Chapter 3

Certification Schemes in Argentine Fisheries: Opportunities and Challenges for Seabird Conservation

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Abstract

In Argentina, one major factor playing a significant role in the implementation of better fishing practices is related to the advent of the *Marine Stewardship Council* (MSC) certification schemes in marine fisheries, given that one of its component addresses the impact of fishing operations on the ecosystem (e.g. effects on the environment, related species, bycatch). In recent years, several fisheries in Argentina—ranging from coastal ice trawlers targeting the Argentine anchovy *Engraulis anchoita* to freezer trawlers targeting the Patagonian scallop *Zygochlamys patagonica* and the Patagonian grenadier or Hoki *Macruronus magellanicus* have been certified under the MSC scheme. Although these processes are not driven by the Government certainly creates opportunities to develop better fishing practices including in the agendas of fishermen not only target species but also other management issues affecting the marine environment. In this chapter, we will review the current status of the certification schemes implemented in the latter referred fisheries regarding seabird conservation discussing challenges and opportunities from the seabird perspective.

Keywords: certification schemes, argentine fisheries, bycatch, albatrosses, penguins, petrels, shearwaters, seabird conservation

1. Introduction

This chapter offers an overview of the status of the certification schemes implemented in three Argentine fisheries certified under the *Marine Stewardship Council* scheme regarding seabird conservation. The first section of this review considers the nature of interactions between pelagic seabirds (albatrosses and petrels) and fisheries, particularly in the Southwest Atlantic Ocean. The second section seeks to define the key features of certified Argentine fisheries providing a summary of the certification process per fishery and extant fishery regulation and management measures related to both certified and non-certified species/fisheries. The third section explores up-to-date scientific, legal, and political actions taken to protect seabirds in Argentine waters, referring to possible steps for implementing an ecosystem approach to national fisheries within the frame of Argentina's National Plan of Action—seabirds and its interaction with current certification schemes.

2. Commercial fisheries and their impacts on marine top predators

2.1. Gloom of fisheries and impacts on marine ecosystems and their fauna

Since the past century, human population and technological skills at sea, as well as the demand for marine products, have grown on a large scale. Favored by a combination of several factors, namely increase in production, reductions in wastage, better utilization, improved distribution channels and growing demand linked to population growth, rising incomes and urbanization, the global fish food supply has grown substantially in the past five decades. Global total capture fishery production (by 2014) was 93.4 million tons, 87% of which came from marine waters [1]. Affecting not only fishery resources globally, this increase has also altered the structure of marine ecosystems, resulting in severe depletion of populations of marine megafauna, such as seabirds, marine mammals, sea turtles and highly migratory fish, and spreading throughout communities of interacting species through indirect effects [2–5]. This has led to a current scenario where almost 60% of the world fish stocks are considered fully fished, nearly 30% overfished and the remaining 10% moderately exploited [1], strongly implying that the approach of modern day fisheries management (focused in target species) has failed to provide the necessary framework for protecting fish populations and related/dependent species and their environments. Though the industry has been making global efforts to improve the size and quality of commercial landings, minor attention has been given to the ecosystem implications of these extractive activities until recent years, including the magnitude and fate of bycatch and discarded target and non-target species (both benthic and pelagic, including marine megafauna) [6, 7], indirect effects such as the removal of one species leading the profit or detriment of another and habitat impacts [2, 4]. To end with, the growing concern over the state of the marine environment, and the fisheries sustainability, has led to a shift in the focus of fisheries management, from a single-stock approach to management which considers the entire ecosystem, including humans [8–11]. This means that the ecosystem effects of fishing should contemplate a wide range of biological interactions, including changes in predator-prey relationships and nutrient dynamics, effects on non-target species

through incidental capture, "cascading" effects mediated by food-web interactions and the loss or degradation of habitats, among others [4, 5, 10].

