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**EVOLUTION OF MANAGEMENT IN THE CELTIC SEA FISHERY:
EFFECTS ON THE GALICIAN FLEET**

Manuel M. Varela-Lafuente

Department of Applied Economics, University of Vigo,
Lagoas-Marcosende s/n, 36310 Vigo, Spain

Juan C. Surís-Regueiro

Department of Applied Economics, University of Vigo,
Lagoas-Marcosende s/n, 36310 Vigo, Spain

M^a Dolores Garza-Gil

Department of Applied Economics, University of Vigo,
Lagoas-Marcosende s/n, 36310 Vigo, Spain

Corresponding author

M^a Dolores Garza-Gil
Lagoas-Marcosende s/n,
36310 Vigo, Spain
dgarza@uvigo.es
Tel: 34 986 812515
Fax: 34 986 812401

Abstract

Characteristics and evolution of the Galician fishing fleet operating in the Celtic Sea are reviewed in a context of Spanish regulation and successive reforms of the European Common Fisheries Policy. This paper analyses the most significant aspects of fishing management that have affected this fleet's activity while linking the institutional framework to strategies and results of Galician fishing in these European waters and also identifying the fishery's greatest management challenges. Finally, we examine stakeholders' perceptions of the most relevant changes resulting from EU fishery reforms.

Keywords: fishing management, CFP, Galician fishery, European fishing areas, economic effects

Highlights

- Galician fishing fleet in European waters is studied
- Successive reforms of European and Spanish fishing management are reviewed
- Economic data for the Galician fleet in European waters are reported
- Fishers' views on the most recent CFP reform are summarized

1. Introduction

The Spanish fleet has for decades been one of the most important operating in European Union (EU) community waters, owing mainly to the number of vessels working in such fishing grounds such as the “Grand Sole” or the Celtic Sea—more specifically, in the International Council for the Exploration of the Sea (ICES) zones Vb, VI, VII, and VIIIabd. Fleets from other countries also operate in these waters; the most significant (by volume of catches) are from France, the United Kingdom, Denmark, Ireland, Norway, Belgium, and the Netherlands.

The Spanish fleet reached its peak at the end of the 1970s, with almost 600 vessels in these waters. Yet this number is now considerably lower—fewer than a hundred vessels and limited to a small number of ports (Celeiro and Vigo in Galicia, and Ondarroa and Pasajes in the Basque Country). Galician vessels account for some 80% of that fleet. This significant reduction in the number of fishing units can be understood only by reviewing the fleet’s evolution as driven by two factors: a series of successive reforms in the EU’s Common Fisheries Policy (CFP), and development of the Spanish legal framework.

The possibility of receiving European structural aid for scrapping vessels while maintaining fishing rights (i.e., the dissociation between fishing rights and vessel ownership, which occurred for this fleet only)—and the subsequently established possibility of transferring such rights—were both enabled by Spanish regulations. These developments, when combined with reforms of the CFP, have strongly affected the Spanish fleet’s evolution and led to nearly continual adaptation of its capacity and fishing rights. Although the first two factors have reduced the fleet’s size, they have mainly affected the fleet’s spatial distribution; in particular, fishing rights were transferred to a large extent from Basque to Galician vessels after the 1990s (González-Laxe, 2006).

Most studies on the effects of fisheries policy focus on analysing either its structural programs and related subsidies (see e.g. Beddington et al., 2007; Cordon and García, 2014;

Hatcher, 2000; Markus, 2010; Munro and Sumaila, 2002; Pascoe and Coglán, 2000; Surís-Regueiro et al., 2003; Surís-Regueiro et al., 2011; Villasante and Sumaila, 2010) or the specific effects of successive reforms on European fisheries governance (Garza-Gil and Varela-Lafuente, 2015; Gray and Hatchard, 2003; Linke and Bruckmeier, 2015; Soma et al., 2015; van Hoof and van Tatenhove, 2009; Villasante et al., 2012). Among those that tackle aspects concerning Spanish fisheries management in the Celtic Sea, the papers of Garza and Varela (2008) and Caballero et al. (2014) trace the institutional evolution of governance in the Grand Sole fishing grounds; Caballero et al. (2008) examine the evolution of governance systems in Galician fisheries.

This study analyses the evolution of the Galician fleet in Grand Sole waters as a consequence of successive CFP reforms. For this purpose, we proceed as follows. Section 2 describes the case study, and Section 3 details the evolution of Galician fisheries governance in Grand Sole. In Section 4 we examine the effects of CFP reforms on the Galician fleet. The study concludes in Section 5 with a summary and discussion of our findings.

