

## Pelagic longline fisheries in southeastern/south Brazil. Who cares about the law?



Fernando N. Fiedler<sup>a,d,\*</sup>, Dagoberto Port<sup>a</sup>, Bruno B. Giffoni<sup>b</sup>, Gilberto Sales<sup>c</sup>, Fabiane Fisch<sup>e</sup>

<sup>a</sup> Universidade do Vale do Itajaí (UNIVALI), Programa de Pós Graduação em Ciência e Tecnologia Ambiental – PPCTA, Rua Uruguai 458, 88302-202 Itajaí, SC, Brazil

<sup>b</sup> Fundação Pró-TAMAR, Rua Antônio Athanasio da Silva 273, 11680-000 Ubatuba, SP, Brazil

<sup>c</sup> Centro TAMAR/ICMBio, Av. Ministro Victor Konder 374, 88301-700 Itajaí, SC, Brazil

<sup>d</sup> Centro Nacional de Pesquisa e Conservação da Biodiversidade Marinha do Sudeste e Sul (CEPSUL), Av. Ministro Victor Konder 374, 88301-700 Itajaí, SC, Brazil

<sup>e</sup> Centro Universitário FACVEST (UNIFACVEST), Av. Marechal Floriano 947, 88501-103 Lages, SC, Brazil

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### ABSTRACT

The fishing industry has been facing problems related to catch yields, predatory competition and economic collapse. Management should be based on substantial scientific studies and the state's ability to implement these. In Brazil, the surface longline fishery has been in existence since the 1950s, and remains of great economic importance. This study analyzes 179 legal instruments (1934–2014), divided into restrictive, administrative and promotional, comparing with catches landed (1996–2011). The results show that there was a complete disrespect for the regulations, wherein fleets continued landing prohibited or size limited species, such as *Kajikia albida*, *Makaira nigricans*, *Alopias superciliosus*, *A. vulpinus*, *Carcharhinus longimanus*, *Galeorhinus galeus* and *Xiphias gladius*. Furthermore, divergent regulatory provisions have hindered understanding/implementation of regulations by all those involved. Being a country of continental proportions and with different longline fisheries along the coast, conducting scientific studies and the development of normative approaches becomes a huge challenge. In a dynamic activity such as fishing, the constant review of these regulations will allow fisheries management to become more accurate and in accordance with the aspirations of the different interests involved. Despite the surface longline fishery having operated for 60 years in Brazil, the existence of incongruous laws makes the management and control of this activity incompatible with the conservation of species. The lack of regulations governing this fishery creates a "gap", increasing the risk of extinction of species (target and bycatch) and the future collapse of this activity.

### 1. Introduction

Fisheries resource management can be defined as a set of formal or informal rules that are established and implemented by law or customs to ensure that access and use of fish stocks does not compromise the stocks, while generating jobs and income, and allowing cultural aspects and modes of life to be passed down from generation to generation [1].

After experiencing an accelerated global growth, strongly linked to the development from the early 1960s [2], industrial fishing has been facing problems related to decreasing production and income, disappearance of the most valued species, and intense competition between fishermen that resulted in some cases the economic collapse of the fishing industry [3]. The key factors that led to this reduction are exploitation policies of the exclusive economic zones - EEZ; grant

programmes; inadequate management and planning; increased efficiency and catch capacity of the fleets; maintained profitability as a result of technological advancement and the variation of fish prices; adaptive capacity of the sector; and fragility of the institutional structures related to fisheries management, especially in relation to the operation of domestic and foreign vessels without the corresponding surveillance and monitoring [4].

Most countries do not meet international standards for the sustainable management of fishing activities, such as: (a) scientific studies for resource management recommendations; (b) transformation of these recommendations into public policies using the best available scientific data with the participation of different actors; and (c) capacity to implement regulatory actions [5]. In this context, the allocation of fishing concessions to foreign fleets can present a high risk

\* Corresponding author at: Centro Nacional de Pesquisa e Conservação da Biodiversidade Marinha do Sudeste e Sul (CEPSUL), Av. Ministro Victor Konder 374, 88301-700 Itajaí, SC, Brazil.

E-mail address: [fnfiedler@hotmail.com](mailto:fnfiedler@hotmail.com) (F.N. Fiedler).

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of overexploitation due to the lack of definite catch limits, a distortion of declared catches, and the excess of bycatch [6,7].