2.2. The Patagonian Shelf: its importance to marine megafauna

In the Southern Hemisphere, the Patagonian Shelf extends along the southern Atlantic Coast of South America from the Río de la Plata to southern Patagonia and Tierra del Fuego, thus extending throughout coastal and shelf waters of Argentina, Uruguay and Southern Brazil [12, 13]. Two major wind-driven currents influence the Patagonian Shelf: the cold, rich in nutrients, northward flowing Malvinas/Falkland Current and the warm, southward flowing Brazil Current. Extensive mixing of the above-mentioned currents in the La Plata region (~35°S) results in a highly productive confluence zone, affecting mainly oceanic areas and to certain extent the continental shelf. This mixing has biological, physical, and meteorological consequences that impact the entire Patagonian Shelf [14, 15]. The outflow from the Río de la Plata, the second largest drainage basin in South America, and upwelling of cold Antarctic waters caused by the prevailing westerly winds, also contributes to the high biological productivity on the continental shelf and slope [16, 17]. Particularly, the region covered by the Argentine Continental Shelf is one of the most extensive areas of the world with 1.7 million km^2, largely comprised a relatively shallow (<100 m deep) underwater plateau and bathed by waters whose temperatures range from to 6 to 18°C. The relative influence of the Malvinas/Falkland and Brazilian currents over the Argentine Continental Shelf coupled with other processes operating at a smaller scale such as tides, winds and river discharge generates several fronts promoting the production and/or concentration of phytoplankton and zooplankton, and the consequent development of major communities of fish, crustaceans and squid [16, 17]. Overall, this is a rich marine ecosystem of global importance with an outstanding biodiversity endemism and high biomass of certain species from warm, temperate and cold waters, offering plentiful food for a diverse number of local and migratory marine megafauna (e.g. seabirds, marine mammals, sea turtles and fish) [14, 18–22]. Squids are important components of the Argentine Continental Shelf ecosystem, for ecological and socioeconomic reasons [23]. The fish diversity of the Argentine Sea and adjacent waters between 34 and 55°S is very important, being composed of 522 species out of which about 60–70 are commercially exploited (with seven species representing more than 70% of the total national catch) [24].

2.3. Spatial and temporal overlap between seabirds and fishing activities: implications to bycatch

As mentioned in the previous section, the waters off Argentina and its shelf break constitute an ecosystem of global importance due to the high abundance and diversity of marine invertebrates and vertebrates. Considering the marine megafauna (seabirds, marine mammals and sea turtles), about 150 species inhabit the region [25]. Of these, roughly 40% encompass seabirds, with 17 breeding species and 40 non-breeding species [20]. Overall, Procellariiformes (albatrosses and petrels) contribute with the highest number of species, some of them showing extreme life history traits including low fecundity and productivity, late age at maturity and long-life expectancy [26]. Many of these species show small breeding populations and many are in decline, as their demographic characteristics severely limit their rate of recovery

(especially those species breeding biennially). The reasons for these declines are largely anthropogenic since humans have been killing (intentionally or incidentally) albatrosses since they went out into the oceanic region. Of all the albatrosses (and some petrels), demographic parameters, changes in adult and juvenile survival via incidental mortality in fisheries have the most immediately important factor influencing population trend. Consequently, at sea, threats for these birds are of higher concern when compared with those affecting populations in the breeding grounds such as introduced predators [27, 28].

Several studies in the Patagonian Shelf using tracking methodologies such as satellite transmitters had been used to assess the distribution at sea, define foraging ranges, and identify the overlap between seabirds and human activities such as fisheries at different spatial and temporal scales. In other marine regions of the world, the foraging distributions of several seabird species strongly overlap throughout their entire annual cycle with commercial fisheries globally [29]. This spatial overlap is a necessary precondition for direct interactions (such as bycatch) between seabirds and fisheries; thus, it can be used as a proxy of risk faced by the birds interacting with fisheries [30, 31] (see Section 3.1).

In the case of albatrosses and petrels in the Argentine Continental Shelf, studies on breeders of southern giant petrels *Macronectes giganteus* and adults of the black-browed albatross *Thalassarche melanophris* during the non-breeding period had showed that the core foraging areas were overlapped with the fishing grounds of trawlers [32, 33]. Similarly, southern giant petrels (adults and juveniles) during the wintering period showed plasticity in the selection of their foraging environments being distribution of fisheries one of the main variables influencing their distribution [34, 35]. On the other hand, fisheries management may impact on a range of seabirds' traits such as foraging behavior [36, 37]. For example, southern giant petrels and black-browed albatrosses may show certain differences in their foraging behaviors with respect to areas inside and outside the permanent Argentine hake *Merluccius hubbsi* fishing closure in the Patagonian Shelf (see Section 3.2). The bulk of the core foraging areas of these species were concentrated in waters adjacent to the fishing closure where the fishing effort is higher than in other areas of the shelf [38]. Besides, this fishing closure produced a redistribution of the seabird bycatch creating a "boundary effect" due to the concentration of the fishing effort in the limits of the closure. This high fishing effort most likely brings an increase of discard availability and fish facilitated during hauling and the consequent attractiveness of fishing vessels for birds.

Coastal seabirds, such as the Magellanic penguin *Spheniscus magellanicus* and the Imperial cormorant *Phalacrocorax atriceps* breeding in the Argentinean continental coast, also showed a clear overlap with commercial hake and Argentine red shrimp *Pleoticus muelleri* trawl fisheries operating within waters of the San Jorge Gulf [39]. Moreover, incidental mortality of these species has been regularly recorded in both fisheries [40, 41], and Magellanic penguins were incidentally captured in the pelagic trawl fishery operating in southern Buenos Aires province [42].

