

**Template for Submission of Scientific Information
to Describe Ecologically or Biologically Significant Areas**

Title/Name of the area: Banks chain of northern Brazil and Fernando de Noronha

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Abstract (*in less than 150 words*)

The North Brazilian Chain (1 ° S to 4 ° S / 37 ° W to 39 W) and Fernando de Noronha Chain (3 ° to 5 ° S / 32 ° to 38 ° W) are made up of islands and seamounts of different depths. The North Brazil Current interacts with the submarine topography generating upwellings that promote productivity. Chains are inserted in oligotrophic environment and Fernando de Noronha and Rocas Atoll are seen as a “hotspot” due to the high biodiversity and endemism. The area is a spawning site and / or feeding site for turtles, elasmobranchs, reef fish and pelagic fish. Some elasmobranchs and turtles species are listed in the IUCN red list as threatened occur in the area. Sharks, reef fishes and lobsters are target for fisheries carried out in the region. Fishing exploitation is a traditional activity in the area. Sea turtles are also subject to incidental catch by pelagic longline and ghost nets. The Rocas Atoll has the highest rate of endemism in the region and Fernando de Noronha has the highest species richness when compared to other Brazilian oceanic islands. Fernando de Noronha and Rocas Atoll fauna display great similarity which is attributed to the presence of shallow oceanic banks that function as steps tones in the area. Larvae of coastal species suggest high connectivity with the continental slope area.

• Introduction

(To include: feature type(s) present, geographic description, depth range, oceanography, general information data reported, availability of models)

The Northern Brazilian Chain (1 ° S to 4 ° S / 37 ° W to 39 W) and the Fernando de Noronha Chain (3 ° to 5 ° S / 32 ° to 38 ° W) consist of several banks that emerge from 4000 m reaching 20 m to 300 m depths on the top. The Northern Brazilian Chain includes the Aracati, Continental, Mundaú banks whereas the Rocas Atoll, the archipelago of Fernando de Noronha and seamounts named Sirius, Grande, Pequeno, Guara and Sudeste, among others, compose the Chain of Fernando de Noronha. The seamounts have a rocky and uneven topography, are arranged parallel to the base of the continental shelf stretching for 1300 km (Coutinho, 1996). The region is influenced by the North Brazilian Current (NBC), that is more intense in the winter months (July / August), whose interactions with the submarine relief (banks and islands) generate discrete upwellings (Travassos *et al.*, 1999) leading to an increasing in local productivity. Islands and seamounts that are inserted in a tropical oligotrophic environment are the habitat for a large number of species.

Thus, the Rocas Atoll, which is the only atoll in the South Atlantic and one of the smaller in the planet (Serafini *et al.*, 2010), has the largest colony of seabirds in Brazil (143,000 birds) with five species nesting on the spot. The same species occurs in Fernando de Noronha: *Sula dactylatra*, *Sula leucogaster*, *Anous stolidus*; *Anous minuta* and *Sterna fuscata* (Silva *et al.*, 2002, Serafini *et al.*, 2010). As in Fernando de Noronha, the Atoll is also used for nesting site for the turtle *Chelonia mydas* and feeding area to juveniles of *Chelonia mydas* and *Eretmochelys imbricata* (Marcovaldi and Marcovaldi, 1999, Grossman *et al.*, 2009).

The Olive turtle (*Lepidochelys olivacea*) uses this area for feeding and as a migration route (Da Silva *et al.* 2011). The benthic macrofauna, dominated by Crustacea and Polychaeta groups, is more abundant at seamounts when compared to the continental shelf, showing a strong association between areas of Fernando de Noronha Chain and Northern Brazilian Chain (Coelho *et al.*, 2009). The similarity of the fauna in both areas is attributed to the shallow oceanic banks that function as steps tones in the area (Richardson, 2003; Sampaio *et al.*, 2004). The occurrence of *Octopus Isularis* (Mollusca, Cephalopoda, Octopoda), an endemic species to a restricted sector of northeastern Brazil, was recorded at Atol das Rocas and Fernando de Noronha (Haimovici *et al.*, 2009). Regarding the fishes, there was higher abundance of larvae at the Northern Brazilian Chain and around the Rocas Atoll, when compared to the break of the continental shelf and adjacent continental slope (Lessa *et al.*, 2009). The occurrence of larvae of Mugilidae, and Carangidae, Hemiramphidae on the banks area suggests connectivity between the chains and the adjacent continental slope (Lessa *et al.*, 2009). Furthermore in the neuston there were records of larvae of pelagic species of high commercial value of the families Scombridae, Istiophoridae, Coryphaenidae Xiphidae and the dominance of species of the families Exocoetidae, Myctophidae and Gobiidae, of high ecological value (Lessa *et al.*, 1999).