2. Case study

In 2016, the Spanish fleet operating in Grand Sole amounted to 81 ships, of which 63 were based in Galicia. The Galician fleet is grouped into four fishing associations, the most important of which are ANASOL in the port of Vigo (28 ships) and the Celeiro association (23 units); see Table 1. This fleet consists of middle-distance vessels whose trips last two weeks on average, including one day to travel from their port to the fishing grounds and another day to return. Most of these vessels engage in longline fishing or use fixed gillnets, yet more than a third were trawlers in 2016.

[INSERT TABLE 1 ABOUT HERE]

The Spanish fleet fishing in Grand Sole mainly catches hake (*Merluccius merluccius*), blue whiting (*Micromesistius poutassou*), anglerfish (*Lophius piscatorius* and *L. budegassa*), horse mackerel (*Trachurus trachurus*), megrim (*Lepidorhombus whiffiagonis*), ling (*Molva molva*), and nephrops (*Nephrops norvegicus*). Table 2 shows the distribution of total allowable catch (TAC) for each species harvested by the Galician fleet in 2016. Depending on the type of gear used, a mixed catch (with variable quantities of hake, anglerfish, megrim, and nephrops) is caught on each trip. Hake is the primary species targeted by the Galician fleet; this species is caught throughout the year, with peak landings in the spring and summer months. The three main gear types used by the vessels that target hake are long lines, fixed gillnets, and trawls. For Galician vessels seeking anglerfish, a trawl fishery was developed in the Celtic Sea in the 1970s—on the shelf edge around the 200-mile contour to the south and west of Ireland and the Bay of Biscay—and expanded until about 1990. Although the effort of most fleets in the anglerfish fishery has evidently declined since the early 1990s, the increased use of twin trawls may have improved the harvest’s overall efficiency (Garza and Varela, 2008). Megrim is caught predominantly by Spanish and French vessels. The nephrops fisheries were developed in the 1970s and 1980s, and they remain a crucial component of fleet activity in this area.

[INSERT TABLE 2 ABOUT HERE]

The state of these targeted stocks has changed markedly over the last decades. With respect to hake, the main species fished by Galician vessels, the International Council for the Exploration of the Sea (ICES) classifies the species as being at full reproductive capacity and being harvested sustainably. However, the spawning stock biomass (SSB) declined severely in the early 2000s and these circumstances led EU to establish measures for assisting the recovery of northern hake stock (EU, 2004). As a result, mortality due to fishing has been significantly reduced and so this species is currently above its maximum sustainable yield (MSY) levels. The SSB has increased appreciably since 2006 and is above recent historical estimates;

moreover, recruitment in 2012 and 2013 was among the highest in the time series (ICES, 2015). Even so, quota restrictions in this fishery have required, since early 2001, that the Spanish and Galician fleets not fish there for several months of each year.

For anglerfish and ling, the most recent estimates of SSB and fishing mortality are such that the ICES has classified these stocks as “undefined”. Even though landings have been stable for the last five years, ICES (2016a) continues to advise a precautionary approach. The blue whiting stock in these waters is classified as being at full reproductive capacity; despite high levels of exploitation, recent years have seen a large increase in its occurrence (ICES, 2017). Absent defined reference points and a full analytical assessment, the viability of horse mackerel is unknown (ICES 2016b); however, there are data indicating that its SSB has declined since the late 1980s. The ICES estimates for megrim are that fishing mortality has been below MSY levels for almost the full time series and has exhibited a declining trend since the late 1990s. Because the biomass of this species has been consistently above MSY levels and has also increased steadily since 2005, the ICES (2016c) advises maintaining an MSY approach. Finally, the available information on nephrops stocks is considered inadequate to support any advice beyond observing precautionary limits (ICES, 2017). In recent years, though, landings have declined.

3. Institutions and governance in the Grand Sole fishery

In 1977, European Commission (EC) authorities set the Exclusive Economic Zone at 200 miles for Atlantic waters. Fishing matters were initially handled under the EC’s Common Agricultural Policy (which mainly addressed that primary sector, with fishing relegated to a lesser priority). The CFP was established in 1983, when conversations had been underway to allow Spain and Portugal to join the European Economic Community (EEC). The Spanish deep-sea fleet comprised about 500 vessels in 1977, and activity was regulated on the basis of

fishing licenses. In the context of the negotiations for membership in the EEC, Royal Decree 681/1980 (OSG, 1980) was passed and established the objective of maximum sustainable yield in fisheries management, thereby making it possible for the state to increase or reduce fishing effort according as whether the fishery was under- or over-exploited. Hence the number of vessels was capped to those in operation at the time.

