

## Legal and institutional tools to mitigate marine turtle bycatch: Argentina as a case study

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### ABSTRACT

This paper explores conservation policy pertinent to three species of marine turtles affected by fisheries, while crossing jurisdictions in their seasonal migrations through the SW Atlantic, particularly the Argentine waters. This case study reviews local legal and institutional frameworks for Argentina and concludes that tools are in place to monitor and mitigate the negative impact of bycatch on the populations. Argentina is signatory of the most relevant international treaties aimed at protecting transboundary species (e.g. Inter-American Convention for the Protection and Conservation of Sea Turtles, Convention on the Conservation of Migratory Species of Wild Animals). Legislation also exists at the federal and provincial levels. Yet, accidental captures continue to occur due to weaknesses in enforcement and the low priority that conservation has in fisheries management decisions. Some urgent practical actions supported by policy are suggested: (a) placement of on-board observers in coastal fishing fleets, (b) application of existing mitigation measures to reduce bycatch, (c) design of a national plan of action for marine turtles in Argentina, and (d) development of a regional plan between Argentina, Brazil and Uruguay. Stakeholder involvement, especially the fishing sector but also the civil society, would be important to energize practical and effective conservation decisions. The example of Argentina is typical for the region and may apply to other countries as well. The conservation community requires investing more in the application of policy, concomitant with perfecting legal tools.

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### 1. Introduction

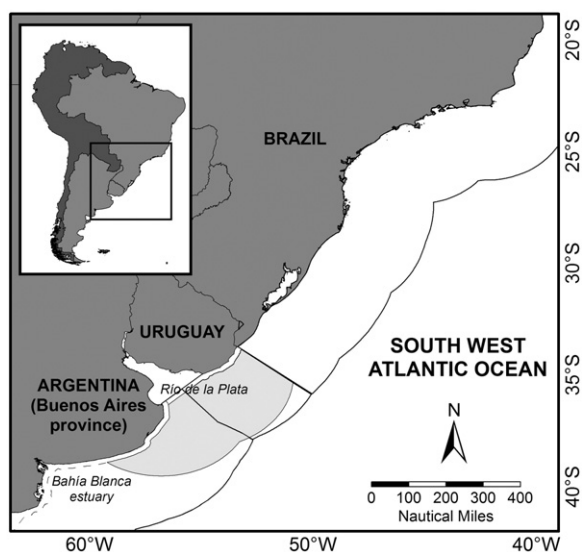
Marine turtles are a small group of seven species of reptiles that spend most of their life in the ocean. Bycatch in fisheries is the main threat they face in a complex life history that includes many habitats, from coastal areas to the high seas [1–3]. As transboundary species, marine turtles link national jurisdictions and extend into international waters [4]. This paper analyzes the

legal background and associated institutional frameworks to advance conservation of marine turtles in the temperate waters off Argentina (Fig. 1). The temperate South Western (SW) Atlantic ocean at the latitude of Argentina represents the edge in the distribution range of marine turtles. Yet, mortality due to bycatch is more common in these waters than previously thought [5].

The life history of marine turtles makes them vulnerable to many human activities [6]. Adults lay their eggs in nesting beaches, where egg poaching by local communities and domestic animals impact reproductive success. The rest occurs at sea, where direct harvesting and bycatch significantly decrease individual survival. Hatchlings spend the first years of life in the open ocean, and complete maturation in coastal waters, where they feed and grow for decades. Mature turtles migrate from feeding to breeding grounds, crossing jurisdictions that include international waters [1–3,6]. Current threats jeopardize populations to the point that all but one species are endangered or critically

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**Fig. 1.** Exclusive economic zones of Argentina (partial), Uruguay and Brazil are shown (full lines) together with provincial waters of Buenos Aires (12 nm; dashed lines). Grey area shows the shared jurisdiction of the Río de la Plata between Argentina and Uruguay. Maps serve illustration purposes and are not meant to be authoritative.

endangered, according to the International Union for the Conservation of Nature- IUCN [7].

Bycatch in commercial fisheries is one of the primary drivers of marine turtle population declines worldwide [6,8]. It is roughly estimated that 85,000 turtles are caught globally in fishing gears every year, but it is likely that the real numbers are much worse [8]. In most fisheries, the impact of turtle bycatch is unknown [8]. Some fisheries have adopted mitigation measures such as turtle excluder devices deployed by the U.S. shrimp fishery and the Australian prawn fleet. Non-permanent closures of fishing sites in the driftnet fishery have been in place in the NE Pacific [9,10].

Fisheries are accidentally catching turtles also in the SW Atlantic [5,8,11,12]. Three species- green (*Chelonia mydas*), loggerhead (*Caretta caretta*) and leatherback (*Dermochelys coriacea*)—are common in the Exclusive Economic Zones (EEZs) of Argentina, Uruguay and Brazil, as well as beyond the continental shelf, into the high seas [5,11,12] (Fig. 1). The occurrence of marine turtles in coastal waters off Argentina was until recently thought to be rare, but systematic surveys demonstrated their regular occurrence [5]. For example, the estuarine areas of Buenos Aires province (Bahía Blanca, Río de la Plata) are seasonal feeding grounds for the three cited turtles [5,13–15] (Fig. 1). From late spring to early fall, turtles feed in these temperate coastal waters, and then migrate north in winter, towards the warmer waters off the Brazilian coast. Some individuals may return to the same areas of Argentina in consecutive foraging seasons [5,13–15, González Carman: unpublished data]. During these extended trips of thousand of kilometers, the three species cross jurisdictions and fishing grounds of commercial and artisanal fleets, where bycatch is common and detrimental to populations (e.g. [5,11,12,16]).

Effective conservation actions must be undertaken at both national and international levels [4]. Although turtle conservation has been the subject of international treaties (e.g. [17–20]), most practical conservation interventions take place at the local level. Local regulations require more attention, considering that turtles spend many months of their annual cycle in national jurisdictions (e.g. [21,22]).

This paper relies on Argentina as a case study and explores the conservation policies pertinent to the three species of marine

turtles affected by fisheries while crossing jurisdictions in their regional seasonal migrations. Specific objectives are to report the overlap between migratory paths and fishing grounds and to describe the legal and institutional tools relevant to the bycatch of turtles that spend part of their life in Argentine waters. This study also discusses the legal scenario of other marine species pertinent to marine turtle conservation, such as sharks and seabirds, in which Argentina has successfully advanced conservation initiatives. Finally, the paper provides practical suggestions derived and related to policies for the regional conservation of marine turtles. The approach used and some of the recommendations made in this study may also be useful to other regions where the same threatened species are found, or even to other trans-boundary species.

## 2. Information and data sources

Information on marine turtle migrations came from field data. Satellite telemetry tracks on two green, one loggerhead and one leatherback turtles were recorded during 2006–2010 from the Río de la Plata and Bahía Blanca (Argentina) to northern waters (Uruguay and Brazil) (Fig. 1). The migratory paths exemplified in this study are representative of the behavior of these species [14,15, González Carman: unpublished data].

Information on the fisheries that accidentally capture marine turtles came from peer-reviewed articles, reports of International Commission for the Conservation of Atlantic Tunas, proceedings of marine turtle scientific meetings, among others. Fisheries operating in the EEZs of Argentina, Uruguay and Brazil, as well as in the adjacent international waters, were considered.