The decline in catches and the ecological and socioeconomic consequences require greater responsibility from countries [8–13]. Two important indicators for management are: (a) the extent to which the results of scientific research are used for decision-making; and (b) whether these decisions are effectively carried out by the public authorities and the productive sector [14]. Furthermore, there is a consensus that the current management models do not contribute to sustainable fishing, essentially because they only consider the variables “fisherman - target-stock” and exclude the ecosystems that sustain this relationship [15]. The Food and Agriculture Organization - FAO, recommends an ecosystemic approach to fisheries that recognises an interdependence between human activities and ecosystems, as well as the need to maintain natural productivity for this and future generations with actions that target the conservation of critical environments, the reduction of pollution and degradation, the minimisation of waste production, and the protection of endangered species [16,17].

The numerous existing regulatory instruments for fisheries were motivated by real problems associated with environmental degradation and the depletion of living stocks, among other issues [18]. Regulatory instruments have required an ecosystem approach to fishing that encompasses social and financial issues [18–24]. Therefore, public fisheries management policies should not be based on models that ignore the complex effects of interactions among ecosystems, fishers and exploited species [25]. An example is the case of Eastern Atlantic and Mediterranean bluefin tuna stock, where scientific studies have pointed to the overexploitation. However, lobbies opposed to the use of robust scientific data have not allowed an improvement in species conservation status [26]. These authors have commented that in order to have a low risk of collapse, mid and long-term sustainable management and an increase in fishery yields, it is necessary to carry out more scientific studies and that these are used as recommendations for management.

The Brazilian fisheries management model is outdated and inadequate, and it is incapable of promoting sustainability in the use of the fish stocks in the country, which causes several problems for the sector, such as overexploitation of stocks and the absence of shared management [27–32].

Among the factors that may have contributed to the failure of Brazilian fisheries management is the significant institutional instability of the last 50 years, when several institutions have been given powers related to fisheries management [33,34] (Table 1).

The joint fisheries planning coordinated by the Ministry of Fisheries and Aquaculture - MPA was confusing and unstable, and led to several conflicts and obstacles in the management of fish stocks due to the differing interests of the ministries - the Ministry of Environment - MMA targeted stock conservation and the MPA sought to promote production and exports [20]. Currently, with the disappearance of the MPA, the management of fish stocks is going through a stage of transition and instability.

Finally, the Brazilian fisheries legislation appears quite complex in terms of scope and spatial standards, which often makes it difficult for users to understand it [47]. For the pelagic longline fleet, which in the southeastern/south - SE/S - targets the catching of the blue shark *Prionace glauca*; swordfish *Xiphias gladius*; albacores *Thunnus alalunga*, *T. obesus*, *T. albacares*; and dolphinfish *Coryphaena hippurus*[48], few specific regulations have been published in the last 50 years, and this activity is regulated primarily by general fishing legislation or legislation that focuses on some species [49].

Consequently, the aim of the present study is to assess the relationship between the restrictive laws associated to pelagic longline fishing in the SE/S of Brazil with the dynamics and strategies used by the national and foreign fleets regarding the species with regulatory instruments captured and landed in the port of Itajaí, state of Santa Catarina - SC - between 1996 and 2011.

**Table 1**  
List of Brazilian institutions responsible for fisheries management in the past 50 years, their legal instrument, scope and/or mandates, and publication dates.

Legal instrument	Date	Institution	Scope and/or mandate	Reference
Decree-Law No. 23672	02/01/1934	Ministry of Agriculture	Creation of the first Fishing Code	[35]
Decree No. 50872	28/06/1961	President of the Republic	Establishment of the Council for the Development of Fishing (CODEPE)	[36]
Delegated Law No. 10	11/10/1962	Ministry of Agriculture	Creation of the Superintendence for the Development of Fishing (SUDEPE)	[37]
Decree-Law No. 221	28/02/1967	During the military dictatorship	Creation of the new Fisheries Code	[38]
Law No. 7735	22/02/1989	During the military dictatorship	Creation of the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA)	[39]
Decree No. 1697	13/11/1995	Board of the Natural Resources Policy	Creation of the Executive Group of the Fishing Sector (GESPE)	[40]
Law No. 9649	27/05/1998	Ministry of Agriculture, Livestock and Food Supply (MAPA)	Creation of the Department of Fisheries and Aquaculture (DPA)	[41]
Law No. 10683	28/05/2003	Presidency of the Republic	Creation of the Special Secretariat of Aquaculture and Fisheries of the Presidency of the Republic (SEAP/PR)	[42]
Law No. 11516	28/08/2007	Ministry of Environment (MMA)	Creation of the Chico Mendes Institute for Biodiversity Conservation (ICMbio)	[43]
Provisional Measure No. 437	29/07/2008	Presidency of the Republic	Creation of the Ministry of Fisheries and Aquaculture (MPA)	[44]
Law No. 11958	26/06/2009	Presidency of the Republic	Shared fisheries management between MPA and MMA	[45]
Provisional Measure No. 696	02/10/2015	Presidency of the Republic	Extinction of the MPA and transfer of the competencies to the MAPA	[46]