Fishing activity around islands and seamounts catch elasmobranchs, pelagic and reef fishes of large and medium sizes (Soto, 1997; Sampaio *et al.* 2006; Serafini *et al.*, 2010) including: *Carcharhinus perezii*, *C. falciformis*, *C. signatus*, *C. galapagensis* and *Sphyrna lewini*, five species of rays, fishes of the Serranidae family (*Epinephelus mystacinus*, *E. adscensionis* e *Mycteroperca venenosa*), Carangidae (*Caranx lugubris*, *C. latus*, *Elagatis bipinnulata*), billfishes (*Xiphias gladius*), dolphinfish (*Coryphaena hippurus*), among others (Mazzoleni and Schwingel, 2002; Serafini *et al.*, 2010). Among sharks *Carcharhinus signatus* and *Carcharhinus falciformis* have been caught in directed fisheries as they are target species (Santana *et al.*, 2009) in longline operations. However, *Negaprion brevirostris*, *Hexanchus griseus* and *C. longimanus* are recorded in incidental catches. Of the species caught in the area both *Rhincodon typus* and *Ginglymostoma cirratum* are listed both in the IUCN red-list as threatened species and in the Brazilian list of threatened species- Annex I (MMA, IN 05, 24/05/2004). Sea turtles are also subject to incidental catch by pelagic longline (Sales *et al.* 2008, Da Silva *et al.* 2011) and ghost nets (B. Armando dos Santos, Pers.Comm.) that occur in this region.

In this context, the decline of populations of top predators can lead to problems in the phenomenon known as "cascade effect" causing an increase in the population of meso-predators and endangering the species of lower trophic levels. In a national recognition to the important role they play for marine conservation, both Fernando de Noronha and Rocas Atoll are currently conservation units that have the status of "National Marine Park" and "Biological Reserve," respectively.

Location

(Indicate the geographic location of the area/feature. This should include a location map. It should state if the area is within or outside national jurisdiction, or straddling both. It should also state if the area is wholly or partly in an area that is subject to a submission to the Commission on the Limits of the Continental Shelf)

The Northern Brazilian Chain (1° S a 4° S/ 37° W a 39° W) and the Fernando de Noronha Chain (3° a 5° S/ 32° a 38° W) consist of several banks that emerge from 4000 m reaching 20 m to 300 m depths on the top. The Northern Brazilian Chain includes the banks of Aracati, Continental, Mundaú, Meio whereas the Rocas Atoll, the archipelago of Fernando de Noronha and seamounts named Sirius, Grande, Pequeno, Guará, Drina and Sudeste, among others, compose the Chain of Fernando de Noronha. Both chains are fully inserted into the Brazilian Exclusive Economic Zone (Fig. 1).

Feature description of the proposed area

(This should include information about the characteristics of the feature to be proposed, e.g. in terms of physical description (water column feature, benthic feature, or both), biological communities, role in ecosystem function, and then refer to the data/information that is available to support the proposal and whether models are available in the absence of data. This needs to be supported where possible with maps, models, reference to analysis, or the level of research in the area)

The seamounts and islands of the northeast region are located off the coast of the states of Ceará and Rio Grande do Norte making up the chains of Fernando de Noronha and the Northern Brazilian Chain (Fig. 1). The first is located between 3° and 5° S and the latter between 1° e 3° S. The seamounts and islands are known due to their importance for fishing, which is the result of the enrichment caused by the interaction of the waters of the North Brazilian Current with the submarine topography (banks and islands) which enhances the local productivity (Travassos *et al.* 1999). The role of seamounts and their islands off the Northeast region on the fishing production is well known by local fishermen because they cause significant production of commercially valuable species (Lessa, 1999).