Information on the Argentine policies relevant to the accidental capture of marine turtles came from public official sites: United Nation Food and Agriculture Organization (FAO) [23]; Digital Library of Treaties [24]; Legislative Information [25]; Ministry of Agriculture, Livestock and Fisheries (MAGyP) [26]; Secretariat of Environment and Sustainable Development (SayDS) [27]; Federal Fishery Council (CFP) [28]; Ministry of Agricultural Affairs of Buenos Aires Province (MAA) [29] and Provincial Organism for Sustainable Development (OPDS) [30]. A list of acronyms appears in the Table 1.

The analysis presented in this study divides the migratory path of turtles into three phases concomitant to the jurisdictions of the SW Atlantic: (1) Argentine waters, (2) Uruguay and southern Brazil waters, and (3) the high seas (Fig. 1). In each phase, a description is made of turtle movements and fisheries where captures have been reported. Since bycatch of marine turtles in Argentina occurs mainly in coastal waters of Buenos Aires province, this review is limited to legislation and policies applicable in this province. The main legal and institutional tools relevant to the conservation of the species in each jurisdiction are identified and a detailed description of the provisions found in each regulation is provided in the supplemental material. Because the legislation does not distinguish between species of marine turtles, the analysis conducted in this study applies to the three cited for the area.

## 3. Migration phase 1: Argentine waters

### 3.1. Threats related to fisheries

In their northern migration from Bahía Blanca and Río de la Plata estuaries, turtles first cross the provincial waters of Buenos Aires (that reach up to 12 nm from the coast) and then enter the EEZ of Argentina. In Bahía Blanca estuary, turtles are exposed

to an artisanal shrimp fishery (targeting *Pleoticus muelleri* and *Artemesia longinaris*). Juvenile green turtles are accidentally caught by this fishery during summer and fall. Mortality has not been reported by fishermen, perhaps because the fishing

operation does not imply trawling, and because nets are frequently visited and caught turtles are safely released [5] (Table 2, Fig. 2).

Gillnets are used along the coast of the Buenos Aires province, from Bahía Blanca to Río de la Plata estuaries (Fig. 2). The gear is set at the bottom (depths of 5–30 m) to target stripped weakfish (*Cynoscion guatucupa*) and whitemouth croaker (*Micropogonias furnieri*). Interactions with green, loggerhead and leatherback turtles are more frequent from late spring to early fall [5]. Estimates suggest that hundreds of juvenile green turtles are annually caught in this fishery [31]. Nets are often deployed during half a day to one day at a time. Turtle mortality occurs and the estimated rate is higher than 50% of the caught individuals [5]. Artisanal longlines, tested in a pilot scientific experiment as an alternative gear to gillnets, have reduced the bycatch of sea turtles under experimental scale conditions (Pablo Bordino, pers. comm.). The artisanal longline showed to be more selective for fish than gillnets, although sea turtles were bycaught in both gears. Apart from artisanal longlines, no other mitigation measure has been tested nor implemented.

In provincial and federal waters, mainly in Río de la Plata estuary, commercial trawling fisheries, targeting whitemouth croaker, accidentally capture green, loggerhead and leatherback turtles during spring, summer and fall (Fig. 2). The rate of bycatch in trawl nets is unknown, although captures with high levels of mortality are reported every year [11, González Carman, pers. observ.]. No mitigation measures have been either tested or implemented.

### 3.2. Regulations

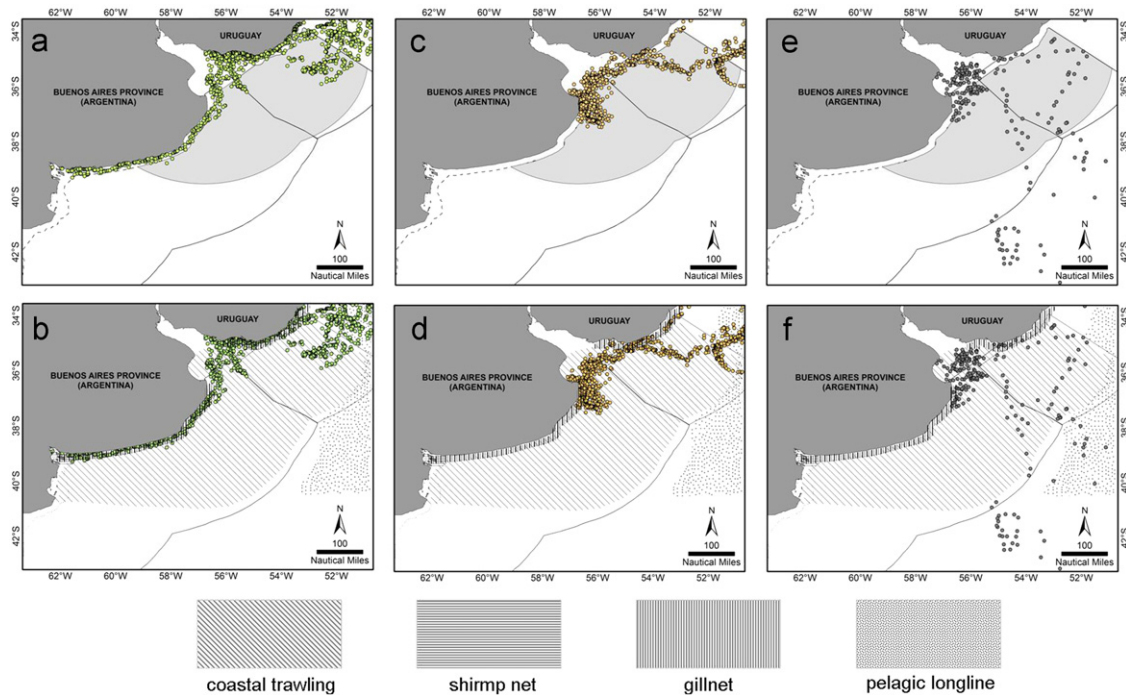
The Argentine Constitution provides the general national framework to protect marine turtles in the country. National policy relevant to wildlife protection is also established by the Federal Environmental Law (Table 2). The Federal Government

