially in times of high shrimp abundance and low prices, therewith challenging the PMP limitations.

On the over-all functioning of the PMP and the stabilisation of the market, it was noted that the price drops currently still occur from time to time, but that the PMP stabilisation mechanism in general worked well.

Another topic mentioned by multiple respondents is the existence of so-called ‘free riders’: shrimp fishers that are not at all part of a PO. In the shrimp fishery, it is not obligatory to be a PO member. ‘Free riders’ do not have to comply with any rules of the POs: the PMP and the MSC plan. It was expressed by one of the interviewees that the actual number of free riders is low, but still has a considerable impact by challenging the authority of the POs. Another interviewee noted that the number of free riders has declined in the last years, and the still existing ones were said to behave ‘fairly proper’.

### **5.2.3 The PMP and the Weekend stop**

As noted in paragraph 4.4.3; both the PMP, as well as the Weekend stop (national legislation) and the Harvest Control Rule (of the MSC plan) limit or can limit the number of fishing hours per week per vessel. In paragraph 5.1 the collective action problem of the Dutch brown shrimp fishery was noted as how to limit the shrimp fishery in times of shrimp oversupply. Not only the PMP mitigates the issue of oversupply, also the Weekend stop is considered important in this respect. For instance, if the Weekend stop is not monitored well, this can reduce the effect of the effort limitations under the PMP.

There seemed to be considerable support for the weekend stop on the side of the shrimp fishery, as the measure gives the (highly competitive) fishers some rest during the weekend. However, on the monitoring and enforcement of this regulation discontent was expressed by the fishers. Fishers observed non-compliance of colleagues, starting their fishing week before midnight on Sunday. One fisher even called himself 'foolish' for sticking to the weekend stop and leaving the harbour only after midnight. Because of its status as national legislation, the public control agency called the 'NVWA' is responsible for the monitoring and enforcement of this measure. The NVWA, however, stressed the controversy on the monitoring of the weekend stop because of its link to market stabilisation and collective self-governance through the PMP. The NVWA stated that, as a public authority, it does not want to be involved in the collective self-governance of the brown shrimp industry.

## 6 Discussion and conclusion

In the introduction of this thesis the main question was positioned: *How is the Dutch brown shrimp fishery currently managing their collective action problem?*

Which was answered through answering three sub questions:

1. *What characterizes the Dutch brown shrimp fishery and how is it regulated?*
2. *What is the main collective action problem as perceived by the fishing industry?*
3. *How is the collective action functioning in practice?*

In the following, a summary of the results will be given, followed up by a broader discussion on fisheries collective action.

In paragraph 3.8, strengths and weaknesses of the study were discussed. Before interpreting the results, two notions should be repeated:

- This study mainly has taken the perspective of the appropriators: the Dutch brown shrimp fishing industry. This perspective must be considered when interpreting the results. Taking another perspective, and for instance including the perspective of other groups that have an interest in the management of brown shrimp fishing, such as nature conservation organisations, would probably have given different results.
- An important limitation of this study is the limited amount of shrimp fishers that have been interviewed for this thesis. At the same time, the majority of representatives of Dutch brown shrimp producer organisations have participated. Still, generalisations on perceptions and opinions of *the* Dutch brown shrimp fishery should be interpreted with this notion in mind.

### 6.1 Summary of results

*1. What characterizes the Dutch brown shrimp fishery and how is it regulated?*

In Chapter 3, we have seen that brown shrimp is a highly dynamic species: it has a short life span, two reproductional seasons, a high natural and fishing mortality, and a high year to year variation in total annual biomass. This is one of the reasons why classic stock assessments and common management practices (such as a Total Allowable Catch) do not suit this fishery. The fishery for brown shrimp is performed as single species fisheries by around 550 vessels

on the North Sea in total, of which around 200 under a Dutch flag. The fishery and the landings follow the dynamics of the shrimp stock: high seasonal and year to year fluctuations. The Dutch brown shrimp industry is organised through six Producer Organisations and an Association of Producer Organisations. Furthermore, the market is dominated by a few large trading companies, which seem to have significant influence on the fishery. Regarding the regulatory framework, we have seen that the fishery is regulated on multiple levels (EU regulations, national regulations, and collective self-governance) and in various fields of law (fisheries law, nature conservation law and competition law). Furthermore, three fishing effort reduction measures in the form of limitations of the number of fishing hours per weeks were encountered: the weekend stop (national legislation to reduce bycatches), the PMP limitation of fishing hours (collective self-governance to stabilise the market in times of oversupply) and the Harvest Control Rule (collective self-governance through the MSC plan to protect the resource).