## 2. Materials and methods

The information was obtained from three programmes that monitor the industrial fisheries fleet in the jurisdictional waters of the SE/S of Brazil and adjacent international waters. The first programme, conducted by the Fisheries Studies Group - GEP, contains pier interviews (4477 records) and on-board maps (1966) of catches landed by the national pelagic longline fleet between 2000 and 2011, while the second On-board Observer Programme - PROA - contains information on the foreign leased fleet (1254 records) between 2003 and 2009 and the biological sampling of catches (4065 records) between 2004 and 2007. Both programmes were conducted by the Universidade do Vale do Itajaí- UNIVALI within the scope of scientific and technical agreements with the Federal Government. The third programme, the Brazilian National Action Plan to Reduce Incidental Capture of Sea Turtles in Fisheries conducted by the National Programme for the Conservation of Sea Turtles - Projeto TAMAR-ICMBio, contains information on the on-board logbooks of five national vessels (438 records) between 1996 and 1999, and monitoring of shipments by scientific observers (2375 records) between 2002 and 2011. The observed species were swordfish; Atlantic white marlin - *Kajikia albida*; blue marlin - *Makaira nigricans*; bigeye thresher - *Alopias superciliosus*; common thresher - *A. vulpinus*; oceanic whitetip shark - *Carcharhinus longimanus*; and tope shark - *Galeorhinus galeus*. These records were recorded in kilograms captured by species and/or number of individuals captured.

To collect information regarding national fishing legislation, a survey was conducted using the national press (Federal Official Gazette), between 1934 and 2014, of all the legal provisions of general interest to regulate activities related to industrial longline fishing, specifically for the SE/S region of Brazil. The sources of consultation were Laws, Normative Instructions (IN), Inter-Ministerial Instructions (IN INTERM), Ordinances, Provisional Measures and Decrees linked to government agencies responsible for fisheries management and planning.

The data set (landed catches, biological sampling and legislation) were inserted in a spreadsheet and organised by type of provision (administrative, promotion, leasing, and restrictive) and correlated with landings. Only provisions classified as restrictive (those that impose or restrict something) were considered.

## 3. Results

In all, 179 legal provisions were considered. Of these, 22 normative provisions were classified as restrictive, 67 as administrative, when organised directly or indirectly, and 90 as promotional, providing subsidies, construction, purchase or reform of vessels, and leasing, when a national company contracted a foreign company that owned the vessel, for fishing in jurisdictional waters (Fig. 1 and Appendix Table A

**Table 2**

Landed catches (kg) of species with regulatory guidelines related to catching/retention/landing performed by the national pelagic longline fleet between 1996 and 2011 in the port of Itajaí (SC). \*Data in number of individuals.

Source: GEP/UNIVALI.

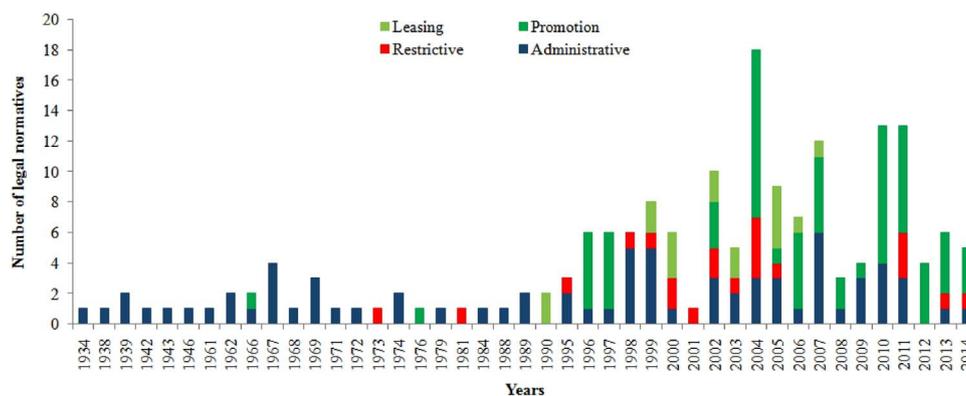
Year	Blue marlin	Atlantic white marlin	Swordfish	Tope shark	Oceanic whitetip shark	Thresher/ Bigeye thresher
1996	5*	122*	1942*			30*
1997	13*	25*	1140*			9*
1998		31*	700*			35*
1999		10*	311*			11*
2000	2542	1173	22919			2856
2001	17051	4479	145750	80	499	9050
2002	1994	2332	183546	526	70818	181259
2003	533	3119	104742	30		5346
2004	820	2516	226209			5766
2005	1234	4973	202432			534
2006	867	4017	156246	486		7046
2007	380	1511	262774	923		18151
2008	980	1446	210788	290		7705
2009	1530	3841	214971	60		12820
2010	7155	1475	155348			6514
2011	3501	1005	380079			8283

– only in Portuguese). The history of the creation of legal provisions reveals a sharp increase in the 1990 s that reached its maximum in 2004.