**Table 1**  
List of acronyms.

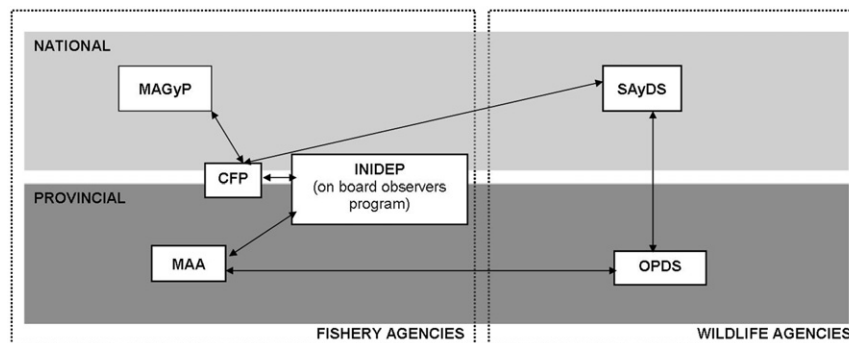
| ACRONYM | NAME  |
|---------|---|
| ACAP    | Agreement on the Conservation of Albatrosses and Petrels                        |
| CBD     | Convention on Biological Diversity  |
| CCSBT   | Commission for the Conservation of Southern Bluefin Tuna                        |
| CFP     | Federal Fishery Council   |
| CICMAR  | Centro de Investigación y Conservación Marina                                   |
| CITES   | Convention on International Trade in Endangered Species of Wild Fauna and Flora |
| CMS     | Convention on the Conservation of Migratory Species of Wild Animals             |
| COFI    | FAO Committee of Fisheries  |
| EEZ     | Exclusive Economic Zone   |
| FAO     | United Nation Food and Agriculture Organization                                 |
| IAC     | Inter-American Convention for the Protection and Conservation of Sea Turtles    |
| ICCAT   | International Commission for the Conservation of Atlantic Tuna                  |
| INIDEP  | National Institute for Fisheries Research and Development                       |
| IPOA    | International Plan of Action  |
| MAGyP   | Ministry of Agriculture, Livestock and Fisheries                                |
| MAA     | Ministry of Agricultural Affairs of Buenos Aires province                       |
| NPOA    | National Plan of Action   |
| NGO     | Non-governmental Organization   |
| NEMA    | Núcleo de Educação e Monitoramento Ambiental                                    |
| OPDS    | Provincial Organism for Sustainable Development                                 |
| PRICTMA | Regional Program for Sea Turtle Research and Conservation in Argentina          |
| RFMO    | Regional Fisheries Management Organizations                                     |
| SAYDS   | Secretariat of Environment and Sustainable Development                          |
| TED     | Turtle Excluder Device  |
| UNCLOS  | United Nations Convention on the Law of the Sea                                 |

**Table 2**  
Summary of the most important aspects of Argentine legislation relevant to the conservation of marine turtles.

| Legal tool  | Scope        | Authority | Main aspects  |
|---|--------------|-----------|---|
| Federal Environment Law (N°25.675)                  | Nationwide   | SAYDS     | <ul style="list-style-type: none"> <li>Any activity which can significantly damage the environment or any component of it, will be subject to an environmental impact assessment previous to its execution [art. 11].</li> <li>The environmental impact studies should have an identification of the damages on the environment and the actions to mitigate the negative effects [art. 13].</li> </ul>  |
| Federal Fisheries Law (N°24.922)                    | Nationwide   | MAGyP     | <ul style="list-style-type: none"> <li>Argentina can adopt conservation measures pertinent to migratory and straddling resources in its EEZ and adjacent areas [art. 4].</li> <li>The MAGyP can establish, previous CFP consent, the conditions and requirements needed to fish, the methods, techniques and fishing gear that are prohibited. It can also participate in international negotiations related with the national fishing policy [art. 7].</li> <li>Fishing will be subject to restrictions established by the CFP based on the conservation of the resources, with the goal of avoid overexploitation and prevent negative effects on the environment and the ecological system [art. 17].</li> <li>The MAGyP can set time-area closures [art. 19] and will determine the fishing gear that is prohibited [art. 21]. It is forbidden to realize any activity that in disagreement with a responsible fishing according to what is determined by the MAGyP and the CFP [art. 21].</li> </ul> |
| Fisheries Law of Buenos Aires province (N°11.477)   | Buenos Aires | MAA       | <ul style="list-style-type: none"> <li>The conservation of the aquatic flora and fauna in boundary areas between provinces or jurisdictions, or in areas of common use, will be implemented through cooperation agreements [art. 14].</li> </ul>  |
| Environment Law of Buenos Aires province (N°11.723) | Buenos Aires | OPDS      | <ul style="list-style-type: none"> <li>Any activity which can significantly damage the environment or any component of it, will be subject to an environmental impact assessment previous to its execution [art. 5(b) and art. 10 to 24].</li> <li>The Provincial State and the municipalities must control the human activities that can threat the environment [art. 6].</li> <li>The Provincial State must adopt an integral system to protect endangered species, including the preservation of the areas where the species is distributed [art. 60(b)].</li> </ul>   |
| Resolution CFP N° 3/2001                            | Nationwide   | MAGyP     | To monitor bycatch of marine reptiles.  |



**Fig. 2.** The migratory paths of (a and b) green, (c and d) loggerhead and (e and f) leatherback turtles overlapped with fishing grounds of several fleets operating in the EEZ of Argentina and the high seas. Maps serve illustration purposes and are not meant to be authoritative (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article).



**Fig. 3.** Flow chart of federal and provincial agencies associated with managing fisheries and wildlife.

must prevent potential harmful or dangerous consequences of human activities. It must ensure the conservation, recovering and improvement of the quality of the natural resources. Lack of information does not justify postponing conservation measures. The Secretariat of Environment and Sustainable Development (SAyDS) is the authority to enforce the Federal Environmental Law (Fig. 3).

In addition to the Federal Environmental Law, the Federal Fisheries Law (Table 2) expresses commitment with the conservation of the living resources inhabiting Argentine jurisdictions, including highly migratory resources within the EEZ and adjacent areas. The enforcement authority for the Federal Fisheries Law is the Ministry of Agriculture, Livestock and Fisheries (MAGyP). In practice, management and strategic decisions on all national fisheries are made by the Federal Fishery Council (CFP) (Fig. 3), a governance body that has federal and provincial representation, including the Foreign Office. The CFP takes decision on the maximum allowable catches based on information provided by the National Institute for Fisheries Research and Development (INIDEP). INIDEP conducts research to inform management within the Argentine territory (Law N° 21.673;

Fig. 3). The CFP must also ensure fishing sustainability and protection of the ecosystem, which includes reducing bycatch (Table 2).

In 2001, the CFP enacted a resolution (Table 2) that entrusts INIDEP, through its on-board observers program, to deploy actions and methodologies needed for an adequate quantification of the incidental capture of marine reptiles, birds and mammals during fishing activities of the commercial fleets, including coastal fleets. This is the only pertinent policy tool in the fishing regulation of Argentina that specifically mentions marine turtles and the problem of bycatch. The commercial fleets operating in offshore or southern waters (jiggers, bottom trawlers, bottom longliners) are being monitored by the program but, until now, bycatch of marine turtles have not been recorded [Chief of INIDEP's On-board Observer Program Gabriel Blanco, pers. comm.]. Fishing fleets may be operating in areas (e.g. southern cold waters) or at depths where marine turtles do not occur, or their capture is not as likely. But in fisheries where accidental captures are indeed recorded, the on-board observer program is not in place.

As a federal country, provinces decide on their jurisdictional waters but must manage their resources in compliance with



federal norms. According to the Federal Fishery Law, Buenos Aires has dominion over its natural resources up to 12 nautical miles from the coast [32].

At the provincial level, the main regulation pertinent to the conservation of marine turtles is the Buenos Aires Constitution. It expresses the commitment of the province with the conservation of natural resources within its territory, and the control of any activity that is detrimental to the ecosystem. Buenos Aires also passed a law, Environmental Law of Buenos Aires province, to protect the environment and avoid detrimental impacts (Table 2). Implicitly, marine turtles are included in both tools. The Provincial Organism for Sustainable Development (OPDS) is the authority to enforce this environmental law (Fig. 3). As a specific action related to marine fauna, the OPDS has a marine wildlife rescue program (Resolution N° 86/2010) that considers the rescue of marine turtles from fishing activities.