In 1981, the first important step was taken toward regulating the deep-sea sector in these fishing grounds: the number of Spanish vessels with the right to access EEC waters was set at 416, of which 53% had their base port in the Basque Country and 42% in Galicia (Lopez Veiga et al., 1993). In addition to setting a limit on the number of vessels, this official order also aimed to determine the number of fishery access rights. So even though the number of vessels might be reduced, the number of rights would not (and could actually be increased by adding the rights of scrapped vessels). Access rights were linked to the vessel, which prevented their sale or transfer without the corresponding sale or transfer of the vessel itself. In 1984, 44 longline ships—which had been excluded in 1981—were included; thus the total number of Spanish vessels allowed to operate in European Grand Sole waters was set to 460.

It was during this period, at the start of the 1980s, that Spain began to negotiate for accession to the EEC. It finally became a member in 1986. After that date, the Spanish fleet operating in European waters became subject to CFP regulation. The subsequent evolution of fisheries management policies that have affected the fleet can be described as occurring in three stages: the period from Spain's admittance to the EEC to when it became possible to transfer fishing rights *without* selling the associated vessel; the period around the CFP reform of 2002; and the period following its latest reform in 2012.

3.1. First stage: Accession to the EEC and regulatory changes at the national level

In 1987, Spain's Treaty of Accession to the EEC came into force and with it the creation of the "list of 300 vessels". This list authorized 300 vessels, of which only 145 "standard" vessels

could operate simultaneously in non-Spanish European waters. A *standard vessel* was defined as a 700-horsepower (518-kW) ship, and conversion indexes were established for other vessels. This treaty did not limit the number of standard vessels but did implement a power limitation mechanism—namely, every substitute vessel could have no more than half the power of the vessel it replaced. Furthermore, such substitution was conditional on the overall EEC fleet not increasing in size. Resolution 26/01/1987 (OSG, 1987) established the participation coefficients for companies in EU fisheries with the aim of clarifying the maze of rights that had been accumulated. After adjusting for these coefficients, at the time of accession there were 300 vessels yet 460 fishing rights; both included the longliners, which were divided among the various associations and companies. Under these limitations, vessels based mainly in Asturias and Cantabria regions were sold to primarily Basque Country's owners, who scrapped them—in addition to their oldest vessels—and accumulated their rights (Lopez Veiga et al., 1993).

In 1997, Law 23/1997 (OSG, 1997a) came into force and established the complete transferability of rights; hence fishing rights could be sold without selling the vessel, although such transfers could only occur with respect to vessels within the same census. Royal Decree 1915/1997 (OSG, 1997b) then limited the accumulation of rights to a minimum of 210 and a maximum of 315 fishing days. As a result, companies that had already restructured their fleet were obliged to sell their rights because they could not continue accumulating them. These limitations, in turn, were changed by Royal Decree 1596/2004 (OSG, 2004), which eliminated the maximum limit per vessel; however, no company could accumulate more than 30% of all of the fishery's fishing possibilities. The economically less efficient vessels began to leave the fishery for this period. These legislative changes favoured the Galician fleet, which could then accumulate rights to the detriment (primarily) of the Basque fleet. In particular, fishing associations based in Galicia controlled by 60% of all vessels in the census in the late 90s.

3.2. Second stage: 2002–2011

The primary objective of the 2002 CFP reform was to ensure a sustainable future for the fisheries sector by guaranteeing stable incomes and jobs for fishermen. The reform initially consisted of three regulations adopted by the European Council in December 2002 and came into force on 1 January 2003: (EC) framework Regulation no. 2371/2002 (EU, 2002a) on the conservation and sustainable exploitation of fisheries resources; (EC) Regulation no. 2369/2002 (EU, 2002b), laying down the detailed rules and arrangements regarding EEC structural assistance in the fisheries sector; and (EC) Regulation no. 2370/2002 (EU, 2002c), which established an urgently needed procedure for the scrapping of vessels used for fishing.

However, the most comprehensive changes were reflected in documents and regulations promulgated after 2004. Here we discuss three particular aspects of significance. First, a new financial instrument was created: the European Fisheries Fund (EFF), through which each country's required "strategic plans" could be operationalized (EC, 2007; EU, 2006). Second, Regional Advisory Councils (RACs) were created and enabled greater participation by fishers in the decision making of fisheries management (EC, 2004). Third, the CFP was linked to more far-reaching projects related to sustainable development; these linkages are evident in the EU's Integrated Maritime Policy (IMP) proposals (EC, 2006) and Marine Strategy Framework Directive (MSD; see EC, 2008a).