Overall, the seamounts have varying depths that range on the top from 20 to 250 m exhibiting a large number of sizes and shapes. The region has a permanent thermocline in summer and autumn that seasonally changes with depth and latitude, being shallower in the fall, a typical pattern of equatorial and tropical regions. The mixed layer is more homogeneous in summer, less thick in autumn, decreasing with the increasing latitude. The horizontal distribution of surface temperature has a higher degree of homogeneity in summer and a wider range of thermal variation in autumn (Becker, 2001). Although the region has three water masses: Tropical Surface Water- that occupies a very narrow range (salinity of 35.5 to 36.5 and temperature > 26° C); The High Salinity Water displaying a salinity 36 to 37 and temperature 20 to 26° C, and The Atlantic Central Water with temperature from 20 to 5° salinity from 36 to 34.4. The maximum sub-surface salinity was recorded at the beginning of the depth of the thermocline, which is more enhanced in low latitudes both in summer and autumn (Becker, 2001). The North Brazilian Current, dominant in the area, moves westward reaching the Sirius and Guara banks on average at 0.6 m.s⁻¹ (Travassos, 1999).

The Fernando de Noronha Archipelago (03° 51'S and 32° 25'W) consists of 21 islands and islets, the major one is Fernando de Noronha that emerges from the ocean floor about 4,000 m deep. The chain of seamounts extends to the coast of Ceará State (Serafini *et al.*, 2010).

Another important feature of this chain is the Rocas Atoll (03° 50'S and 33 ° 49'W), whose origin is volcanic related to deposits of calcareous algae and corals on extinct volcanoes (Gasparini, 2004). Its format is almost elliptical (Almeida *et al.*, 2000) and its topography consists of skeletal remains of coralline algae, gastropod shells and Foraminifera (Silva *et al.*, 2002).

In a national recognition to the important role they play for marine conservation, both Fernando de Noronha and Rocas Atoll are currently "Conservation Units" that have the status of "National Marine Park" and "Biological Reserve," respectively. The Archipelago Fernando de Noronha has also the status of a State Environmental Protection Area linked to Pernambuco state (Serafini *et al.*, 2010).

In recent decades these Chains of seamounts and islands have been studied in the scope of the Joint Oceanography Projects -JOPS II (German Cooperation/Ministry of Science and Technology-MCT, 1995); Assessment Program of Living Resources of Exclusive Economic Zone-REVIZEE (MMA/SECIRM, 1995 to 2002). The existing data on banks were mostly generated from samples of scientific and commercial fishing operations. Landings of longline fisheries were followed in Natal (RN) since the 90's. Information on ichthyoplankton, ictioneuston, benthos, physical and chemical oceanography and meteorology were generated in the two last decades, constituting the basis for future research and management.

Also, research focusing the Rocas Atoll and Fernando de Noronha have been developed due to facilities of the Station of the Biological Reserve and the Marine National Park, respectively. In general, efforts to improve the understanding of the enrichment processes that operate in the area of seamounts, inserted in an oligotrophic tropical environment, are extremely desirable, as well as research for clearing up the connectivity between populations distributed in different banks and islands of this area, with the aim of their conservation.

Feature condition and future outlook of the proposed area

(Description of the current condition of the area – is this static, declining, improving, what are the particular vulnerabilities? Any planned research/programmes/investigations?)

The present condition raises concerns in view of the increasing fishing pressure in the region, especially on the seamounts. This area has been a traditional fishing ground for the red snapper (*Lutjanus purpureus*) and lobsters. Negative effects of this activity can be detected on exploited elasmobranch (Santana et al., 2009; Lessa et al., 2009). The absence of specific records of capture (Hazin et al., 1993), the increase in fishing effort, that has led to the loss of productivity in fisheries for sharks (PRONABIO, 1998), population declines, are highly worrying (Santana et al., 2009). In this sense the exploitation of *C. signatus* is emblematic (Santana et al., 2009). The local exploitation affects migratory species that uses the area in different phases of their life cycle, resulting in population declines, especially for species that have essential habitats the continental shelves and slopes of oceanic islands, as in *C. falciformis*. Also, the incidental capture of sea turtles by pelagic longline and ghost nets is highly worrying.

Apart from few areas free of fisheries, as the surroundings of Biological Reserve of Atol das Rocas and the tiny area of the Fernando de Noronha shelf (up to 50 m isobath), there is no restriction nor any effective protection of the area. Also, the incidental capture of sea turtles by pelagic longline and ghost nets is a highly worrying issue.

Assessment of the area against CBD EBSA Criteria

(Discuss the area in relation to each of the CBD criteria and relate the best available science. Note that a candidate EBSA may qualify on the basis of one or more of the criteria, the boundaries of the EBSA need not be defined with exact precision. And modeling may be used to estimate the presence of EBSA attributes. Please note where there are significant information gaps.)