Buenos Aires adopted the Federal Fisheries Law, but also developed its own policy, the Fisheries Law of Buenos Aires province (Table 2). The conservation of the natural resources in the provincial policy is not as clearly stated as in the Federal Fisheries Law. It refers to the conservation of natural resources only in the context of boundary areas between provinces, jurisdictions or zones of common interest, and promotes cooperation agreements to protect aquatic flora and fauna. The authority to enforce this law is the Ministry of Agricultural Affairs of Buenos Aires Province (MAA) (Fig. 3).

#### 4. Migration phase 2: Uruguay and southern Brazil waters

##### 4.1. Threats related to fisheries

After leaving the coastal waters of Argentina, marine turtles migrating north to warmer waters, close to the coast of Uruguay and Brazil, may be caught by artisanal and commercial fleets. Gillnets and trawling nets cause high mortality [11,12,33–39]. Individuals migrating further from the coast, near the continental shelf break, interact with commercial fisheries deploying driftnets to capture sharks (*Sphyrna* spp.) in Brazilian waters [36,40] (Fig. 4).

If marine turtles survive the interaction with coastal fisheries on the shelves of Argentina, Uruguay and Brazil, they are also threatened by the Uruguayan and Brazilian pelagic longline fisheries, which operate in their EEZs capturing swordfish (*Xiphias gladius*), tuna (*Thunnus* spp.) and sharks (*Sphyrna* spp., *Carcharinus* spp.) [11,16,41–43]. The capture rate of loggerheads and leatherbacks reaches up to 0.42 turtles/1000 hooks [16]. Most of the captures occur during the fall, winter and spring [44]. Circular hooks have been tested as a measure to reduce bycatch, but no conclusive evidence of the benefit has been reached yet [45] (Fig. 4).

##### 4.2. International instruments

The conservation of transboundary species require international cooperation, thus treaties among countries are required [3,19,20]. Argentina, Uruguay and Brazil are signatories of all major international conventions relevant to marine biodiversity conservation: Convention on Biological Diversity (CBD), Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and Convention on the Conservation of Migratory Species of Wild Animals (CMS) (Table 3). Since these instruments are committed to the conservation of endangered species [19], they apply to the three species of marine turtles cited for the region.

An instrument that deals with bycatch as a specific threat to biodiversity is the Code of Conduct for Responsible Fisheries of

the Food and Agriculture Organization of the United Nations (FAO Code of Conduct). It is a non-binding tool adopted by Argentina, Uruguay and Brazil. Therefore, these countries are responsible for the monitoring of the bycatch of marine turtles. They agreed also to conduct studies to improve the selectivity of fishing gears, promoting cooperation in the development of better fishing practices (Table 3).

The most turtle-focused of all international instruments is the Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC), a legally binding, multilateral treaty signed by Argentina in 2010 and ratified in 2011. The IAC has also been signed by Uruguay and Brazil.

The IAC shares principles with FAO Code of Conduct, although it refers exclusively to marine turtles (Table 3). It aims at protecting habitats on which marine turtle populations depend on. It therefore considers the terrestrial environment and the marine habitat within the national jurisdiction and the high seas. The IAC addresses bycatch with very specific guidelines. As members, Argentina, Uruguay and Brazil should regulate fishing activities to reduce to the greatest possible extent the incidental capture, retention, harm and mortality of marine turtles during fishing activities. Regulations, and the development or improvement of fishing gears or techniques are urgently required.

The IAC considers in detail the use of a mitigation measure for the shrimp trawling fleets, the turtle excluder device (TED), and provides guidelines on its implementation and exceptions of use (Table 3). The TEDs could be a technical solution to reduce bycatch in the trawling fleets of Argentina and Uruguay that operates in Río de la Plata estuary. The IAC encourage the Parties to promote scientific research, designate protected areas and develop regional management plans. The cooperative implementation of the interventions promoted by the IAC at the regional level may result in the reduction of bycatch of marine turtles in the SW Atlantic.

Argentina is signatory of the Río de la Plata Bilateral Treaty (Table 3). Under this agreement, Argentina and Uruguay developed guidelines regarding the shared jurisdictions of the Río de la Plata estuary (Fig. 1). A binational authority, the Technical Commission of the Maritime Front, is in charge of regulating human activities, such as fishing, to ensure sustainability and promote research to evaluate and preserve resources. Since marine turtles intensively use the estuary (Fig. 2), this treaty and the Commission, are important for planning of marine turtle conservation.

Apart from the cooperation frame that international instruments provide, the three countries have several conservation groups working on marine turtles: Regional Program for Sea Turtle Research and Conservation (PRICTMA) in Argentina, Karumbé and Centro de Investigación y Conservación Marina (CICMAR) in Uruguay, Projeto TAMAR- ICBio, Núcleo de Educação e Monitoramento Ambiental (NEMA) and many other groups in Brazil. They are connected through the SW Atlantic Network [46], a group of marine turtle biologists and conservationists that share advances on research and draw up conservation actions. It is in the frame of the ASO Network that mitigation actions to reduce bycatch along the migratory routes of marine turtles can be promoted.

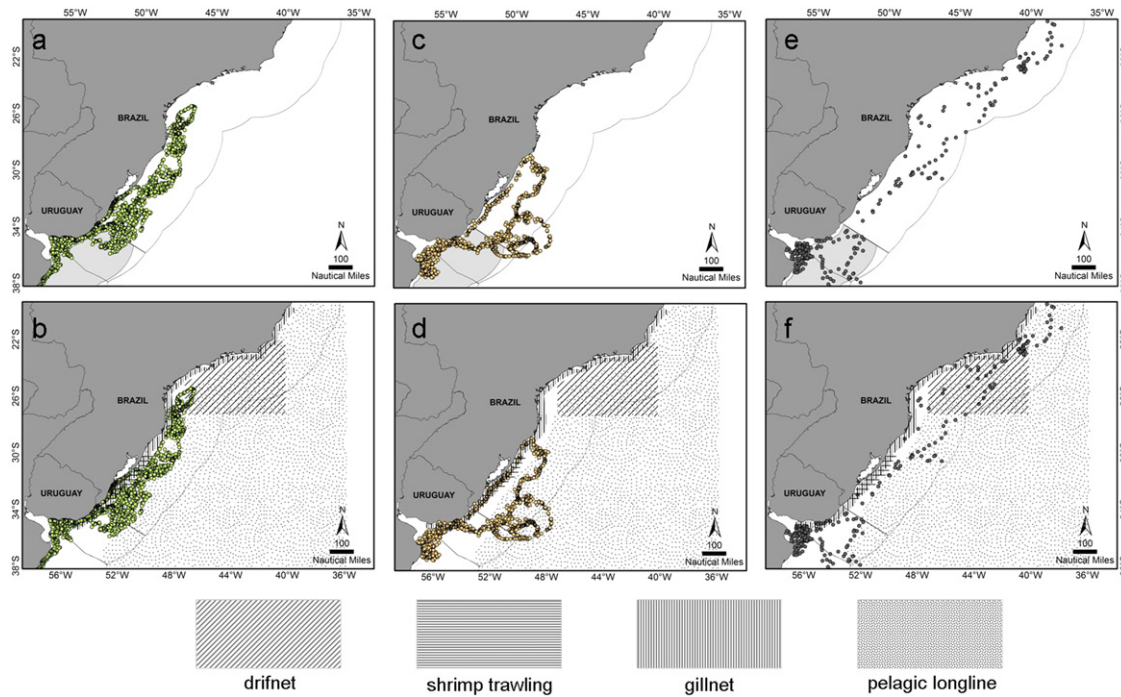
#### 5. Migration phase 3: The high seas

##### 5.1. Threats related to fisheries

Pelagic longline fisheries of Brazil and Uruguay also operate in the high seas [11,16], where marine turtles feed and travel (Fig. 4). They are the same fleets that operate near the continental shelf break [11,16,41–43].