The at-sea mortality of adults and juveniles in fisheries were linked to the global population declines of many seabirds' populations mainly albatrosses and petrels, which have been extensively recognized as one of the most threatened group of birds [29]. The information gathered from remote sensing technologies is relevant to identify risk areas for seabirds at sea

and also into the framework of the ecosystem-based fishery management which has as their main goal to maintain ecosystems in a healthy, productive and resilient condition so they can provide the services humans want and need [29, 30].

3. Certification schemes in commercial fisheries

3.1. Improving fishing practices from the seabird conservation perspective

Interactions between pelagic seabirds (albatrosses, petrels, shearwaters) and fisheries occur in all oceans of the globe, virtually in all fisheries, and are dominated by the effect of fishing on birds. Despite the fact that the provisioning of fishery discards and offal to birds can be viewed as beneficial, as was mentioned above incidental mortality in fisheries is by far the main at-sea threat albatrosses and petrels are facing nowadays, and certainly the main cause of declinations in populations recorded in modern days [2, 43–45]. Longline fisheries have for many decades been responsible for the deaths of large numbers of seabirds worldwide. This is primarily due to the fact that (1) after high seas gillnets were banned in international waters (United Nations Resolution 46/215), much of the fishing effort subsequently shifted its approach to the use of longlines and (2) though longline was long considered as highly selective practice [46] seabird bycatch in these fisheries occur when baited hooks deployed onto the sea surface attract seabirds to fishing vessels leading to attacks on baits, capture and death by drowning [47, 48]. The species most affected include surface-feeding scavengers (like albatrosses), surface-divers (such as *Procellaria* petrels) or opportunists, which assemble behind boats and try to steal the bait off of hooks (e.g. albatross, petrels, skuas and gulls). In a recent global review, it was estimated that 160,000 seabirds were killed globally each year in at least 69 longline fisheries reviewed [49]. In spite of great efforts made to mitigate seabird mortality in longline fisheries [45, 50], incidental mortality in commercial longline fisheries threatens the continued existence of seabird populations in many regions of the world and is a key reason why 15 of the 22 species of albatrosses are listed as "threatened" by the International Union for Conservation of Nature [51].

3.1.1. Plan of action: seabirds

In view of the detrimental effects of longline fishing activities on several seabird species, in March 1997, the Committee on Fisheries on its 22nd season pursued FAO (Food and Agriculture Organization of the United Nations) to develop guidelines leading to a Plan of Action aimed at reducing the incidental catch of seabirds. The International Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries (IPOA-Seabirds) was formally adopted by the 23rd session of the Committee on Fisheries in 1999. This document was elaborated within the framework of the Code of Conduct for Responsible Fisheries, agreements from the 1995 United Nations Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks and any applicable rules of international law. Briefly, the FAO Code of Conduct for Responsible Fisheries (adopted in 1995 and hereinafter refereed as to the Code) establish principles and standards applicable to tile conservation, management and development of all fisheries, also

taking into account the biological features of these resources and their environment and the interest of consumers and other users [52]. Although the Code is voluntary, all stakeholders concerned with the management of fisheries, and the conservation of fishery resources, are encouraged to adopt it.

The development of the IPOA-Seabirds provided a framework that allowed the delineation of principles and guidelines to improve the fishing practices and to promote the development of National Plans to reduce this source of mortality in seabirds. As far as 2014, at least 12 States and other entities have completed their National Plan of Action-Seabirds (NPOA-Seabirds) or broadly equivalent documents. As an example of transboundary international efforts, a European Community Plan of Action-Seabirds has already been evoked so as to reduce the incidental mortality of seabirds wherever its longline vessels operate [53]. Finally, due to the nature of the IPOA-Seabirds guidelines (flexible and capable of evolving as new information becomes available), they may be further revised and complemented by other guidelines on specific matters. Consequently, FAO updated in 2009 its previous technical document and extended it to include other fisheries such as trawling once the later were identified as a serious threat to top predators including seabirds [54].