CBD EBSA Criteria (Annex I to decision IX/20)	Description (Annex I to decision IX/20)	Ranking of criterion relevance (please mark one column with an X)			
		Don't Know	Low	Some	High
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features				x
<i>Explanation for ranking</i> The Chain of Fernando de Noronha encompasses the Rocas Atoll, which is the only atoll in the South					

<p>Atlantic Ocean, to which the highest rate of endemism of 8.5%, when compared to Fernando de Noronha (5.9%) and Abrolhos 0.6% has been estimated (Serafini <i>et al.</i>, 2010). The area of Fernando de Noronha and Atol das Rocas is considered a hotspot due to its high biodiversity and endemism, crucial for marine conservation in Brazil (Rocha, 2003).</p> <p>The Fernando de Noronha Chain has an unequivocal ecological importance due to high biological productivity and for characterizing important key habitats that are used as nurseries, feeding, breeding and sheltering sites of various species. Overall, 34 species of sponges, 7 corals, 18 crustaceans were recorded. Among the latter two species occurring only in oceanic islands, the land crab (<i>Gecarcinus lagostoma</i>) and aratu (<i>Grapsus grapsus</i>). Regarding the fishes, 169 species were recorded in Fernando de Noronha and 117 in Rocas. The number of endemic species (10) highlights the importance of the region, among them the wrasse (<i>Thalassoma noronhanum</i>) and damselfish (<i>Stegastes rocasensis</i>). The area also hosts 16 species of sharks and five species of rays (Serafini <i>et al.</i>, 2010).</p> <p>In the area occurs the <i>Octopus Isularis</i> (Leite <i>et al.</i>, 2008) (Mollusca, Cephalopoda, Octopoda), an endemic species to a restricted sector of northeastern Brazil recorded at Atol das Rocas and Fernando de Noronha (Haimovici <i>et al.</i>, 2009).</p>					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				x
<p><i>Explanation for ranking</i></p> <p>It can be found at Rocas Atoll the largest colony of seabirds of Brazil (143,000 birds). Five species are more abundant spending all stages of their life cycle in these environments. Species nesting at the Atol das Rocas and Fernando de Noronha: <i>Sula dactylatra</i>, <i>Sula leucogaster</i>, <i>Anous stolidus</i>; <i>Anous minuta</i> and <i>Sterna fuscata</i> (Silva <i>et al.</i>, 2002, Serafini <i>et al.</i>, 2010). As in Fernando de Noronha, turtles use the site for spawning and feeding: <i>Chelonia mydas</i> <i>Chelonia mydas</i> and <i>Eretmochelys imbricata</i> (Grossman <i>et al.</i>, 2009, Serafini <i>et al.</i>, 2010). In these waters there are aggregations of reproductive male and female <i>Chelonia mydas</i>, which breed in these islands. Also <i>Lepidochelys olivacea</i> uses the area for feeding and migration (Fig.2) (Sales <i>et al.</i> In 2008, Da Silva <i>et al.</i> 2011).</p> <p>Invertebrates are poorly known however, 34 species of crustaceans and 17 polychaetes were recorded (Paiva <i>et al.</i>, 2007). The benthic macrofauna, dominated by Crustacea and Polychaeta groups is more abundant in seamounts compared to the continental shelf showing strong association between the areas of the Fernando de Noronha Chain and Northern Brazilian Chain (Coelho <i>et al.</i>, 2009). Overall, a kind of octopus <i>Octopus insularis</i> (Leite <i>et al.</i>, 2008) (Mollusca, Cephalopoda, Octopoda), which is endemic to a restricted sector of northeast Brazil can be found in the area. It is used as migration routes, breeding and as a nursery of elasmobranchs, which have low recovery capacity and high vulnerability (due to low fecundity, late maturation and high longevity). The islands and seamounts are habitats for five species of rays and 16 species of sharks. Fisheries exploitation affects the elasmobranch in seamounts, <i>Carcharhinus signatus</i>, <i>falciformis</i>, <i>Carcharhinus</i> and <i>Sphyrna lewini</i>, species highly vulnerable in this area that have been targeted in directed fisheries.</p> <p>The blue shark (<i>Prionace glauca</i>) gives birth in the area, as well as reef sharks or those associated with banks and islands (<i>Negaprion brevirostris</i>, <i>Carcharhinus perezii</i>, <i>C. falciformis</i>, <i>C. signatus</i>, <i>C. galapagensis</i>). Also, serranid fishes (<i>Epinephelus mystacinus</i>, <i>E. adscensionis</i> poisonous and <i>Mycteroperca</i> sp.), carangid fishes (<i>Caranx lugubris</i>, <i>C. latus</i>, <i>Elagatis bipinnulata</i>) (Serafini <i>et al.</i>, 2010). The Archipelago of Fernando de Noronha is the habitat used throughout the year by a population of spinner dolphin (<i>Stenella longirostris</i>) (Silva-Jr., 2005).</p>					
Importance for threatened, endangered or declining species	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.				x