### *2. What is main the collective action problem as perceived by the fishing industry?*

Based on the interviews, the main collective action problem was the highly instable market and the oversupply in times of peak shrimp abundance, which causes the price to drop to a very low level for months or even years after. The collective action that would stabilise the market would be: if all shrimp fishers would limit their fishing effort during the peak abundance, they would all not face the consequences of oversupply through low prices in the months or years after. The collective action to mitigate this issue is organised through the Production and Marketing Plan. Therefore, the focus of this study has been on this plan, and not on the other collective self-governance: resource conservation through the MSC-plan.

### *3. How is the collective action functioning in practice?*

Past experience with a weighty fine from the Netherlands' Authority for Consumers and Markets in 2003 still seems to be important as the industry is very alert on not receiving another fine. Where Steenbergen et al. in 2017 concluded that initiatives for collective self-governance failed due to a mismatch between the fisheries policy framework and the framework for competition law, this hurdle now seems to be taken, as the Production and Management Plan is now established. On the practical implementation of the PMP, some issues persist. Some Producer Organisations, responsible for the sanctioning of their members when they do not comply with the limitations on the number of fishing hours, seem to

compete with each other on the favour of their members. This competition of POs through monitoring and sanctioning forms a collective action problem in itself, and currently hinders the functioning of the PMP.

## 6.2 Discussion

When linking the results to the theory as discussed in Chapter 2, we can characterise the Dutch brown shrimp fishery as a common pool resource that presents two collective action problems for the appropriators: the conservation of the resource and the stabilisation of the market; of which the latter one was perceived to be more influential than the former. The collective action for resource conservation is organised through both state regulation (mainly in the form of input regulations) and collective self-governance (through the MSC management plan). The collective action for stabilisation of the market, which has been the focus of this thesis, is mainly organised through collective self-governance (through the PMP) and indirectly through state regulation (the weekend stop).

We have seen that free rider problems occur at two levels: the level of the appropriators (i.e. fishers that do not comply with the collective self-governance rules) and at the level of monitoring and sanctioning (i.e. the producer organisations that compete with each other on the favour of the fishers, which hinders the monitoring and sanctioning of the PMP). This finding corresponds to Ostrom's theory on collective action and the design principles, as she qualified monitoring and sanctioning to be the 'crux' of organising collective action (Ostrom, 1990, p. 94). Ostrom noted that a second order collective action problem can arise when the appropriators have to monitor each other. In the case of the brown shrimp fishery, we saw the second order collective action problem of monitoring at the level of the multiple producer organisations, rather than the level of the appropriators themselves.

The fisher that called himself 'foolish' for sticking to the weekend stop can be linked to Levi's notion of "*No one prefers to be a 'sucker'*" (in: Ostrom, 1990, p. 94), in the sense that no one likes to be the only one that is sticking to the rules, while the others are breaking them.

It would be interesting to follow the developments in this field in the next years, as alternatives to the current mechanism of monitoring and sanctioning operated by the POs have been proposed, such as an independent monitoring agency.

In Chapter 2 we have seen that fisheries collective action can turn into a ‘monopoly fishery’, as described by Manning & Uchida (2016). On the collective action to stabilise the market within the Dutch brown shrimp fishery, this issue seems to have been resolved, as the PMP for instance works with a ‘trigger price’ and is being sent to public authorities to be approved. Therefore, the PMP does not seem to establish a monopoly situation.

### **6.3 Conclusion**

The basic paradigm in fisheries management is based on the assumption that the collective action for resource conservation will simultaneously benefit the fishers: when a Tragedy of the Commons can be avoided by reducing fishing effort, the fishers are secured of a stable income from fisheries and thus benefit. By investigating the case of the brown shrimp fishery, we learned however, that resource conservation and a stable income for fishers do not always coincide as expected. In this fishery we actually saw two collective action problems: resource conservation and market stabilisation. For both of them holds that collective action in the form of effort reduction could mitigate the problem, but the timing on when to reduce effort differs: for resource conservation, the effort should be reduced when the shrimp abundance is relatively low; for market stabilisation, the effort should be reduced when the shrimp abundance is high. Therefore, because of the dynamics in this fishery, the timing of effort reductions turns out to be of major importance. This is a valuable finding of this study, as precisely timing effort reductions is not often in the focus of attention of fisheries managers.

Although the issue of collective action versus a monopoly fishery seems to have been resolved in this case, the topic remains very sensitive within the fishery, if not a taboo. I would argue that an open discussion on the borders between collective action for resource conservation, market stabilisation, and the formation of cartels would benefit the discussion on collective self-governance in fisheries. Furthermore, for this specific fishery, such a discussion could reduce the fear of being surprised by a weighty fine from the ACM.