**Table 3**  
Summary of the most important aspects of the international commitments adopted by Argentina that are relevant to the conservation of marine turtles. I: international, R: regional.

| Legal tool  | Type                               | Scope | Main aspects  |
|---|------------------------------------|-------|---|
| Convention on biological diversity  | Treaty (hard law)                  | I     | <p>Parties should:</p> <ul style="list-style-type: none"> <li>establish planning and monitoring obligations for the protection of biological diversity, for example, through the integration of conservation into national plans and policies [art. 6(a)],</li> <li>prepare environmental impact assessments for activities likely to have a significant adverse impact on biological diversity [art. 14] (i.e. fishing),</li> <li>establish protected areas and management guidelines, using the precautionary principle, to promote the recovery of threatened species [art. 8],</li> <li>use bilateral, regional or multilateral agreements to control activities that are likely to have significant adverse impacts on biodiversity in other's countries jurisdiction or on the high seas [art. 14].</li> </ul>  |
| Convention on international trade in endangered species of wild flora and fauna | Treaty                             | I     | All the species of marine turtles of Argentina, Uruguay and Brazil are included in the Appendix I, thus all international trade for primarily commercial purposes is prohibited [art. 3]  |
| Convention on the conservation of migratory species of wild animals             | Treaty                             | I     | <ul style="list-style-type: none"> <li>All marine turtle species of Argentina, Uruguay and Brazil are included in Appendix I and II.</li> <li>According to obligations on species of Appendix I, Parties must endeavor to conserve and, where feasible, restore essential habitats of the species [art. 3(4)]. Furthermore, Parties must prevent or mitigate obstacles to the migration of species, and must reduce factors leading to endangerment [art. 4(a)].</li> <li>In relation to species included in Appendix II, Parties must endeavor to develop agreements for the conservation of populations or the species as a whole [art. 14]. The purpose of these agreements is to restore a given species to a favorable conservation status or to maintain it in such a status.</li> </ul>  |
| United Nations convention on the law of the sea                                 | Treaty                             | I     | <ul style="list-style-type: none"> <li>Parties has absolute sovereignty over all resources (including marine turtles) within its territorial sea (up to 12 nm from shore) and their EEZ (from 12 to 200 nm) [art. 3 and 57].</li> <li>If turtles are incidentally captured in Argentina's EEZ, conservation and management measures to maintain or restore the species must be created, prohibiting the taking of marine turtles or requiring gear modifications to reduce bycatch mortality [art. 61].</li> <li>On the high seas, Parties (e.g. Brazil, Uruguay and Argentina) should take measures to protect marine turtle populations that are being accidentally captured in each EEZ and also in the adjacent international waters [art. 89].</li> </ul>  |
| Code of conduct for responsible fisheries of the FAO                            | Non-binding instrument             | I     | <ul style="list-style-type: none"> <li>Management measures on resources should not only ensure the conservation of target species but also of species belonging to the same ecosystem or associated with or dependent upon the target species [art. 6(2)].</li> <li>Selective and environmentally safe fishing gear and practices should be further developed and applied and waste, catch of non-target species, both fish and nonfish species, and impacts on associated or dependent species should be minimized [art. 6(6)].</li> <li>Parties should carry out studies on the selectivity of fishing gear, the environmental impact of fishing gear on target species and on the behavior of target and non-target species in relation to such gear [art. 12(10)].</li> <li>Parties should promote fishermen cooperation in the development of selective fishing gear and practices [art. 8(5)(1)].</li> <li>Parties should make effort to ensure that documentation of fishing operations and retained catch of fish and non-fish species [art. 8(4)(3) and 12(4)].</li> </ul>   |
| Inter-American convention for the protection and conservation of sea turtles    | Treaty                             | R     | <ul style="list-style-type: none"> <li>Human activities that could affect sea turtles during periods such as migrations should be restricted to the extent practicable [art. 4(2)(c)].</li> <li>Protected areas and other measures to regulate the use of areas where sea turtles regularly occur (including permanent or temporary closures and modification of fishing gear) should be designated [art. 2(d) and Annex II].</li> <li>Scientific research relating to sea turtles and their habitats should be promoted [art. 4(2)(e)].</li> <li>The environmental education and dissemination of information to encourage the participation of stakeholders (government institutions, non-governmental organizations, the general public and the communities directly involved in the protection, conservation and recovery of sea turtle populations and their habitats) should be promoted [art. 4(2)(g)].</li> <li>The incidental capture, retention, harm or mortality of sea turtles in the course of fishing activities should be reduced to the extent practicable. For this purpose appropriate regulation of such activities, development, improvement and use of appropriate gear, devices or techniques (such as TEDs) are needed [art. 4(2)(h)].</li> <li>Develop regional management plans among Parties (for example among Argentina, Uruguay and Brazil) and to adopt measures in its respective national laws for implementation of the provisions of this Convention and to ensure effective compliance by means of policies, plans and programs [art. 18].</li> </ul> |
| Río de la Plata Bilateral Treaty  | Treaty among Argentina and Uruguay | R     | <ul style="list-style-type: none"> <li>Joint scientific researches to evaluate, and conserve the living resources and its sustainable exploitation should be promoted [art. 58].</li> <li>The pollution and any other detrimental effects derived from the use, exploration and exploitation of the marine environment should be eliminated [art. 82(b)].</li> <li>Norms to regulate the fishing activities should be established [art. 54 and 82(d)].</li> </ul>   |



**Fig. 4.** Migratory paths of (a and b) green, (c and d) loggerhead and (e and f) leatherback turtles overlapped with fishing grounds of several fleets operating in the EEZ of Uruguay, Brazil and the high seas. Maps serve illustration purposes and are not meant to be authoritative (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article).

## 5.2. Regulations

No particular country has national jurisdiction over the high seas. It is the United Nations Convention on the Law of the Seas (UNCLOS) that deals with the conservation of species in international waters, considering conservation obligations similar to those that apply to the EEZ. Argentina has been a signatory of UNCLOS since 1995, and Uruguay and Brazil are also part of the same treaty. Under UNCLOS, the three countries, and any other State fishing in adjacent high seas waters, must agree on the measures necessary to protect the populations of the harvested species, and also the species associated with, or dependent upon, harvested species during fishing operations (Table 3). Therefore, the pelagic longline fleets of Uruguay and Brazil are expected to avoid the negative impact of their activities on marine turtle populations.

The problem of bycatch in the high seas is also considered by several Regional Fisheries Management Organizations (RFMOs). In the SW Atlantic, relevant RFMOs are the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) and International Commission for the Conservation of Atlantic Tuna (ICCAT) [47]. Argentina is not Party to either of them. Conversely, Uruguay and Brazil are Parties to ICCAT and have conducted research on marine turtle bycatch in the pelagic longline fleets [43–45].