During the period analysed, the production of the national fleet (Table 2) and leased foreign fleet (Table 3) fluctuated in terms of catches of key target species and species with specific regulations (GEP/UNIVALI database).

Regarding restrictive provisions, the main object of this study, those highlighted relate to species governed by specific regulations (i.e. swordfish, Atlantic white marlin and blue marlin, bigeye and common thresher sharks, oceanic whitetip shark and tope shark) and one Inter-Ministerial Instruction which aimed to mitigate the incidental capture of seabirds.

The Ordinance IBAMA No. 56 (2/8/1995) [50] prohibits the catching of swordfish smaller than 125 cm or weighing less than 25 kg. This ordinance was revoked by the still current Ordinance IBAMA No. 115 (17/8/1998) [51] that prohibited the catching, landing, conservation, transport, industrialisation, commercialisation and exporting of this species under 125 cm. Some of the numerous regulations that fix the limit of catches for each year deserve attention, namely the IN MAA No. 17 (30/12/1999) [52] that establishes catch limits fixed by the International Commission for the Conservation of Atlantic Tunas (ICCAT) for the leased foreign fleet operating in Brazilian territorial waters; the IN MAA No. 7 (28/9/2000) [53] that suspended these catch authorisations until December 31, 2000; and the IN MAA No. 16 (30/7/2001) [54] that fixed a maximum limit (in



**Fig. 1.** Number of legal provisions between 1934 and 2014 classified as restrictive, administrative, promotions and leasing associated to surface longline fishing in Brazil.

**Table 3**

Landed catches (kg) of species with regulatory guidelines related to catching/retention/landing performed by the leased foreign pelagic longline fleet between 2001 and 2009 in the port of Itajaí (SC). \*Data in number of individuals.

Source: GEP/UNIVALI.

Ano	Atlantic white marlin	Swordfish	Oceanic whitetip shark	Thresher/Bigeye thresher
2001	265	19344		1115
2002		11979	37130	11979
2003		50252		1190
2003		27*		4*
2004	6057	156459	57	5610
2005	1804	201031	126	3785
2006	260	153325	53	5669
2007		8190		100
2009	42	56262		820

tonnes) and allowed catches for fishing seasons in 2001, and altered article 3 of the IN MAA No. 17 [52], referring to the catch limit of total weight of landed swordfish to 15% for the fleet of tuna and similar species. Although there are data of landed catches for the entire study period, for the national fleet most of the information was collected in total landed weight. For the leased foreign fleet, the data of 2004–2007, governed by Ordinance IBAMA No. 115 [51], registered the landed catch of individuals under the minimum permitted size of 125 cm (Fig. 2).

The catches of Atlantic white marlin and blue marlin were initially regulated by IN MMA No. 16 (30/7/2001) [54] that established a maximum catch limit for the fishing season of 2001. Subsequently, several regulations fixed annual catch limits for these species. Article 1 (section IV and V) of IN SEAP/PR No. 3 (19/9/2003) [55] defines the maximum catch limit of these species, while article 2 of the same norm prohibits the domestic trading and export of these species until December 31. Furthermore, during the duration of IN MAPA No. 35 (5/4/2002) [56], the IN MAPA No. 45 (1/7/2002) [57] was published, prohibiting the domestic trading and export of these species between July 1 and December 31. Subsequently, IN SEAP/PR No. 11 (12/11/2004) [58] also banned the domestic trading and export of these species until December 31, 2005. Finally, IN SEAP/PR No. 12 (14/7/2005) [59] prohibited, among other things, the domestic trading and export of these species for an indeterminate period. Even with the

publication of different regulations (2001–2005), the contradictions between these regulations created a loophole in the legislation that allowed the national and the leased foreign fleets to continue landing Atlantic white marlin (Fig. 3) and blue marlin (Fig. 4).