As regards the fleet and fishing activities, a new component of the 2002 CFP reform (and its subsequent modification) was introducing a long-term approach to fisheries management, which included preparation of emergency measures, multi-year recovery plans for stocks that had been fished in excess of safe biological limits, and multi-year management plans for other stocks. This reform reduced the uncertainty due to associated with annual and often abrupt changes in TAC provisions and allowed for more rapid and decisive action by EC when stocks were discovered to be at risk or in imminent decline. Moreover, the 2002 reform

established the possibility of implementing individual quotas for managing the EU fisheries. At the request of ship owners operating in the Grand Sole fishing area, the Spanish government mandated that each ship included in the census of seagoing, ocean-going, or longliners exceeding 100 gross registered tonnes fleets—and operating in ICES zones Vb, VI, VII, and VIIIabd—be recognized as being entitled to harvest the individual distribution of demersal species for these zones (Order APA/3773/2006; OSG, 2006). Previously, access coefficients implied a limit on the total effort that could be employed; however, that approach resulted in a race to catch species whose quota (including transfers) might then well be depleted. Once the quota was made applicable to individual vessels (although quotas by associations were admissible), this “race to fish” ceased and thereby enabled the fleet to adjust its catches throughout the year. A system of individual transferable quotas (ITQs) was implemented in 2007 for the Grand Sole fleet; it assigned the initial quotas based on the previous period’s access rights. The system of ITQs established in 2007 under Order 3773/2006 was meant to prevail for two years. Yet in 2008, Order ARM/3812/2008 (OSG, 2008) converted ITQs into permanent quotas for the Grand Sole fishery.

At the same time, European aid to the fleet—and directives related to fishing activity—have been used by the EFF (reflecting its “Axis 1”) since 2005 to avoid aggravating the imbalance between fleet overcapacity and actual fishing possibilities. This approach is intended to improve product quality and the safety and working conditions on board, to encourage the adoption of more selective fishing techniques, and to see that vessels are equipped with satellite-based vessel monitoring systems (EC, 2008a). Socioeconomic measures have also been introduced to support not only individual fishers but also particular sectors (Axis 2 of the EFF).

The 2002 reform introduced a critical innovation in the European fisheries governance system: giving fishers a greater say—through the creation of Regional Advisory Councils—in

regulatory decisions that affect them. In addition to fishers, these councils include the following stakeholders: scientific experts; representatives of other sectors related to fisheries and aquaculture; local, regional, and national authorities; environmental groups; and consumers (EC, 2004). By participating in RACs, fishers can make their opinions on fisheries policy known and also advance their own proposals; that being said, the RACs are strictly advisory in nature. The Grand Sole fishery is part of the North Western Waters Advisory Council, whose aims include offering qualified technical advice and preparing strategic reports (on the management of these fishing grounds) for submission to the European Commission and the national administrations of member states.

Finally, the CFP introduced and developed ways to comply with ECC guidelines, from a system wide perspective, within the framework of sustainable development programs (e.g., IMP and MSD). Along these lines, previously proposed objectives and goals or general principles that lacked a definite timeline were reformulated and made more specific. Thus, the EFF Axes 3 and 4 now consider the possibility of co-financing collective actions of public interest (e.g., local management plans, improvements in products and markets, socioeconomic diversification projects) as well as traditional CFP goals (e.g., improved port infrastructure and equipment).

The European Fisheries Fund, which increased to €4,305 million, was distributed over seven years (i.e., over the 2007–2013 period). Member states selected projects eligible for funding from among the options permitted and with reference to the implementation of their respective strategic plans.

3.3. Third stage: The latest CFP reform (2012)

In the EC's opinion, the 2002 reform did not live up to expectations in the short term: the deterioration of some stocks continued, and insufficient attention was paid to the problem of

discards. All this occurred in a situation of economic fragility for many fleets and of problems with socioeconomic sustainability in many areas that depend on fishing (EC, 2008a, 2008b).

After 2009, the EC set up a review of the CFP that culminated in approval of a new reform (EU, 2013b) and of the new European Maritime and Fisheries Fund (EMFF) (EU, 2013a). The primary goal of the new CFP was ensuring that activities in the fishing sector were environmentally and socioeconomically sustainable (EU, 2013b). Toward these ends, changes in management strategies were contemplated; objectives included reinforcing decision procedures and adjusting or decentralizing implementation while bearing in mind the diversity of fisheries, fishers, and countries.