Especially in the sphere of policy makers, phrases as ‘the fishing industry should take its responsibility’ are expressed, implying that fishing industries should organise themselves to fish sustainably. Ostrom (1990) studied factors that could enable fisheries to collectively manage themselves and Leal (1998) concluded that ‘a self-regulated fishery is an idea whose time has come’. However, it can be questioned how much responsibility should be delegated

to fisheries organisations. As Mannin & Uchida (2016) noted, collective action for resource conservation can turn into a less favourable 'monopoly fishery' (although they also argue that a monopoly fishery is still preferable over a Tragedy situation). Also, Jentoft (1989) noted that fishers are not the only groups with interests in the management of the fishery, and by having the fishers self-govern the resource, the interests of other groups (such as environmental groups and other types of fishers) might be neglected, such as the issue of bycatches of non-target species. Therefore, it should be carefully considered which functions the fishery could be allowed to self-govern (and under which conditions), and which should remain within the power of public policy institutions. I would like to encourage programs that educate fisheries managers to include this critical reflection on collective self-governance in their curriculum.

The attention has been on the collective action in the field of market stabilisation, to give focus to this thesis. The current functioning of the collective action on resource conservation through the Harvest Control Rule of the MSC plan has not yet been described in scientific literature. Further resource should be dedicated both to the practice of form of collective action, as well as the ecological effects on the resource, to answer the question whether the fishery is still potentially causing growth overfishing.

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## Appendix I – List of respondents

<b>Respondent</b>	<b>Date</b>	<b>Digital or in-person</b>	<b>Duration</b>	<b>Consent form</b>	<b>Recorded and Transcribed</b>
Fisheries representative 1	10.02.2021	Digital	45 mins	Oral, recorded	Yes
Brown shrimp fisher 1	12.02.2021	Digital	51 mins	Oral, recorded	Yes
PO representative 1	18.02.2021	Digital	50 mins	Oral, recorded	Yes
Brown shrimp fisher 2	19.02.2021	Digital	2 hours	Written	Yes
PO representative 2	22.02.2021	Digital	51 mins	Written	Yes
PO representative 3	23.02.2021	Digital	1h 42 mins	Written	Yes
Representative Ministry LNV	24.02.2021	Digital	50 mins	Oral, recorded	Yes
PO representative 4	02.03.2021	Digital	47 mins	Written	Yes
PO representative 5	03.02.2021	Digital	1h 10mins	Written	Yes
Representative NVWA	09.03.2021	Digital	36 mins	Oral, recorded	Yes
Representative Trading Company 1	Non-response				
Representative Trading Company 2	Non-response				

## **Appendix II – Information sheet and consent form for respondents<sup>9</sup>**

‘Master thesis Noor Visser: Management perspectives of the Dutch brown shrimp fishery in the North Sea’

You are invited to participate in the above mentioned research project, which complies with the General Data Protection Regulation and Personal Data Act. This letter will give you information about the purpose of the project and what your participation would involve when you choose to do so.

### **About the project**

This project is conducted by Noor Visser as her master thesis for the master International Fisheries Management at the University of Tromsø. The project is supervised by Prof. Peter Arbo and Maaïke Knol-Kauffman, PhD; who are also responsible for the project. The project has started August 11<sup>th</sup>, 2020 and will finish before June 18<sup>th</sup>, 2021.

### **Purpose and background**

The purpose of the project is to get a better understanding of the current situation of the brown shrimp fisheries in the Dutch part of the North Sea and its management. Apart from describing the current situation and various perspectives on this situation; the study will also look into future pathways of the management of this fishery.

Semi-structured interviews will be held to collect different perspectives on the fishery. The interviews will be held with:

- Representatives of the Dutch brown shrimp fishing fleet and/or active fishers
- Representatives of the Dutch public agencies that work with the brown shrimp fishery
- Representatives of intergovernmental organisations that are concerned with the brown shrimp fishery

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<sup>9</sup> Respondents would receive the sheet in the language of the interview, so in practice, all respondents received the Dutch translation.

You are invited to participate, since you are associated with one of those respondent groups.

## **Participation**

Participation in the research project involves a personal interview, which will be held preferably digitally. The interview will take 30-60 mins. The main topic of the interview will be the current state of the brown shrimp fisheries and your perspective on the future of this fishery. If you give permission, the interview will be audiorecorded with the app 'Nettskjema-diktafon'.

## **Participation is voluntary.**

If you choose to participate, you can withdraw your consent at any time without giving a reason. Withdrawal is preferably communicated by email to the researcher (nvi009@post.uit.no) or to one of the supervisors (maaike.knol@uit.no). If the consent is withdrawn, all personal data of the participant will be deleted. There will be no negative consequences for you if you choose not to participate or later decide to withdraw.