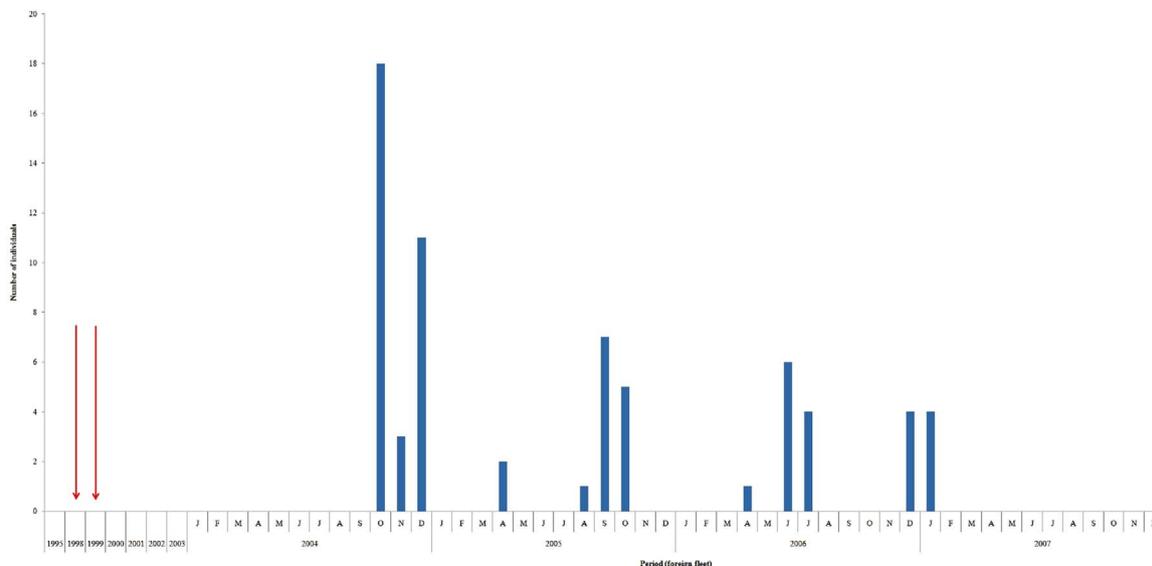
In relation to the bigeye thresher and common thresher sharks the IN INTERM MPA/MMA No. 5 (15/4/2011) [60] banned their catching, retaining on board, landing, storage and trading. However, after the publication of the IN (April–December), 3263 kg of this genus were landed in the port of Itajaí (Fig. 5). Subsequently, Ordinance MMA No. 445 (17/12/2014) [61] acknowledged the two species as endangered. Except for 2002, where the capture landed was 181,259 kg for the national fleet and 11,979 kg for the leased foreign fleet, in the other years considered in the present study the average capture remained at 8100 kg for the national fleet and 2600 kg for leased foreign fleet.

Regarding the capture of the oceanic whitetip shark and the tope shark, Fig. 6 shows the landings of these species by national fleet after the publication of IN MMA No. 5 (21/5/2004) [62], which acknowledges the two species as endangered, overexploited or threatened by overexploitation. Both species were included in Appendix I (endangered) of this regulation. The regulation bans all catches (except for scientific purposes) and stipulates a maximum period of 5 years for the creation of management plans, which was not observed. Subsequently, IN MMA No. 52 (8/11/2005) [63] reclassified the oceanic whitetip shark to Annex II (overexploited or threatened overexploitation) of IN MMA No. 5 [62], thus allowing its capture and trade. There were no catches of these species by the foreign surface longline fleet during the study period.

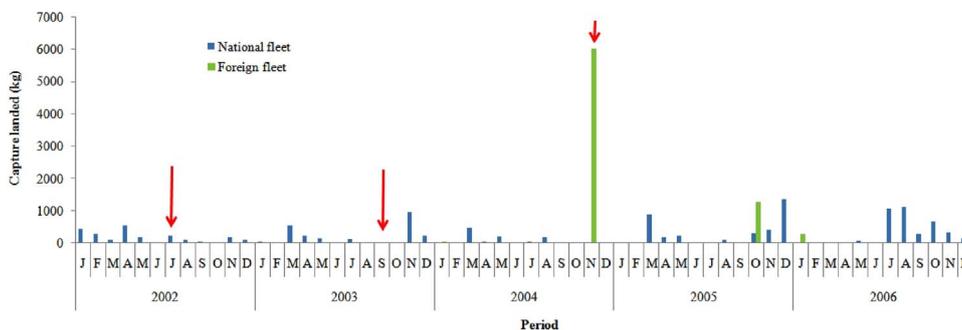
Finally the IN INTERM MPA/MMA No. 4 (15/4/2011) [64] was created to establish measures to mitigate the incidental capture of seabirds. It is the first regulation since the introduction of the longline fishery in Brazil in the 1950s that regulated fishing gear. According to this regulation, all vessels operating south of 20°S latitude were required to use leads with a minimum weight of 60 g not more than 2 m from the hook.