The 2012 CFP reform introduced several key changes in fisheries management. Those that affected the Grand Sole fishery include: multi-year ecosystem-based management, reaching the maximum sustainable yield of fish populations by 2020, implementation of ITQs, and the gradual phase-out of discarding species subject to TACs (with elimination of such discards by 2019). New obligations require that member states reinforce the role of science in the CFP (through increased data collection and sharing of information on stocks, fleets, and the impact of fishing activities), and the reform calls for decentralized governance to bring decision procedures closer to the fishers themselves. However, the EC has yet to define the general framework; moreover, member states must develop the implementation measures and behave cooperatively at the regional level.

On the one hand, many of these policies are present also in structural policy planning (EU, 2011, 2013a)—under which it is expected that fishing capacity will be adjusted by means of market instruments (e.g., transferable fishing concessions) and the specific strategic plans of respective member states, which are obliged to maintain registers and strict controls over their fleets. On the other hand, the aids for scrapping of vessels and temporary cessations of fishing were eliminated. Also, the EMFF introduced new conditions for financial aid, linking

such aid to regulatory compliance by member states and operators both. Failure to comply can now result in the suspension of aid to operators and/or in fines to member states.

The EMFF was initially set up to cover the period 2014–2020 (EU, 2013a), and it was allocated €5,750 million for this period (of which just over a fifth was earmarked for Spain). The fund declared three main goals: (i) to assist fishers as they transition to sustainable fishing; (ii) to help coastal communities and regions improve and diversify their economies; and (iii) to facilitate access to funding under a system of co-financing with member states. More generally, the EMFF tends to highlight its environmental and socioeconomic aims and is somewhat less concerned about matters strictly related to fishing.

This framework implicitly supports the principle of proportionality in distribution (a.k.a. the principle of relative stability and TACs). It is therefore important to emphasize that the establishment of permanent ITQs for Spanish fisheries in Grand Sole waters, which had prevailed since the previous stage, is by these principles included under the umbrella of European regulations. The TAC percentages for the Galician fleet's target species are shown in Table 2; the majority of fishing possibilities—owing to fishing rights accumulated in the 1990s—correspond to the Galician fleet.

4. Effects of institutional changes on the Grand Sole fleet

4.1. Evolution of fleet and income

After Spain joined the EEC, there was a period of stability in the number of vessels belonging to the Grand Sole fleet. It was not until the period characterized by the accumulation of rights and the allocation of financial aid—at the end of the 1990s and beginning of the 2000s—that the number of Spanish vessels declined precipitously from nearly 300 to about 200 (see Table 3). Therefore, the possibility of accumulating rights (while still receiving a premium for scrapping) prompted restructuring of the sector. The new century's regulatory changes, which

resulted in the reassignment of fishing rights to individual licensed vessels, meant that the number of those vessels was not reduced. This circumstance was exploited by the Galician fleet, which accumulated a greater number of rights and increased its share of the Spanish fleet to more than 60%.

[INSERT TABLE 3 ABOUT HERE]

Nonetheless, the Spanish fleet's size was diminished over time by two factors. First, the management plan for its main target species (hake) involved progressive reductions—in terms of the TAC and also of fishing effort in the fishery—in the mid-2000s (EU, 2004). Second, the TACs of its other target species were also gradually lowered. Thus the Galician fleet's number of vessels declined during this period, although not as much as in other Spanish regions. Hence the Galician fleet came increasingly to predominate in the Grand Sole fishery.

[INSERT TABLE 4 ABOUT HERE]

The decline in fishing possibilities resulted in a concomitant reduction in the revenues earned by ship owners and crews (see Table 4). However, a slight improvement in revenues (and net income) was observed upon cessation of the hake management plan. It is not clear how the Spanish government's 2007 establishment of ITQs affected revenues, although it seems unlikely that they increased before the number of vessels operating in the fishery was reduced significantly.

[INSERT TABLE 5 ABOUT HERE]

As for the 2012 CFP Reform, not enough time has elapsed and so the data are insufficient to enable a thorough evaluation of its effects. We can, however, observe the resulting evolution in the number of vessels and their distribution among the longline/fixed gillnet and trawling methods of fishing. As shown in Table 5, the number of vessels used in all methods declined. This trend was more acute in the trawl segment (68% fewer vessels in 2016

than in 2008) and about half as dramatic in the longline/fixed gillnet segment (a decrease of 32%).

4.2. Fishers' views on the latest CFP reform

Given that improving fisheries governance is one of the new CFP's aims, it is crucial that we consider fishers' opinions—and especially (in the context of this paper) the opinions of those operating in the Grand Sole fishery. We therefore conducted a survey of the Galician fishers working there. The questionnaire asked fishers to classify (on a 5-point Likert scale) their level of agreement with different fishery management options and with the prospect of greater participation in the decision-making process: level 1 (strongly disagree); level 2 (disagree); level 3 (undecided); level 4 (agree); and level 5 (strongly agree). The surveyed fishers were informed that “increasing their participation” involved being included in the decision-making process, taking on management responsibilities, and having the option to propose management methods to policy makers. It was understood that local management aims must complement those of national and/or European regulators. The survey also requested information about current participation levels of public administrations and other stakeholders.