## 6. How conservation on other endangered marine species may help turtles

Some of the legal and institutional tools reviewed above for turtles have already promoted the conservation of endangered species of sharks and birds. In 2007, following the FAO International Plan of Action for the Conservation and Management of Sharks (IPOA- Sharks), the CFP encouraged the first workshop to

set the basis for a national plan of action, which was approved in 2009 (CFP Resolution N° 6/2009).

Marine birds, as marine turtles, are affected by fisheries but are not targets for consumption. In 2006, Argentina signed the Agreement on the Conservation of Albatrosses and Petrels (ACAP, Law N°26.107). One year later, a national plan of action was released (NPOA-Seabirds, Plan de acción nacional para reducir la interacción de aves con pesquerías en la República Argentina). The NPOA- Seabirds was advanced by federal and provincial governmental agencies (of fisheries and wildlife), scientific institutions and local non-governmental organizations (NGOs). Its main goal was to reduce the interaction between marine birds and fisheries in Argentine waters. Its specific aims relate to fisheries monitoring, improvement of fishing practices, fishermen training and public awareness. In 2008, the CFP enacted a resolution addressing bycatch of albatrosses and petrels in the longline fleet, and establishing precise actions to reduce it (CFP Resolution N°08/2008). This resolution covered fishing gear, operations and mitigation techniques. Fishing operations were required to be monitored by observers from INIDEP since 2007. In 2010, the CFP approved the NPOA- Seabirds (CFP Resolution N° 03/2010).

Comparatively to sharks and marine birds, policy on marine turtles requires further development. In 2005, the FAO Committee of Fisheries (COFI) refused to support an international plan of action for marine turtles. COFI members agreed that it would be better to achieve real progress on the existing IPOAs, rather than add another IPOA to the list of poorly implemented soft laws [20]. Instead, the COFI adopted the document “Guidelines to Reduce Sea Turtle Mortality in Fishing Operations”, which draws attention to the problem of bycatch in marine turtles and suggest appropriate measures of mitigation [48].

Despite the lack of an IPOA-Sea Turtles, hard-law treaties, indirectly attempting the conservation of marine turtles, had already been adopted by Argentina in the 1980s and 1990s (e.g. CMS, CITES, CBD). The recently signed IAC is equivalent to the ACAP for seabirds. Plans of action specific to marine turtles, one regional for the SW Atlantic and other for Argentina, are still needed.

## 7. Advancing marine turtles conservation in Argentina

The regular occurrence of marine turtles in Argentine waters is a recent finding [5], yet local policy and institutional framework to advance conservation solutions to threats affecting marine turtle while in provincial and EEZ waters are in place. In Brazil, despite a longer history of marine turtle research and high abundances of animals on land and at sea, legal full protection for marine turtles was achieved only recently [49]. The current publication of the National Red List Assessments for Marine Turtles in Brazil, will inform the development of a National Plan of Action to guide conservation activities and research on marine turtles for the next 5 years [50].

It is not because of lack of legal tools or agencies that accidental captures are not monitored and continue impinging a cost to marine turtle populations in Argentina. The mitigation of threats is embedded in international instruments (e.g. CBD, IAC, FAO Code of Conduct, Río de la Plata Treaty) and in national laws (Federal Environmental Law or the Federal Fisheries Law). Implementing and enforcement agencies for these legal tools exist, and the on-board observer program of INIDEP is the right tool to monitor bycatch. Yet, the captures and the lack of monitoring persist. This is partially due to weaknesses in implementation of mitigation measures and their enforcement. There is opportunity for refinements and improvements in the national and provincial policy. Some urgent practical actions can be implemented based on current situation and scientific knowledge:

a. Interventions supported by the current legal and institutional systems:

- Place on-board observers in the trawling industrial fleet operating in the Río de la Plata estuary and coastal waters of Buenos Aires Province, to collect data on marine turtle bycatch. In some ships, allowing an observer on board requires to have one less fisherman in the fishing crew. In those cases, and in the case of the artisanal fleets, observers could work on land when ships and boats enter port.
- Test further mitigation measures based in experience from other regions. For example, TEDs can be tested in the trawling fleet and lower profile nets in the gillnet fleet (see [48]). Some mitigation measures have not been tried before because the scientific data showing the occurrence of marine turtles, and their accidental captures in Argentine waters, were lacking. Now, these obstacles have been overcome (see [5]).
- Identify marine and coastal protected areas of Argentina, Brazil and Uruguay that are connected by marine turtle migrations. Protected areas include marine turtles as a conservation target, but unknown if the same individuals are being protected in other places. Under provisions of the CBD and CMS, an integrated management with common conservation goals is desirable among these areas.

b. Actions that require improvements of current policy:

- Following the example of CFP Resolution 08/2008 on seabird bycatch, pass resolutions determining when, where and how accidental captures of marine turtles must be avoided. Scientific information on the behavior of marine turtles already exists to support these measures.
- Work on a national plan of action for marine turtles to reduce accidental captures under Argentine jurisdiction. This plan should establish monitoring guidelines for bycatch in the coastal fleets (gillnet and trawling), design and test of mitigation measures, train of on-board observers, promote education and public awareness, and encourage research on abundance estimation, demography and habitat use. Special emphasis

should be placed on strategies to ensure funding for monitoring bycatch, testing mitigation measures and the improvement of current and implementation of new marine protected areas in Buenos Aires province.

- Design a Marine Turtle Regional Management Plan for the SW Atlantic, encouraging common goals and conservation initiatives in Argentina, Uruguay and Brazil. This Plan would be supported by previous agreements adopted by the countries, such as the CMS, FAO Code of Conduct and IAC, and could be called and conducted by scientist and conservationist working in the frame of the ASO Network.

c. Actions to improve the current state of knowledge on marine turtle populations and the effect of human activities on them:

- Estimate bycatch rates for the three species in the artisanal gillnet and the coastal trawling fleets of Buenos Aires province, through the information obtained by observers on board and on land. These numbers must then be informed to the CFP and the SAYDS.
- Estimate survival rates for the three species in the Río de la Plata estuary. Data must then be used to measure the impact of bycatch on marine turtle populations and evaluate the effectiveness of mitigation plans.
- Identify areas of high bycatch risk to start testing mitigation measures, based on marine turtle core areas and zones of high fishing effort.

The implementation and enforcement of a mitigation measure would benefit from communication and exchange between agencies within the Buenos Aires province (i.e. MAA and OPDS), and also between provincial and federal agencies (i.e. CFP, SAYDS and OPDS). Some ways of communication are already established (e.g. the SAYDS has representation in the CFP). But now that the IAC has been adopted, the conservation of marine turtles is in the agenda, and as a first step the designation of a working group composed by members of all the agencies to address the management of bycatch could be a first step to enhance that communication. At the international level, common management goals may also be agreed by better communication between Argentina, Brazil and Uruguay through already existing channels of dialog. Finally, together with the participation of all provincial and national agencies of wildlife and fisheries, local communities of fishermen, NGOs and other users of the ocean may be included in the discussion and definition of the measures to reduce the accidental capture of marine turtles.

## 8. Conclusions

Despite the global distribution of marine turtles, there are only three other case studies such as this in the published literature on marine turtle conservation. In Mexico, lack of adequate policy enforcement as well as out-dated legislation for some issues have been reported [51]. Something similar has been reported for India, highlighting the need for more specific marine turtle legislation [52]. In the USA, gaps in policy or weaknesses of enforcement does not seem to be the main problem, but a population-based, multi-species, multi-gear approach to bycatch has been suggested as a requirement to increase management effectiveness [9]. It would be useful to have more reviews on policy and institutional frameworks for critical places, such as the Mediterranean, eastern Pacific and other countries in the SW Atlantic, identified as priorities for marine turtle conservation [8].