#### 4. Discussion

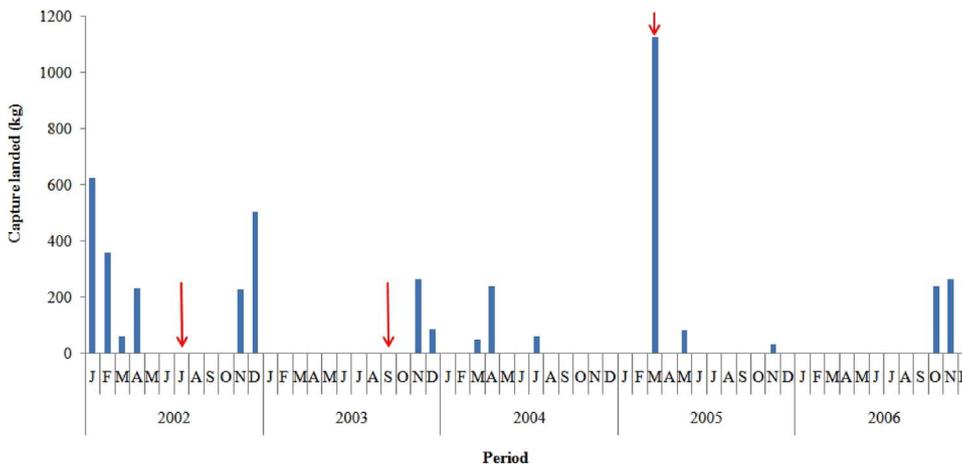
The fishing laws of a country directly reflect the policies, interests and concerns of the period in which they were created, and they are dynamic instruments for guidance, management, control and enforcement while targeting a given objective [65]. The proper implementation of fisheries management requires the support of a well-founded legal



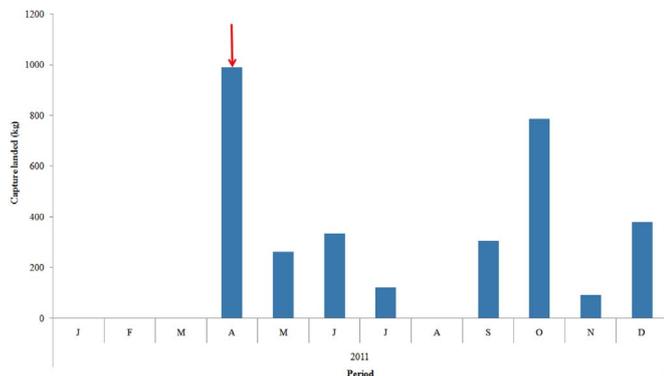
**Fig. 2.** Number of individuals of swordfish - *Xiphias gladius* - smaller than 125 cm captured and landed by the leased foreign fleet operating in the port of Itajaí/SC, between 2004 and 2007. Red arrows indicate the year of publication of the regulatory guidelines that establish the minimum catch size.



**Fig. 3.** Catches in kg of Atlantic white marlin – *Kajikia albida* - landed by national and leased foreign surface longline fleets operating in the port of Itajaí/SC between 2002 and 2006. Red arrows refer to the publication of restrictive regulations.



**Fig. 4.** Catches in kg of blue marlin – *Makaira nigricans* - landed by the national surface longline fleet operating in the port of Itajaí/SC between 2002 and 2006. Red arrows refer to the publication of restrictive regulations.



**Fig. 5.** Catches in kg of bigeye thresher shark – *Alopias superciliosus* and common thresher shark – *A. vulpinus* - landed by the national pelagic longline fleet operating in the port of Itajaí/SC in 2011. Red arrow refers to the publication of the restrictive regulation.

basis and the observance of the international standards and international agreements to which the country is a signatory [66]. Furthermore, fisheries development should closely accompany research programmes on environmental preservation [34]. It is precisely this point that leads to the greatest difficulties, as well as the lack of communication between scientists and the public managers who are responsible for drafting these regulations [67].