and/or habitats					
<p><i>Explanation for ranking</i></p> <p>Among the sharks <i>Carcharhinus signatus</i> is listed as over-exploited species (Normative Instruction of MMA, 05.24.2004- Annex II) and included in the IUCN red-list (2006) in the category-vulnerable (VU). The species has as habitat for growth and reproduction seamounts and the break of continental shelves. This area has identical role for <i>Carcharhinus falciformis</i> and <i>Carcharhinus signatus</i> both caught in directed fisheries (Santana <i>et al.</i>, 2009; PRONABIO, 1998). In incidental catches the species <i>Negaprion brevirostris</i>, <i>Hexanchus griseus</i> and <i>C. longimanus</i> occur. The last mentioned, is listed in the red list as vulnerable (VU) (IUCN, 2006) and in the national list in the Annex-II (Normative Instruction of MMA, 05.24.2004). Besides, both <i>Rhincodon typus</i> and <i>Ginglymostoma cirratum</i> are listed in the red-list as vulnerable (VU) (IUCN, 2006) being also included in the National list of Threatened Species (MMA, IN 05, 24.5.2004, Annex I). <i>Sphyrna lewini</i> and <i>C. signatus</i> were explored in this area by drift gillnets; the exploitation lost productivity in few years (PRONABIO, 1998). Both species are currently listed in categories of threat on the Red List (IUCN, 2006) or Annex II of the National List of Threatened Species (MMA, IN 05, 24.5.2004).</p> <p>A spawning aggregation of <i>Chelonia mydas</i> is recorded in the region, a species that nests on the islands. The area is also used as feeding ground of juveniles of <i>Chelonia mydas</i> and <i>Eretmochelys imbricata</i> (Marcovaldi and Marcovaldi, 1999, Grossman <i>et al.</i>, 2009, Serafini <i>et al.</i>, 2010). Further, feeding and migration, was evidenced for <i>Lepidochelys olivacea</i> by telemetry studies (Fig. 2) (Da Silva <i>et al.</i>, 2011). All sea turtle species are endangered (MMA 2003, IUCN, 2006; (Serafini <i>et al.</i>, 2010; Marcovaldi <i>et al.</i> In 2011, Almeida <i>et al.</i>, 2011, Castilhos <i>et al.</i> 2011).</p>					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.			x	
<p><i>Explanation for ranking</i></p> <p>The region is the habitat of several species of elasmobranchs, at least 16 species of sharks and 5 of rays. This group is generally characterized by slow growth, late maturity, high rates of longevity and low rate of fertility (Holden, 1974). The area is essential for spawning and feeding of turtles <i>Chelonia mydas</i> and <i>Eretmochelys imbricata</i> (Serafini <i>et al.</i>, 2010). With respect to corals, the Atoll is basically composed of a single coral species (<i>Siderastrea stellata</i>) endemic to Brazil. There are records of diseases occurring in this species in the locality (R. Francinni-Filho & B. Padovani. pers. Com.).</p>					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.			X	
<p><i>Explanation for ranking</i></p> <p>Upwelling events that occur at seamounts of the Fernando de Noronha Chain and Northern Brazilian Chain determine high fishing productivity in the region (Lessa <i>et al.</i>, 1999). The maintenance of relatively high biomass and food webs is explained by the local production of eggs and larvae of several species of teleosts, and the aggregation of species promoted by local characteristics. Noteworthy was the occurrence of larvae of pelagic species of high commercial value of the families Scombridae, Istiophoridae, Coryphaenidae Xiphidae and dominant forage species of families Exocoetidae, Myctophidae and Gobiidae, of high ecological value (Lessa <i>et al.</i>, 1999).</p>					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				x
<p><i>Explanation for ranking</i></p> <p>The extended area of Fernando de Noronha and Rocas Atoll is seen as a biogeographic unit, named "Noronha hotspot" due to high endemism and biodiversity that is crucial for marine conservation in Brazil (Rocha, 2003). For fish, molluscs, corals, cnidarians, sponges and algae, Fernando de Noronha is an island</p>					