3.1.2. Fisheries certification

Managing the common resource of the world's fisheries has become an activity involving a great deal of risk, with many vested interests. It is by far a highly politicized problem, as not surprisingly, many nations compete for the shared fisheries resources. Deciding how to share these resources sometimes leads to political strains which indirectly affect attempts to protect seabirds. Market-based approaches relying on economic incentives and property rights have won favor in the past two decades when compared to mandate and control regulations [55]. In this context, private standards and related certification schemes are becoming significant features of international fish trade and marketing [56]. Fisheries certification is an instrument that recognizes desirable fisheries practices, while ecolabeling provides information to the consumer about the environmental impact caused by the product [57, 58]. Together, these initiatives aim to create market incentives for improved fisheries management [59]. There is a range of sponsors or developers of standards and certification schemes for fisheries sustainability, including private companies, industry groups, non-governmental organizations (NGOs) and even some combinations of stakeholders. A relatively new development is government-sponsored national ecolabels (e.g. in France and Iceland). It is worth pointing out that a range of ecolabeling and certification schemes exists in the fisheries sector, each with its own criteria, assessment processes, levels of transparency and sponsors. What is covered by the schemes can vary considerably: incidental mortality (bycatch) issues, fishing methods and gear, sustainability of stocks, conservation of ecosystems and even social and economic development [57].

The development of the Marine Stewardship Council (hereafter MSC) in 1997 went further ahead in the sense that it certifies an actual fishery as being both sustainable and sustainably managed. In this context, the MSC certification attempts to recognize producers using responsible fisheries practices [60–63]. Initially developed by Unilever and the WWF, the

MSC has operated independently of those two parents since 1999 [60, 61]. The MSC program is designed to be voluntary and meet the guidelines issued by FAO and be international in scope. By March 2015, 255 fisheries were and further 121 were at different stages of the assessment process, together accounting for about 10% of the global wild-caught seafood [64], thus turning MSC as the most worldwide fisheries certification program [65]. Briefly, the MSC's fishery certification process is an assessment to determine whether a fishery meets certain environmental standards for sustainable fishing. The MSC standard is composed of three core principles and a set of performance indicators and scoring guidelines, known as the "default assessment tree" [66]. Such principles are (1) sustainable target fish stocks, (2) environmental impact of fishing, and (3) effective management. The certification process has two stages: a confidential pre-assessment that identifies the characteristics and limitations of the fishery in question and a complete public assessment in which a third-party certification body (known as certifier or Conformity Assessment Body) evaluates whether a fishery meets the standard. The certification process implies a pre-assessment evaluation, a full-assessment and further annual surveillance [66].

Regarding seabird conservation and taking into account the three principles described above, in Principle 2, seabirds appear in the components dealing with the bycatch of Endangered, Threatened and Protected (ETP) species and the ecosystem function component. Within Principle 3, seabirds and their conservation might be addressed through any of several information-related performance indicators which relate to the needs for information of the management system and enforcement of the certification requirements, to planning and decision performance indicators, and to enforcement of any regulation related to seabird bycatch. In a recent review, of the 138 MSC certified fisheries, 38 were assessed to potentially pose a significant risk to seabirds. An additional 22 fisheries were selected for exhaustive review because of uncertainty about the information available for them. The remaining 78 fisheries were considered low risk given the little threat pose to seabirds, including gears such as collection of shellfish, handlines, or harpooning [67]. A remaining concern is the fairly large number of fisheries for which filling information gaps on bycatch is a condition of certification, meaning that the certification was given without full information. It should be stressed though that the impact of MSC certification on seabird conservation is somewhat limited, because few of the fisheries that have high seabird bycatch are likely to apply and invest the significant sums required for assessment, only to be turned down. These fisheries, therefore, remain beyond the reach of MSC. One of the issues in the MSC fishery certification process is that it relies on undocumented and virtually impossible to document expert opinion. Even when the experts are knowledgeable in the various aspects of the fishery, different experts may interpret the same data differently or place different importance on different aspects of a given conservation issue [67].

3.2. Argentine commercial fisheries: status of targeted stocks, fishery regulations, and management measures

As referred in earlier sections of this chapter (see Section 2.2), commercially targeted fish species in Argentine waters range from 60 to 70 species. However, the main target species comprise a handful of species including the Argentine hake (c. 33% of the total catch), followed by the Argentine shortfin squid *Illex argentinus*, the Argentine red shrimp, and the

Patagonian grenadier or Hoki *Macruronus magellanicus* (c. 23, c. 12, and c. 7% of the total catch, respectively) [68]. Another targeted species playing an important role in the food web of the Argentinean marine ecosystem though with lowered captures is the Argentine anchovy (*Engraulis anchoita*; c. 2% of the total catch). With the exception of the Patagonian grenadier and the Argentine anchovy, the three remaining targeted species/fisheries are not certified. Nevertheless, given the importance of these on overall landings, we will briefly comment about their status along with those certified resources/fisheries.