Among the provisions considered in this study, only 12.3% have a restrictive nature. Even considering the possible existence of regulations that were not included in this study, the provisions related to promoting fishing activity have always been a priority of the federal authorities, which reflects the state’s interest in the development of fisheries. Moreover, many of the problems related to the creation of

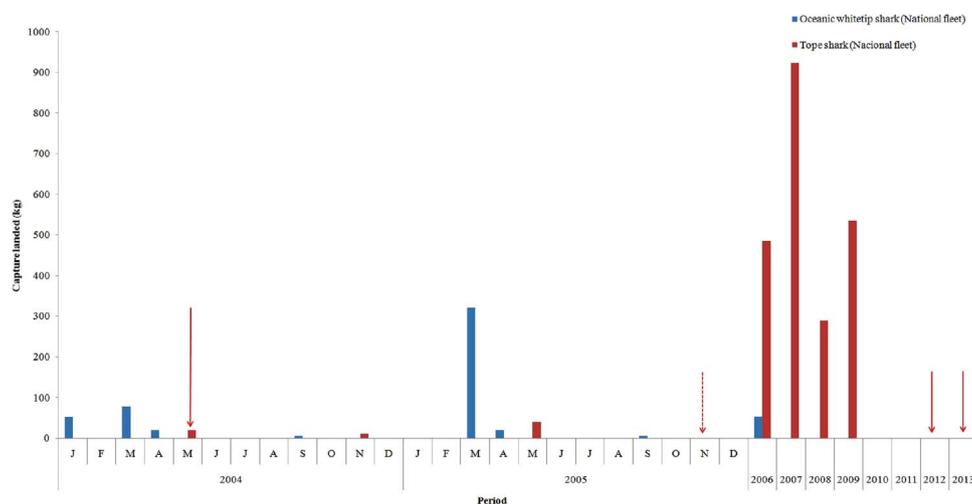
regulations are the result of an institutional discord since shared management became obligatory [34], according to Law No. 10.683 (28/05/2003) [42] and Decree No. 6.981 (13/10/2009) [68]. Brazil has a broad, albeit dispersed and intricate set of regulations. Some of these regulations are inadequate or outdated, thus hindering their effectiveness in relation to users and their application by managing bodies directly involved in fishing. This issue also leads to numerous interpretations of the laws and directly affects the stocks available for capture [66,69–71].

There are two key elements to promote sustainable management of fisheries resources. The first is the existence of the information combined with the improvement of the knowledge and theoretical tools. The second is the improvement of the institutions and institutional arrangements involved in the activity in order to allow effective participation and adequate representation of social groups [20]. In this sense, it is clear that the Brazilian state has failed in its mission to ensure the sustainability in the use of fisheries resources, mainly due to failures in the process of data collection and analysis and constant errors in decision making. Thus, the Brazilian state should be considered to be primarily responsible for the crisis in the fishing that the country is facing [20].

Pelagic longline fishing has great economic importance because it involves the catching of species with high market value [72,73]. In addition, the capture strategies are defined both by the market, the technologies, and the availability of target species [48,74,75].

In relation to the species considered in this study, it was observed that the national and leased foreign fleets fail to comply with specific standards. Species such as the white marlin, oceanic whitetip shark, bigeye thresher, and the tope shark were landed by both fleets in the port of Itajaí despite prohibition of catching these species.

For swordfish, the current regulation that establishes the minimum



**Fig. 6.** Catches in kg of oceanic whitetip shark – *Carcharhinus longimanus* - and tope shark – *Galeorhinus galeus* - landed by national surface longline fleet operating in the port of Itajaí/SC between 2004 and 2014. There are no catches of these species by foreign surface longline fleet during the study period. Solid red arrow on the left refers to the capture prohibition of the two species; Solid red arrows on the right refer to capture prohibition of oceanic whitetip shark (IN INTERM No.1, 12/3/2013); and the list of endangered species (Ordinance MMA No. 445, 17/12/2015); Red dashed arrow refers to the switch of oceanic whitetip shark to Annex II of the IN MMA No. 5, which permitted its capture and trade.

allowed length for landing was breached during the period of this study (Fig. 2), and fines were not recorded by the regulatory bodies. Studies report the wide participation of individuals in the catches landed by the national fleet of the same port between 1992 and 2003 [76]. The capture of immature individuals can drastically reduce future populations and the yield of fleets that catch this species. In the ICCAT region of operation, with three genetically different stocks, namely Mediterranean, North Atlantic and South Atlantic, the recommendation to not land individuals of less than 120 cm in length has been present since the 1990s [77,78]. For the IUCN this species is currently categorised as “least concern”, i.e. species that requires less conservation concern [79].

In relation to the Atlantic white marlin, successive regulations defined capture quotas and prohibitions that created some confusion regarding their validity. Currently this species is categorised by the IUCN [80] and by Ordinance MMA No. 445 [61] as “vulnerable”, and the SE/S of Brazil is considered an important conservation area because it is used for spawning [81]. This species is not only captured by pelagic longline fishing, but also by purse seine and sport fishing [82], and although its capture is prohibited, both pelagic longline fleets continued to land this species in the port of Itajaí without records of seizure and/or punishment.