[INSERT TABLE 6 ABOUT HERE]

In constructing the pilot questionnaire, we contacted various Galician fishers' organizations to present our proposed study and request their collaboration. Following adoption of the final questionnaire, we conducted personal interviews that lasted an average of 15 minutes each; altogether, 21 questionnaires were completed. Table 6 reports characteristics of the survey participants, and Table 7 summarizes (by segment) their responses.

[INSERT TABLE 7 ABOUT HERE]

With regard to transferable rights, there is greater support from fishers on larger vessels (trawlers) for a system of individual *effort* yet more support from fishers on smaller (longline

and gillnet) vessels for individual *quotas*. The result obtained for the trawler segment was conditioned on the enactment of legislation that prohibits discards and by-catches.

On the topic of greater participation in decision making, Galician fishers working the Grand Sole fishing waters were in favour of increased participation on the part of producer organizations, fishermen's guilds, and (in the case of trawlers) ship-owner associations. The participation of trade unions was not preferred by any segment. As for greater involvement by public administrations, survey respondents favour greater participation only of the Galician government (both sectors) and of the Spanish government (though only in the longline/fixed-gillnet sector). Fishers are not inclined to support greater participation of European authorities. The reasons given for this negative attitude reflect fishers' beliefs that the European government is less concerned (than are regional and national governments) about their problems and that it is unduly influenced by interest groups (including environmental groups) as well as other EU governments—although fishers do acknowledge that European institutions have legitimate concerns about managing the fisheries in which different EU countries participate. Finally, with respect to other stakeholders, we found that fishers are in favour of increased decision-making participation only by scientists and technical experts (longline/gillnet segment) or by the food industry (trawler segment).

The survey also asked an open-ended question about discards. The question was answered only by fishers in the trawler segment; the other fishers evidently believed their fishing methods to be selective enough that discards and by-catches are not an issue. Fishers from the trawler segment were of the opinion that prohibiting discards can generate inefficiencies and cause difficulties for the Galician fleet in European waters, since the fleet does not have a quota for all of the species it catches. As mentioned previously, these fishers believe that an effort control system would be more suitable than one based on quotas because

the former would allow them to fish different species without being obligated to throw any back into the sea

5. Discussion and conclusions

The management of Galician fisheries in Grand Sole waters is based on a system of property rights in the form of individual transferable quotas. From the *institutional economics* perspective (Jentoft, 2004), this ITQ system in the Grand Sole fisheries is characterized by five key components. First, fishery access rights are based on historical criteria; there is an extant census of vessels that fish in these waters. Second, the fleet's management rights are limited by regulation, and quota management can be either collective (via ship-owners' associations) or individual (directly through the ship owner). Third, the right of exclusion—which is the Spanish government's jurisdiction, albeit contingent on European regulations—stems from being included (or not) in the census of vessels authorized to operate in the fishery. Fourth, as regards the right to sell or lease, an ITQ owner can transfer the quota (in whole or in part) to another vessel *provided* it is part of the fishery's fleet census. Fifth, the right to withdraw from the system is also linked to the distribution of ITQs among vessel owners included in the census.

From a strictly *institutional* point of view, the case of the Spanish and Galician fleet in Grand Sole fishing waters can be characterized as the evolution of a fishery's governance based on “effort rights” to one based on transferable quotas. The latter have been used in the fishery since 2007, are stipulated annually on the basis of historical rights, and are usually managed by fishermen's associations. The evolution of European and Spanish regulation—in particular, the possibility of receiving structural aid for scrapping without the forfeit of fishing rights, and the option to transfer such rights—has made it possible to regulate the sector by adapting fleet capacity to the Grand Sole's fishing possibilities. This evolution has also wrought a

redistribution of fishing rights in favour of the Galician fleet and to the detriment of fleets from other Spanish regions.

With respect to decision-making processes, surveyed Galician fishers exhibit generally positive attitudes toward the 2012 CFP insofar as increasing their own participation and that of the regional government. Fishers were in favour of rights systems, although longline and gillnet fishers preferred a system of individual quotas whereas trawl fishers preferred one tied to individual effort. Some of the associations in the fishing sector advocate extending quota transferability among member states, allowing companies from different member states to negotiate the temporary leasing of rights, and establishing limits to avoid concentration of quotas or rights in just a few hands (ARVI, 2012a, 2012b).