With regards to the status of main target species in the argentine commercial fisheries, during the 1990s landings of the Argentine hake increased from 435,000 to 645,000 tons. In response to the growing risks of collapse, the *Consejo Federal Pesquero* (CFP, Federal Fisheries Council) reduced the total allowable catch to 189,000 tons in 1999. However, ineffective surveillance and control led to continued overexploitation of the fishery. As a result, the total biomass of the species continued to decline, a scenario worsened by increased discards of juveniles, representing between 11 and 24% of total landings during the period 1990–1997 [69]. The current status of the resource "hake" (both northern and southern stocks combined) is considered as "recruitment overfishing" meaning that the reproductive biomass of the species is in such low level that jeopardizes the animals' ability to reproduce and recover above equilibrium levels previous to 1997, a period in which the resource descended below the species minimum critical level [*Resolución Auditoría General* (Resolution Audit General's Office) 09/2011]. Attempts to reduce the bycatch of juvenile hake or increase the escape of undersized fish through the nets began using the ice-trawl fleet as study case and finalized with the development of a bycatch reduction device called DEJUPA (*Dispositivo para el Escape de Juveniles de Peces en las redes de Arrastre* or Juvenile Fish Bycatch Reduction Device for Trawl Net). The use of DEJUPA (along with the use of certain mesh size in the cod-end) is in current days mandatory for all bottom-demersal trawlers targeting hake under Resolution CFP N° 08/2010, though compliance is still partial. In addition, a fishing closure issued by Provision *Subsecretaría de Pesca y Acuicultura* (SSPyA, Under Secretariat of Fishing and Agriculture) N° 136 was established in 1997 at protecting juvenile hake in high seas waters, covering c. 119,000 km^2. A modification to the previous fishing closure took place in 2000 (Resolution SAGPyA N° 265) further revised by the establishment of a committee for the management of the hake (Resolution SAGPyA N° 12/2001). Since then, the core area of the fishing closure aimed at protecting juvenile hake has remained stable, though partial openings and closures at its margins have occurred mainly driven by the hake spawning biomass estimated from scientific surveys leaded by *Instituto Nacional de Investigación y Desarrollo Pesquero* (INIDEP, National Institute for Fisheries Research and Development) and to political and socio-economic shifts [70]. During 2012, another fishing closure was established by Resolution *Comisión Técnica Mixta del Frente Marítimo* (CTMFM, Argentine-Uruguayan Joint Technical Commission of the Maritime Front) N° 08 for the protection of juvenile hake in the vicinity of the Argentine-Uruguayan Common Fishing Zone.

On the other hand, the Patagonian grenadier or Hoki is the most abundant fishery resource on the southern shelf and slope south of 45°S. During the last years, the biomass catches for this species declined at least 4% (from c. 124,500 to c. 55,000 tons) [68]. Considering commercially important invertebrates, the Argentine shortfin squid is a neritic-oceanic species that can be found from 54 to 23°S of Argentina [23]. Its abundance is difficult to estimate due to its short

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lifespan, complex population structure, and the high inter-annual variability in its population size chiefly due to variable environmental conditions [71]. The Argentine red shrimp is mainly distributed in the San Jorge Gulf. There are difficulties with this stock in linking the spawning biomass to the magnitude of subsequent recruitment. Hence, the fishery operates under continuous monitoring and is closed when necessary to protect the spawning process and minimize overfishing during growth and recruitment. Shrimp fishing trawlers have the sole authority to operate in areas of permanent closure for hake fishing. The main impact of this fishery is through its bycatch, involving 80 species of fish, the most common of which being juvenile hake [72]. The Argentine anchovy is an under-exploited species and is commonly used for filleting and canning. There is a protected area for reproduction purposes, which is closed to fishing within the Common Fishing Zone Argentinean-Uruguayan (ZCPAU).

In relation to fishery regulations and management measures, the Argentine Constitution provides the general national framework to protect marine wildlife in the country. The National policy relevant to wildlife protection is also defined by the *Ley Federal del Ambiente* (Federal Environmental Law) (N° 25.675) enforced by the *Consejo Federal del Medio Ambiente* (Federal Environment Council), the highest environmental authority. The *Ley Federal de Pesca* (Federal Fisheries Law) (N° 24.922) is the central norm in fisheries issues within Argentina at the federal level. However, the regulation of maritime fisheries presents a clear degree of dispersive rules, with different extent range between provincial jurisdictions, and at the federal level, the Federal Fisheries Council is the governance practical body that has federal and provincial representation.

3.3. Certification schemes in argentine commercial fisheries

The incorporation of Argentine commercial fisheries into certification schemes started in 2006 with the certification of the Patagonian Scallop *Zygochlamys patagonica* fishery. Since that time four other fisheries had been involved in certification processes, all under the Marine Stewardship Council (MSC) normative. Two of them are still certified: Argentine Anchovy (Bonaerense stock) certified in 2011 and the Patagonian grenadier or Hoki certified in 2012. While other two fisheries, formerly certified had withdrawn from the MSC assessment process: Southern King Crab *Lithodes santolla* in 2014 and the Argentine Patagonian Toothfish *Dissostichus eleginoides* in 2015.