For the blue marlin, the same problems with the national regulations also occur. This species is categorised as “vulnerable” by the IUCN [83] and as “in danger” by Ordinance MMA No. 445 [61], and is consequently fully protected. The SE/S of Brazil is the most important spawning area of this species, considered the most tropical among the sailfish, in the Atlantic region [81]. This population dropped 60% due to inefficient management and use of the longline fleet in Espírito Santo that specifically target the capture of young individuals [84], thus justifying the categorisation and protection measures. However, this species is still being caught and landed by the national fleet despite specific national legislation and international recommendations.

In the case of the bigeye thresher and common thresher sharks, both species were categorised by the IUCN [85,86] and Ordinance MMA No. 445 [61] as “vulnerable”, because of their declining populations. However, IN INTERM MPA/MMA No. 5 [60], which prohibits its capture and other actions, was in force during the data collection period of this present study, and the national fleet continued to land and trade this species. Longline fishing is not directed to catch these species. However, both are caught due to the high demand for shark fins in the Asian market [87]. Both species are especially vulnerable to

fisheries exploitation because their natural habitat overlaps with fishing areas of different fleets, both regulated as IUU (illegal, unreported, and unregulated fisheries) in which they are readily captured [85,86].

The prohibition of fishing for oceanic whitetip shark entered into force between 2004 and 2005, although the species continued to be landed by national and leased foreign fleets. This species has circum-global distribution and is constantly mentioned in the catch reports of different studies published overseas [88–91] and in Brazil, and surpasses the sustainable level of the stocks [92–98]. Consequently, the species is categorised as “vulnerable” at a global level [99] and in Brazil [61].

The tope shark, stated in Annex I of the IN MMA No. 5 and recently in Annex I of Ordinance MMA No. 445 [61], is globally categorised by the IUCN as “vulnerable” [100] and as “critically endangered” in Brazil, where its capture and trade is prohibited. This species is constantly captured in beach trawls, bottom gillnets, and bottom longline [101], and the data provided by the present study reinforces the role of pelagic longline fishing in catching this species. This probably occurs because two populations are found in the southern region of Brazil; one that breeds in coastal waters of the continental shelf and another that migrates to this region in winter from Uruguay and Argentina [102,103]. Overfishing in the entire area of occurrence has led to an 85% decrease of this species [103]. In the present study, this species was sporadically captured and only landed by the national fleet in some of the years of the series.

Although longline fishing has been carried on since the 1950s, and is currently quite a widespread and diverse practice, it was not regulated by the government until 2011, when IN INTERM MPA/MMA No. 4 [64] was published to reduce the incidental catching of seabirds. Article 3 of this regulation specifies that the fleet of the SE/S of Brazil (below 20°S) must use leads that are not less than 60 g, and it modified the distance in of the lead from the hook. This generated huge controversy in the industry. The main complaint was that gathering the fishing gear had become dangerous because the line would continuously snap and the lead would flip back toward the vessel.

In such a dynamic activity, the revision of these regulations based on readily available data would enable a more precise management that also observes the aspirations of the different actors, be they fishermen, vessel owners, conservationists, public managers or consumers [22,104–107].

## 5. Conclusion

With regard to the behaviour of the fleets in relation to restrictive regulations, it should be noted that even with the valid regulations prohibiting or limiting (e.g. percentage, size) the catching of certain species, the vessels do not fully observe the law. The scenario of oceanic fishing in Brazil, from the perspective of the different legal provisions, clearly reveals that the country still prioritizes the improvement of the fishing effort. The application of current regulations by the authorities has been inefficient in most of the SE/S region of Brazil. Even with reliable and robust scientific studies, there is no guarantee that these studies will be considered in the process of law-making. Moreover, a review of literature reveals a lack of continued studies on the impacts of these laws on target and incidental species, which means that decisions are being made with insufficient and outdated information and can endanger both the natural populations and the economic activity.

Although pelagic longline fishing has been carried out for more than 60 years in Brazil, the current set of inconsistent laws makes any management or inspection of the fishing activity incompatible with the conservation of the species. This reality expresses an institutional and policy weakness in fisheries management in the country, because the absence of regulations that govern fisheries creates loopholes and consequently increases the risk of species extinction (target and bycatch) and the future collapse of the industry.

Finally, the conduct of scientific studies and the creation of regulations is a huge challenge due to the different longline fishing modalities that are being used along the Brazilian coast, with their own landing and gear characteristics, target species and different incidental catches.

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## Appendix A. Supplementary material

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.marpol.2016.12.011.

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