As implementation and enforcement seem to be poor in most places where conservation is urgent, it may be possible that the



next decade in turtle conservation is devoted to implementing tools, or at least give the same level of attention to implementation than to the development of new or improve policy. But, conservation successes may be multiplied if the implementation efforts are designed on a regional basis, a level of complexity for conservation action that is relatively neglected, compared to national or international efforts. Integrating policy information for the main regions of the world where turtles migrate and live may help create more geographic specificity to the international policy.

Taxonomic specificity of policy tools, such as ACAP or IAC, are desirable, yet there is a need to integrate policy for species with national, regional and international initiatives on spatial conservation, such as the creation of large marine protected areas. Protected corridors for marine turtle conservation, for example, may be a useful tool to complement mitigation measures. Moving from species to spaces may require scientific understanding of migratory behavior with fisheries data and a gap analysis of policy to connect conservation theory and practice.

Bycatch in fishing gear is one of the most dramatic conservation problems in the ocean affecting marine megafauna. Yet, turtle conservation also depends on mitigating ocean pollution, particularly plastic garbage that harms turtles [6]. Policy related to pollution is not integrated to policy related to fisheries, and the institutional framework is different as well. An analysis, as the one performed here, but on the policies regarding pollution is needed.

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## References

- [1] Bolten AB. Variation in sea turtle life history patterns: neritic vs. oceanic developmental stages. In: Lutz PL, Musick JA, Wyneken J, editors. The biology of sea turtles, vol. II. Boca Ratón, FL: CRC Press; 2003. p. 243–58.
- [2] Musick JA, Limpus CJ. Habitat utilization and migration in juvenile sea turtles. In: Lutz PL, Musick JA, editors. The biology of sea turtles, vol. I. Boca Ratón, FL: CRC Press; 1997. p. 137–64.
- [3] National Research Council. Decline of the sea turtles: causes and prevention. Washington; 1990. 280p. ISBN: 0-309-54342-8.
- [4] Frazier J. Marine turtles and international instruments: the agony and the ecstasy. J. Int. Wild. Law Policy 2002;5:1–10.
- [5] González Carman V, Álvarez KC, Prosdociimi L, Inchaurrega MC, Dellacasa RF, Faiella A, et al. Argentinean coastal waters: a temperate habitat for three species of threatened sea turtles. Mar. Biol. Res. 2011;7:500–8.
- [6] Lutcliffe ME, Plotkin P, Witherington B, Lutz PL. Human impacts on sea turtle survival. In: Lutz PL, Musick JA, editors. The biology of sea turtles, vol. I. Boca Ratón, FL: CRC Press; 1997. p. 387–410.
- [7] IUCN. IUCN Red List of threatened species. Version 2011.2., (2011). <http://www.iucnredlist.org>, accessed January 10 2011.
- [8] Wallace BP, Lewison RL, McDonald SL, McDonald RK, Kot CY, Kelez S, et al. Global patterns of marine turtle bycatch. Conserv. Lett. 2010;3(5):369–81. <http://dx.doi.org/http://dx.doi.org/10.1111/j.1755-263X.2010.00105.x>.
- [9] Moore JE, Wallace BP, Lewison RL, Zydelis R, Cox TM, Crowder LB. A review of marine mammal, sea turtle and seabird bycatch in USA fisheries and the role of policy in shaping management. Mar. Policy 2009;33:435–51.
- [10] Marine Species Section, Approvals and wildlife division, environment Australia in consultation with the marine turtle recovery team. Recovery plan for marine turtles in Australia. 2003. 49p. ISBN 0 6422 1436 0.
- [11] Domingo A, Bugoni L, Prosdociimi L, Miller P, Laporta M, Monteiro DS, Estrades AA, Albareda DA. El impacto generado por las pesquerías en las tortugas marinas en el Océano Atlántico sud occidental. San José, Costa Rica: WWF Programa Marino para Latinoamérica y el Caribe; 2006 72p. ISBN 9968-825-31-X. In Spanish.
- [12] Gallo BMG, Macedo S, Giffoni BB, Becker JH, Barata PCR. Sea turtle conservation in Ubatuba, southeastern Brazil, a feeding area with incidental capture in coastal fisheries. Chelonian Conserv. Biol. 2006;5(1):93–101.
- [13] González Carman V, Albareda DA. Tortugas marinas del Atlántico Sudoccidental. In: Foro para la conservación del Mar Patagónico y áreas de influencia. Síntesis del estado de conservación del Mar Patagónico y áreas de influencia. Edición del Foro, Puerto Madryn; 2008. In Spanish. <http://www.patagoniansea.org>, accessed January 10 2011.
- [14] González Carman V, Albareda D Tortugas. In: Falabella V, Campagna C, Croxall J, editors. Atlas Web del Mar Patagónico. Especies y Espacios. Wildlife Conservation Society and BirdLife International; 2009 accessed January 10 2011 <http://www.atlas-marpatagonico.org>.
- [15] López-Mendilaharsu M, Rocha CFD, Miller P, Domingo A, Prosdociimi L. Insights on leatherback turtle movements and high use areas in the South-west Atlantic Ocean. J. Exp. Mar. Biol. Ecol. 2009;378:31–9.
- [16] Sales G, Giffoni BB, Barata PCR. Incidental catch of sea turtles by the Brazilian pelagic longline fishery. J. Mar. Biol. Assoc. UK 2008;88:853–64.
- [17] Campbell LM, Godfrey MH, Drif O. Community-based conservation via global legislation? Limitations of the Inter-American convention for the protection and conservation of sea turtles J. Int. Wildlife Law Policy 2002;5: 121–43.
- [18] Hykle D. The Convention on migratory species and other international instruments relevant to marine turtle conservation: pros and cons. J. Int. Wildlife Law Policy 2002;5:105–19.
- [19] Wold C. The status of sea turtles under international environmental law and international environmental agreements. J. Int. Wildlife Law Policy 2002;5: 11–48.
- [20] Lutgen GL. Soft law with hidden teeth: the case for a FAO International Plan of Action on sea turtles. J. Int. Wildlife Law Policy 2006;9:155–73.
- [21] Byrd BL, Hohn AA, Godfrey MH. Emerging fisheries, emerging fishery interactions with sea turtles: a case study of the large-mesh gillnet fishery for flounder in Pamlico Sound, North Carolina, USA. Mar. Policy 2011;35: 271–85.
- [22] McClellan CM, Read AJ, Cluse WM, Godfrey MH. Conservation in a complex management environment: the by-catch of sea turtles in North Carolina's commercial fisheries. Mar. Policy 2011;35:241–8.
- [23] United Nation Food and Agriculture Organization (FAO) <http://www.fao.org>, accessed January 10 2011.
- [24] Digital Library of Treaties <http://tratados.cancilleria.gob.ar>, accessed January 10 2011.
- [25] Legislative Information <http://www.infoleg.gov.ar>, accessed January 10 2011.
- [26] Ministry of Agriculture, Livestock and Fisheries <http://www.minagri.gob.ar>, accessed January 10 2011.
- [27] Secretariat of Environment and Sustainable Development <http://www.ambiente.gov.ar>, accessed January 10 2011.
- [28] Federal Fishery Council <http://www.cfp.gov.ar>, accessed January 10 2011.
- [29] Ministry of Agricultural Affairs of Buenos Aires province <http://www.maa.gba.gov.ar>, accessed January 10 2011.
- [30] Provincial Organism for Sustainable Development <http://www.opds.gba.gov.ar>, accessed January 10 2011.
- [31] Albareda D, Bordino P, Prosdociimi L, Rodríguez-Heredia S, Zapata MF, González Carman V. Captura accidental de tortuga verde (*Chelonia mydas*) en la pesquería artesanal del sur de la Bahía Samborombón, Buenos Aires, Argentina. In: III Jornadas de Conservación e Investigación de Tortugas Marinas en el Atlántico Sur Occidental. Piriápolis, Uruguay; 2007. p. 37. In Spanish. <http://www.tortugasaso.org>, accessed January 10 2011.
- [32] Sabsay D, Di Paola ME, Quispe C, Machain N. Bases para una gestión ecosistémica sustentable del Mar Patagónico. Puerto Madryn: Editorial Mare Magnum; 2006 64p.
- [33] Lezama C. Impacto de la pesquería artesanal sobre la tortuga verde (*Chelonia mydas*) en las costas del Río de la Plata exterior. Master Thesis. Montevideo, Uruguay; 2009. 82p. In Spanish.
- [34] Contato MCD, Soto JMR, Rosa FD. Captura incidental de tartaruga-de-couro (*Dermochelys coriacea*) e tartaruga-verde (*Chelonia mydas*) em redes-de-emalhe-de-fundo no sul de Brasil. In: II Reunión sobre Investigación y Conservación Tortugas Marinas del Atlántico Sur Occidental. San Clemente del Tuyú, Argentina; 2004. In Portuguese. <http://www.tortugasaso.org>, accessed January 10 2011.
- [35] Monteiro DS, Estima SC, Junqueira SP, Bugoni L, Gandra TBR. Ocorrência de *Chelonia mydas* e interação com a pesca artesanal no interior do estuário da Lagoa dos Patos – RS. In: II Jornada de Conservação e Pesquisa de Tartarugas Marinhas no Atlântico Sul Occidental. Casino, Brasil; 2005. p. 68. In Portuguese. <http://www.tortugasaso.org>, accessed January 21 2011.
- [36] Marcovaldi MA, Sales G, Thomé JCA, Dias da Silva ACC, Gallo BMG, EHSM Lima, et al. Sea turtles and fishery interactions in Brazil: identifying and mitigating potential conflicts. Mar. Turtle Newsl. 2006;112:4–8.
- [37] Martí da Silva L, de Oliveira MV, Monteiro DS, Estima SC. Captura incidental de tartarugas marinhas na pesca artesanal no estuário da Lagoa dos Patos e região costeira adyacente, Rio Grande do Sul – Brasil. In: III Jornadas de Conservación e Investigación de Tortugas Marinas en el Atlántico Sur Occidental. Piriápolis, Uruguay; 2007. p. 61. In Portuguese. <http://www.tortugasaso.org>, accessed January 10 2011.
- [38] López EA, Monteiro-Filho ELA. Captura accidental de tartarugas marinhas em artes de pesca artesanal na desembocadura da Baía de Paranaguá, estado do Paraná – Brasil. In: IV Jornadas de Conservación e Investigación de Tortugas Marinas en el Atlántico Sur Occidental. Mar del Plata, Argentina; 2009. p. 40. In Portuguese. <http://www.tortugasaso.org>, accessed January 10 2011.
- [39] Laporta M, Miller P, Ríos M, Lezama C, Bauzá A, Aisenberg A, et al. Conservación y manejo de tortugas marinas en la zona costera uruguaya. In: Menafrá R, Rodríguez-Gallego L, Scarabino F, Conde D, editors. Bases para la conservación y el manejo de la costa uruguaya. Montevideo, Uruguay: Vida Silvestre; 2006. p. 259–70. In Spanish.