The second Principle of the MSC Standard, "Minimizing environmental impacts," has been highlighted by researchers involved in certification processes as the main drawback for most Argentinean fisheries to meet the MSC standard [73]. In particular, Argentina has developed several National Plans of Action (NPOA) based on FAO Plan of Action for the conservation and management of chondrichthyes (*Plan de Acción Nacional-Tiburones* or NPOA-Sharks, since 2009) and to reduce the interaction of seabirds (*Plan Nacional de Acción-Aves Marinas* or NPOA-Seabirds, since 2010) and marine mammals (*Plan de Acción Nacional-Mamíferos Marinos* or NPOA-Marine Mammals, since 2015) with fisheries. Furthermore, the CFP under Resolution N° 3/2001 have instructed the *Instituto Nacional de Investigación y Desarrollo Pesquero* (INIDEP, National Institute for Fisheries Research and Development) through the Onboard Observers Program to carry out actions and methodologies required for the proper quantification of bycatch of reptiles, birds, and marine mammals and implement them during commercial fishing operations. This context provides a favorable legal and regulatory framework for the

consideration of these taxa in any fishery certification. The assessment against MSC principles and criteria of certificated commercial fisheries envisage this type of evaluation as unwanted catch in the categories "Endangered, Threatened and Protected species (ETP)" or "Secondary species" (out-of-scope species but not considered ETP). However, the impact of certified commercial fisheries on seabirds, mammals, and reptiles has been unequally treated in the certification scheme of Argentine certified commercial fisheries. In the Argentine anchovy (Bonaerense stock) [74] and Patagonian grenadier fisheries [75], this aspect has been, and it is actually being evaluated, while in the Patagonian Scallop fishery [76], it is underestimated. The final document on the Patagonian Scallop assessment states that seabirds are rare along the shelf break front where the fishery takes place, and so, the interaction between these fleet and seabirds is minimized [76]. However, recent reports inform the association of at least 14 seabird species during the fishing operations [77]. Moreover, five of the attending species are listed in any category of global threat [51].

The certification process has been highlighted by all stakeholders (chiefly industry and certification bodies) as a good decision for many reasons. From the researchers, academics, and NGOs point of view, it implies the enforcement of authorities to conduct research, engagement of stakeholders, and the commitment to carry out action plans [73]. Regardless of whether fisheries meet the MSC standards, not all enterprises in the fishing industry share the financial and administrative capacity to comply with the certification requirements, nor the necessity to participate in the MSC program. Argentine fisheries participating in the MSC program meet this profile, but profound asymmetries exist in terms of onboard observers' coverage among them. While the degree of the observer programme coverage in the case of the Patagonian Scallop since its certification has been of 100% (4 vessels involved in the certification process from a total of 4 operative vessels in the period 2006–2016), the coverage in other fleets has been variable and far from ideal. Observer coverage onboard vessels fishing for Argentine anchovy has ranged from 11 to 13% during the period 2012–2016 in a fleet ranging from 24 to 66 operative vessels. The coverage in vessels targeting Patagonian grenadier has fluctuated between 8 and 36% during the period 2011–2016 in a fleet ranging from 37 to 117 operative vessels [73–76, 78, 79].

4. Seabird conservation in the context of certification schemes

4.1. Improving seabird conservation and fisheries management

It is widely recognized that albatrosses and petrels are one of the most threatened group of birds [44, 45]. Therefore, it is paramount to reduce and prevent pelagic seabird bycatch. Moreover, the incidental mortality of seabirds (chiefly albatrosses and petrels) does not only have devastating consequences for them (and other marine megafauna) but also may turn fishing operation less efficient [80]. The Code of Conduct for Responsible Fisheries developed by FAO [81] encouraged the maintenance and conservation of biodiversity through the reduction of the effects of fishing on non-target species. As a consequence, in recent years, a number of techniques or measures to mitigate incidental mortality of seabirds have been developed, particularly in longline fisheries [82], as these been the first fisheries to be tackled

the issue of bycatch of albatrosses and petrels globally. Apart from being effective in reducing the bycatch of birds, mitigation measures should be practical and easy to apply in commercial fisheries, preferably not reducing the catches of the target species, and ideally, provide incentives for fishermen for their use.