The institutional perspective also considers management adaptation to resource systems and governance systems both (Jentoft and Chuenpagdee, 2015; McGinnis and Ostrom, 2014). Thus fishers recognize that “regionalization” within the EU can be efficient, as they clearly favour their own increased participation (and that of the *regional*, but not the supranational, government) in the decision-making process. Furthermore, some associations—for example, the Cooperative of Ship-owners of the Port of Vigo (ARVI)—want the Regional Advisory Councils to have more say in such matters as the content of multi-year plans and the setting of calendars and allowable discards for fisheries.

Because the regulatory treatment of discards is a central issue in fisheries management—especially for the trawl fleet—it is important to study how prohibiting them will affect fleet catches (in terms of species and quantities) and also to consider the reaction of affected fishers (i.e., anticipating their response strategies). Despite acknowledging that the objective of reducing discards is a valid one, fishers take issue with the EC approach to achieving it. Thus many fishers believe that, in mixed or complex fisheries such as the Grand Sole, the sacrifices entailed by observing an outright prohibition will vary markedly by fleet

and country; hence they propose that such rules be implemented in a more flexible (and temporary) manner.

There is, overall, a fair amount of common ground with regard to policy objectives and even instruments. Yet fishers raised substantial objections to the 2012 reform's re-definition of the "principle of relative stability" and to the elimination of direct aid that would compensate for fleet capacity adjustments (ARVI, 2012b). With respect to the former, fishermen have come to accept—especially after Brexit—the revised principle in light of fishing as it is currently practiced (i.e., more than three decades after the principle was first drafted) and of Spain's having joined the EU. With regard to direct aid, fishers disagree with the new European guidelines and advocate maintaining compensation for the definitive or even temporary halting of activity; they argue that capacity adjustments would thereby be more efficient. In this debate (and others), one can hardly question the need to undertake systematic cost–benefit analyses and comparisons of all proposals and projects emanating from (or channelled through) the EMFF.

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Table 1. Galician fishing fleet in Grand Sole, 2016

	Main gear			Total
	Longline & fixed gillnet (≥100 GRT)	Longline & fixed gillnet (<100 GRT)	Trawl	
<i>Number of vessels by association</i>				
Galicia	37	5	23	65
ANASOL (Vigo)	10	0	18	28
CELEIRO	21	0	2	23
OPPLUGO	2	4	0	6
Others	4	1	3	8
<i>Average technical characteristics</i>				
Length (m)	32.1	24.8	34.4	32.3
Capacity (Gt)	291.5	156.2	328.2	293.6
Power (Kw)	438.1	250.9	474.3	435.9
Age (years)	15.6	23.8	16.2	16.5

Note. GRT = Gross registered tonnage; m = meters; Gt = Gross tonnage; kW = kilowatts.

Source. Authors' compilation from: the Fishing Vessel Register of the Autonomous Community of Galicia (<http://www.pescadegalicia.gal/rexbuque.html>); the Operational Fleet Census of the Spanish Ministry of Agriculture (<http://www.magrama.gob.es/gl/pesca/temas/flota-pesquera-espanola/censo.asp>); and the Community Fishing Fleet Register (<http://ec.europa.eu/fisheries/fleet/index.cfm>).

Table 2. Fishing opportunities for Galician fleet in Grand Sole, 2016

	Angler- fish	Hake	Megrim	Ling	Nephrops	Pollack	Blue whiting	Total
TAC Spain (tons)	4,740	30,677	7,065	2,837	1,668	277	26,878	74,142
% TAC for Galician fleet in Grand Sole	66.6%	71.1%	75.5%	70.7%	74.9%	49.5%	45.5%	62.0%
Total TAC for Galicia (tons)	3,158.9	21,826.2	5,335.6	2,006.6	1,250.0	137.0	12,238.9	45,953.2
Longline and fixed gillnet (≥ 100 GRT)	2,105.6	12,884.4	3,664.3	1,274.4	869.2	96.8	8,943.0	29,837.6
Longline and fixed gillnet (< 100 GRT)	0.0	1,395.9	0.0	0.0	0.0	0.0	0.0	1,395.9
Trawl	1,053.3	7,545.9	1,671.3	732.3	380.9	40.2	3,295.9	14,719.7

Source. Authors' compilation from several orders of the Spanish Ministry of Agriculture (BOE-A-2013-7605, 2013; BOE-A-2014-2907, 2014; BOE-A-2015-12992, 2015).