- [40] Monteiro DS, Bugoni L, Estima SC, Gandra TBR, A pescaria de emalhe de superfície direcionada à captura de tubarões-martelo e a interação com tartarugas marinhas no litoral norte do Rio Grande do Sul. In: II Jornada de Conservação e Pesquisa de Tartarugas Marinhas no Atlântico Sul Ocidental. Casino, Brasil; 2005. p. 60. In Portuguese. <<http://www.tortugasaso.org>>, accessed January 10 2011.
- [41] Pinedo MC, Polacheck T. Sea turtle by-catch in pelagic longline sets off southern Brazil. *Biol. Conserv.* 2004;119:335–9.
- [42] Kotas JE, Sd Santos, VGd Azevedo, Gallo BMC, Barata PCR. Incidental capture of loggerhead (*Caretta caretta*) and leatherback (*Dermochelys coriacea*) sea turtles by the pelagic longline fishery off southern Brazil. *Fish. Bull.* 2004;102:393–9.
- [43] López-Mendilaharsu M, Sales G, Giffoni B, Miller P, Fiedler FN, Domingo A. Distribución y composición de tallas de las tortugas marinas (*Caretta caretta* y *Dermochelys coriacea*) que interactúan con el palangre pelágico en el Atlántico Sur. *Collective Volume of Scientific Papers ICCAT* 2007; 60:2094–109. In Spanish.
- [44] Giffoni B, Domingo A, Sales G, Fiedler FN, Miller P. Interacción de tortugas marinas (*Caretta caretta* y *Dermochelys coriacea*) con la pesca de palangre pelágico en el Atlántico Sudoccidental: una perspectiva regional para la conservación. *Collective Volume of Scientific Papers ICCAT* 2008; 62 (6) 1861–70. In Spanish.
- [45] Domingo A, Barceló C Swimmer Y, Pons M, Miller P. Anzuelos circulares vs anzuelos "J" en la flota palangrera uruguaya. *Collective Volume of Scientific Papers ICCAT* 2009; 64 (7):2427–42. In Spanish.
- [46] ASO Network, <<http://www.tortugasaso.org>>, accessed January 10 2011.
- [47] Small CJ. Regional Fisheries Management Organizations: their duties and performance in reducing bycatch of albatrosses and other species. UK: Cambridge: BirdLife International; 2005 105p..
- [48] Food and Agriculture Organization of the United Nations. Guidelines to reduce sea turtle mortality in fishing operations. Rome; 2009: 139p. ISBN 978-92-5-106226-5.
- [49] Marcovaldi MA, Marcovaldi GG. Marine turtles of Brazil: the history and structure of Projeto TAMAR-IBAMA. *Biol. Conserv.* 1999;91:35–41.
- [50] Brazil Publishes National Red List Assessments for Marine Turtles. <<http://iucn-mtsg.org/2011/05/11/brazil-publishes-national-red-list-assessments-for-marine-turtles/>>, accessed January 10 2011.
- [51] Namnum S. The Inter-American convention for the protection and conservation of sea turtles and its implementation in Mexican law. *J. Int. Wildlife Law Policy* 2002;5:87–103.
- [52] Upadhyay S, Upadhyay V. International and national instruments and marine turtle conservation in India. *J. Int. Wildlife Law Policy* 2002;5:65–86.