As current Argentinean certified fisheries use towed nets as main gears, for reducing seabirds' interactions with trawl fisheries, best practices include protecting the warp cables, managing offal discharge and discards, and reducing the time the net is exposed on the surface of the water [82]. Mitigation measures aimed at avoiding or reducing interactions between seabirds and Argentinian certified trawl fishing gear are solely taken place in the large high-seas freezer trawl fishery that targets Patagonian grenadier. The Albatross Task Force of Aves Argentinas has designed bird scaring lines—and assessed its efficacy at reducing seabird mortality—to protect the warp cables in this fleet in coordination with the INIDEP [83]. It was in this context that the CPF issued Resolution N° 3/2017 for the mandatory use of tori-lines (for trawl cables) in demersal freezer trawlers commencing in May 2018. Despite the progress achieved and that mitigation measures are included in the plan of action of the certified Argentine anchovy fishery, issues dealing with the development and at sea trailing of mitigation measures tailored for certified trawlers targeting this resource are far from realization.

Both inspectors and observers are the key personnel in charge of monitoring the use and compliance of mitigation measures to reduce the incidental capture of seabirds onboard Argentinean commercial fishing vessels (certified and non-certified vessels combined). The main distinction between these bodies is that the area of intervention of inspectors corresponds to national waters and they also have the capacity of applying the law by means of performing acts of infringement under Provision *Subsecretaría de Pesca y Acuicultura* (SSPyA, Under Secretariat of Fishing and Agriculture) N° 424/2004. There are both national and provincial observers' programs in Argentina. The former monitors national waters belonging to the INIDEP, while the provinces of Rio Negro, Chubut, Santa Cruz, and Tierra del Fuego have their own observers' programs to monitor its coastal waters [84]. Though programs differ in administrative, jurisdictional, and type of fleets issues, in recent years, several workshops took place aimed at standardizing protocols for data collection by either national and provincial observers' programs. There is no distinction between protocols for data collection on seabird-related issues in certified and non-certified fisheries.

4.2. Opportunities and challenges in seabird conservation: the case of certified Argentinean fisheries

In the case of the Argentine anchovy fishery (Bonaerense stock), during the 2011 certification pre-assessment, the main interacting seabird species (including records of incidental mortality) comprised Procellariiformes such as the Great and Sooty shearwaters (*Ardenna gravis*, listed by the IUCN as Least Concern and *A. grisea*, Near Threatened) and the White-chinned petrel *Procellaria aequinoctialis* (Vulnerable). According to the MSC evaluation team, these species were considered as Unwanted catch and listed in the category "Endangered, Threatened and Protected species" [85]. These preliminary results were studied in greater detail during the certification stage and informed in the corresponding audits. In order to achieve such goal, observers belonging to the INIDEP were tasked onboard vessels so as to record seabird

abundance and interactions following standardized protocols already in place [86]. During a period of 3 years of research (2011–2013), the species interacted the most included shearwaters (chiefly *A. gravis*), the kelp gull *Larus dominicanus* (Least Concern), the black-browed albatross (Least Concern), and the white-chinned petrel. The highest mortalities included 101 shearwaters and 12 penguins. A great proportion of the contacts (92%) and all mortalities were recorded taking place with the net [87].

The fishery targeting Patagonian grenadier was certified in 2012 and is currently in the process of being recertified. At the time of certification, several studies had already identified high interaction rates and mortalities of seabirds with high-seas demersal trawlers operating in southern Patagonian Shelf (chiefly black-browed albatross, kelp gull, southern royal albatross *Diomedea epomophora*, southern giant petrel, and white-chinned petrel). In this case, the main recorded contacts were collisions with the warp cables [86, 88]. For this reason, during the certification period, the main goal was to research and implement mitigation measures available in the literature [82]. In modern days, the MSC evaluation team considers that is highly likely that seabirds fall within the biological limits given that the conservation status of most captured seabird species is considered as minor concern. In addition, it is mandatory for vessels to task onboard observers to ensure compliance with regulations. By the time of finishing this chapter, the fishery was in the process of receiving a new certification [89].

As for the fishery targeting Patagonian scallop, the former was certified in 2006 and recertified in 2012 and again in 2017. Though the impact of this commercial fishery on "ETP species" including seabirds is recorded by onboard observers with 100% coverage since its certification, it seems to have negligible effects on such marine megafauna [76, 90, 91]. Still, new information shows that there is an important attendance of seabirds (chiefly Procellariiformes) in different management areas of the fishery, though no contacts (consequently incidental mortality) have been recorded [77].