Table 3. Evolution of the fishing fleet in Grand Sole, 2000–2016

Year	Number of Spanish vessels	Average size (m)	Average capacity (Gt per vessel)	Average power (kW per vessel)	Number of Galician vessels	Galician/Spanish vessels (%)
2000	201	N/A	289.52	566.84	N/A	N/A
2001	200	N/A	290.97	571.03	N/A	N/A
2002	200	N/A	279.50	673.00	119	59.50
2003	199	N/A	280.90	676.38	120	60.30
2004	199	N/A	280.90	676.38	121	60.80
2005	199	N/A	285.20	687.62	132	66.33
2006	192	31.54	340.90	687.86	135	70.31
2007	188	31.59	335.45	661.15	135	71.81
2008	185	31.58	333.06	650.55	132	71.35
2009	183	31.55	317.18	606.27	130	71.04
2010	170	31.70	299.96	567.36	127	74.71
2011	146	31.77	305.11	581.44	113	77.40
2012	130	31.65	306.87	592.88	97	74.62
2013	111	31.53	339.39	658.93	91	81.98
2014	93	31.43	357.26	694.66	75	80.65
2015	84	31.63	375.54	753.78	73	86.90
2016	81	31.32	365.43	738.14	65	80.25

Note. Gt = gross tonnage; kW = kilowatts; N/A = not available.

Source. Authors' compilation from Spanish Ministry of Agriculture (MAGRAMA).

Table 4. Evolution of main economic aggregates, 2000–2014

Year	Landing value	Gross value-added	Crew income	Gross surplus/ mixed Income
2000	1003.79	682.42	281.69	400.74
2001	1109.80	669.06	204.15	464.91
2002	1189.72	775.34	271.95	503.39
2003	1198.01	764.93	225.23	539.70
2004	1171.26	735.09	228.55	506.54
2005	1243.54	750.85	200.23	550.62
2006	1180.84	723.01	197.69	525.32
2007	1264.48	703.35	204.98	498.36
2008	1083.70	692.61	220.67	471.94
2009	1145.92	705.05	245.36	459.70
2010	1170.76	724.53	292.80	431.73
2011	1712.77	754.46	332.09	422.37
2012	2032.14	1037.83	407.57	630.27
2013	2396.63	1248.48	486.01	762.47
2014	2869.14	1518.14	571.42	946.72

Note. Units for reported values are euros (2016) per vessel.

Source. Authors' compilation from MAGRAMA (2016) and STECF (2016).

Table 5. Evolution of the Galician fleet by gear, 2016 versus 2008

	2008	2016
Longline and fixed gillnets	63	43
Trawlers	69	22
Total Galician fleet	132	65

Source. Authors' compilation from www.pescadegalicia.gal.

Table 6. Demographic and business characteristics of the fishers surveyed ($N = 21$)

Description of variables	Longline and gillnet	Trawl
<i>Demographic characteristics</i>		
Age of respondent in years	38.8 (8.62)	40.0 (4.79)
<i>Vessel characteristics</i>		
Ownership (indicator variable)	0.63 (1.56)	0.19 (0.83)
Number of workers per vessel	16.3 (2.01)	16.3 (2.01)

Notes. For Ownership, dummy = 1 if respondent owns the vessel (and = 0 otherwise). Standard deviations reported in parentheses.

Table 7. Fishers' views on CFP

	Longline and gillnet	Trawl
<i>On transferable rights</i>		
Rights based on individual effort		
Non-transferable annual	−0.532 (0.501)	−0.683 (0.604)
Non-transferable multi-annual	0.370 (0.109)	0.451 (0.188)
Transferable	−0.236 (0.149)	0.279 (0.071)
Rights based on individual quotas		
Non-transferable annual	0.247 (0.127)	0.221 (0.208)
Non-transferable multi-annual	0.347 (0.305)	0.489 (0.761)
Transferable	0.834 (0.001)	0.766 (0.351)
<i>On participation in decision making</i>		
Their representatives		
Producer organizations	0.486 (0.080)	0.352 (0.073)
Guilds	0.329 (0.100)	0.270 (0.091)
Trade unions	0.128 (0.840)	0.243 (0.188)
Ownership associations	0.351 (0.501)	0.004 (0.096)
Public administration		
European Council	0.086 (0.085)	0.195 (0.227)
Spanish government	0.024 (0.055)	0.210 (0.182)
Galician government	0.128 (0.054)	0.243 (0.062)
Other stakeholders		
Traders	0.230 (0.113)	0.217 (0.120)
Seafood industry	0.139 (0.481)	0.423 (0.064)
Scientists and technicians	0.401 (0.080)	−0.079 (0.546)

Note. *p*-values reported in parentheses; **bold** signifies statistical significance.