## **Handling of the data**

We will only use your personal data for the purpose specified in this information letter. We will process your personal data confidentially and in accordance with data protection legislation (the General Data Protection Regulation and Personal Data Act).

If you give consent to audiorecord the interview, the app 'Nettskjema-diktafon' will be used. This app is developed by the University of Oslo to secure research data. The app will store the files directly into Nettskjema, instead of storing the files on the device that is used for recording. When the device is not online while recording, the recording will be encrypted and temporarily stored on the device until the phone is online. For security reasons, it is not possible to play the audio recordings directly on the device used for recording.

The audiorecordings of the interviews will only be accessible to the master student (Noor Visser) and the supervisors (Prof. Peter Arbo and Maaike Knol-Kauffman PhD). The recordings will be transcribed (written out) and anonymised.

The final product of the project (the master thesis) will not contain personal data. All data will be anonymised, so so that anyone reading the document is not able to identify (directly or indirectly) any of the people who have participated in the study.

All audio recordings and other data that can (directly or indirectly) be traced back to a person will be deleted after the project is completed.

## **Risks to the participants**

To avoid spread of the COVID-19 virus, interviews will preferably be held digitally. When meeting in person, the national guidelines preventing spread of the virus will be followed, such as good hand hygiene, social distance and cough etiquettes. There are no other health risks identified.

## **Your rights**

So long as you can be identified in the collected data, you have the right to:

- access the personal data that is being processed about you;
- request that your personal data is deleted;
- request that incorrect personal data about you is corrected/rectified;
- receive a copy of your personal data (data portability); and
- send a complaint to the Data Protection Officer or The Norwegian Data Protection Authority regarding the processing of your personal data.

## **What gives us the right to process your personal data?**

We will process your personal data based on your consent. Based on an agreement with UiT The Arctic University of Norway, NSD – The Norwegian Centre for Research Data AS has assessed that the processing of personal data in this project is in accordance with data protection legislation.

## **Where can I find out more?**

If you have questions about the project, or want to exercise your rights, contact:

- UiT The Arctic University of Norway via Maaïke Knol-Kauffman, by email: [maaïke.knol@uit.no](mailto:maaïke.knol@uit.no); or by telephone: tlf. +47 7764 6731.
- The Data Protection Officer of UiT The Arctic University of Norway, Joakim Bakkevold, by e-mail: [personvernombud@uit.no](mailto:personvernombud@uit.no); or by telephone: +47 77646322.

- NSD – The Norwegian Centre for Research Data AS, by email: personverntjenester@nsd.no; or by telephone: +47 5558 2117.

Yours sincerely,

Maike Knol-Kauffman

Noor Visser

Supervisor

Master student

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## Consent form

I have received and understood the information about the project '*Master thesis Noor Visser: Management perspectives of the Dutch brown shrimp fishery in the North Sea*' and have been given the opportunity to ask questions. I give consent:

- to participate in a personal interview
- to record the audio of the interview

I give consent for my personal data to be processed until the end date of the project: June 18<sup>th</sup>, 2021.

**Name:** \_\_\_\_\_

**Date:** \_\_\_\_\_

# Appendix III – Interview Guide

## Intro

- Welcome
- Explanation of the project
- Permission for audio recording (written or oral at beginning of the recording) and turning on the audiorecording.

## Questions

- If you would describe the Dutch brown shrimp fishery to someone who is not familiar with this fishery, how would you describe it?
  - o Further questioning the elements named by the respondent: What do you mean with X? Why is Y important?
- What are the rules in the Dutch brown shrimp fishery? Which are the most important?
- Questions to specific topics:
  - o Could you explain me the role of the PO?
  - o I heard about the PMP, could you explain how this works? And who controls this?
  - o Can you tell me some about the brown shrimp traders? How do those ‘gentlemen’s agreements’ work? Why would you make a gentlemen’s agreement with a trader?
  - o How does the licencing system work? To a fisher: what kind of licences do you posses?
  - o How does the weekend stop work? Who controls the weekend stop?
- What is the current situation of the brown shrimp fishery? Is it going well?
- How do you see the future of the Dutch brown shrimp fishery?

## Outro

- Thank you for your participation
- Will receive a copy if interested

## Appendix IV – Coding scheme

Red: Functioning of POs, self-management

Light green: PMP

Brown: Weekend stop

Black: Control and monitoring, compliance

Orange: Shrimp trade, shrimp market

Yellow: Shrimp biology/ecology, spatial distribution

Grey: Licences

Blue: Nature conservation, external effects

Purple: MSC

Dark green: Sieving