To resume with, the interactions (including bycatch) of seabirds with the Argentine anchovy and the Patagonian grenadier fisheries can be considered high. Despite this, such fisheries have been certified and recertified based on claimed issues related to (i) the conservation status of species involved in the bulk of the interactions not qualify for any IUCN threatened category, (ii) a complete lack of information regarding the at-sea abundance of the species involved, and (iii) a presumable high compliance on the use of mitigation measures (e.g. streamer lines), among others. Despite this, some essential aspects need to be taken into account: firstly, that threatened seabird species do interact with vessels [39–42, 83, 86–88, 92] although possible to a lesser degree than non-threatened species. However, this may be related to the lowered observer coverage during fishing activities of certified fisheries, as observers are tasked to perform seabird counts (and associated levels of interactions) once per haul per day, thus underestimating attending seabird assemblages and consequently the species composition and their conservation status. It has to be stressed that observers are not fully dedicated to seabird-related issues onboard certified (and non-certified) vessels. Secondly, there are no mitigation measures currently in place for fishing vessels targeting pelagic school fish such as the Argentine anchovy, therefore interactions with the latter could be sustained and/or increase. Thirdly, the levels of compliance with regards to the use of mitigation measures have not been fully assessed in vessels targeting demersal fish such as the Patagonian grenadier.

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4.3. Argentina's National Plan of Action-Seabirds and the interaction with current certification schemes

The approval of the National Plan of Action-Seabirds (NOPA-S) by the CPF in 2010 constituted a critical milestone in Argentina, marking the end of a long-term process aimed to understand the basics of the seabird bycatch in commercial fisheries and establishing a framework to guide conservation and management actions to minimize seabird bycatch in commercial fisheries. As referred in Section 3.1, the Argentinean NPOA-S follows the guidelines provided in the FAO International Plan of Action-Seabirds further expanding to include trawl and other fisheries known to affect the conservation status of seabirds [46, 54]. The above referred process covered about a decade of work and collaboration between governmental agencies, the academia, and NGOs and allowed the implementation of further detailed research in a range of fisheries (including semi-commercial) and the development of conservation advise and management regulations, including one binding conservation measure approved in 2008 calling for the use of seabird bycatch mitigation methods in demersal longline fisheries [Resolution CPF N° 08/2008], and a more recent conservation measure approved in 2017 for freezer trawlers [Resolution CPF N° 03/2017]. Another important milestone in this process was the accession of Argentina to the Agreement on the Conservation of Albatrosses and Petrels (www.acap.aq) in 2006, providing the international framework to the domestic initiatives and leading to international action and engagement with relevant counties worldwide. Although significant progress can be seen since the inception of the process that started in the late 1990s, there is still much more to do in Argentina to effectively bring the number of seabirds killed in fisheries down to acceptable levels. That should include the full implementation of current binding measures, monitoring of compliance and the development of additional regulations to address the bottom ice-trawl and other fisheries known to impact seabirds in the Patagonian Shelf.

As commented in a Section 3.1, a bit more than a decade ago, FAO developed a set of voluntary guidelines for the ecolabeling of fish and fishery products from marine capture fisheries [56]. These guidelines primarily address issues related to the sustainable use of fishery resources and refer to principles, minimum requirements and criteria, and procedural and institutional aspects of ecolabeling. There are already several national, international, industry sponsored, NGOs-led and consumer-supplier partnership certification, and standards schemes under development in the fisheries sector [56–58]. However, it is apparent that the only fisheries-specific scheme that adheres to the FAO guidelines is the MSC Responsible Fisheries Scheme [93]. Although certification and branding are only aspects of product promotion for the fishery, it must be pointed that any given fishery under such scheme must comply with certain minimum standards of data collection and implementation of measures to minimize the impact on the ecosystem, hence providing a benefit beyond the actual management of a given fish stock. In Argentina, and most likely in many other states, the advent of fisheries certification schemes has created opportunities for improving databases, the better understanding conservation issues such as bycatch of top predators, and generated improved conditions for the dialog between different stakeholders (industry included). Domestic examples can be taken from the freezer trawlers targeting the Patagonian scallop, the freezer trawlers targeting Patagonian grenadier, and the coastal ice-trawlers targeting the Argentine anchovy, all of them fisheries certified under the MSC scheme.

Although certification processes are not driven by governments, certainly open windows for partnerships and ultimately create opportunities to develop better fishing practices at an ecosystem level. For example, the certification process in the Patagonian grenadier fishery allowed the implementation of an outreach program for crew in freezer trawlers, substantially improving the onboard conditions for the implementation of seabird bycatch mitigation measures. The anchovy trawl fishery operating in northern Patagonia offers another example of improved conditions for data collection aboard and the understanding of seabird bycatch in coastal fisheries. From the Government perspective, the important matter to address seabird bycatch in fisheries in a strategic fashion is to have available a framework to guide the implementation of conservation actions, and that tool is provided by a NPOA-S that is periodically reviewed and updated by a group of experts. The reciprocal action between the implementation of the NPOA-S (as well as other national plans) and the certification schemes, creating opportunities for research and development, must be accompanied by the monitoring of compliance and enforcement fulfilled by the local authorities.

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Conflict of interest

The authors declare no conflict of interest.

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