<p>that has the highest number of species which is attributed to its large size, greater diversity of reef habitats (Serafini <i>et al.</i>, 2010) .</p> <p>Reef fishes occurring in Fernando de Noronha has the highest species richness (169) when compared to other Brazilian oceanic islands, showing great similarity with the fauna of Rocas Atoll. These two areas share all ten endemic species of fish and are the habitat for five species of rays and 16 species of sharks. The similarity of the fauna of both areas is attributed to the presence of shallow oceanic banks that serve as steps tone between the areas (Richardson, 2003; Sampaio <i>et al.</i>, 2004). Fernando de Noronha and Atol das Rocas are recognized as important feeding areas of <i>Chelonia mydas</i> and <i>E. imbricata</i> (Sanches & Bellini, 1999), both endangered species (MMA 2004, IUCN, 2006).</p>					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.				x
<p><i>Explanation for ranking</i></p> <p>Anthropogenic influence due to industrial and artisanal fisheries carried out in the Archipelago of Fernando de Noronha and on various banks that are traditional fishing ground in the region, especially shallow banks. This exploitation is traditional in the region and led to declines of several demersal and pelagic species. The area also suffers impact of tourism developed in Fernando de Noronha with the consequent impact of the human population in the archipelago of Fernando de Noronha. Moreover, Fernando de Noronha is route of merchant ships.</p>					

Sharing experiences and information applying other criteria (Optional)

Other Criteria	Description	Ranking of criterion relevance (please mark one column with an X)			
		Don't Know	Low	Some	High
Add relevant criteria					x
<i>Explanation for ranking</i>					

References

(e.g. relevant documents and publications, including URL where available; relevant data sets, including where these are; information pertaining to relevant audio/visual material, video, models, etc]

Almeida, C. E. de, Marchon-Silva, V., Ribeiro, R., Serpa-Filho, A., Almeida, J. R. de & Costa, J. (2000) Entomological fauna from Reserva Biológica do Atol das Rocas, RN, Brazil: I. Morphospecies composition. *Revista Brasileira de Biologia*, 60(2): 291- 298.

Becker, H. 2001. Hidrologia dos Bancos e Ilhas Oceanicas do Nordeste Brasileiro. Uma Contribuição ao Programa REVIZEE. Tese de Doutorado, Universidade Federal de São Carlos, UFSCar, 2002, 158p.

Castilhos, J. C. de; Coelho, C. A.; Argolo , J. F.; Santos, A. S. dos; Marcovaldi, M. Â.; Santos, A. S. dos; Lopez, M. Avaliação do estado de conservação da tartaruga marinha *Lepidochelys olivacea* (Eschscholtz, 1829) no Brasil. *Revista Biodiversidade Brasileira* Ano I, n. 1, p. 28-36. 2011
<https://www2.icmbio.gov.br/revistaeletronica/index.php/BioBR/article/viewFile/90/75>

Coelho-F., P., A., Ramos-Porto, M., Freitas, T.C.A., Almeida, V.A.K., 2009. Oceanografia biológica: A macrofauna bentica na ZEE da região Nordeste do Brasil. (Fabio Hazin, Ed) . Programa REVIZEE, SCORE-NORDESTE, Vol. 2. 195-234p.

Coutinho, P. N. C.. Levantamento do estado da arte da pesquisa dos recursos vivos marinhos do Brasil – Oceanografia Geológica. Programa Revizee. 97 p., 1996.

Da Silva, A.C.C.D.; Santos, E.A.P.; Oliveira, F.L.C.; Weber, M.I.; Batista, J.A.F.; Serafini, T.Z.; Castilhos, J.C. Satellite-tracking highlights multiple foraging strategies and threats for olive ridley turtles in Brazil. Marine Ecology Progress Series 443: 237–247. 2011

Gasparini, J. L. & Floeter, S. R. (2001) – The shore fishes of Trindade Island. *Journal of Natural History*, 35(11): 1639-1656. (<http://dx.doi.org/10.1080/002229301317092379>)

Grossman, A., Moreira, L. M. de P., Bellini, C. & Almeida, A. de P. (2009) – Conservação e pesquisa das tartarugas marinhas nas ilhas oceânicas de Fernando de Noronha, Atol das Rocas e Trindade, Brasil. In: Mohr, L. V., Castro, J. W. A., Costa, P. M. S. & Alves, R. J. V. (orgs.), *Ilhas oceânicas brasileiras: da pesquisa ao manejo*. Vol. II, p. 191-214, MMA Secretaria de Biodiversidade e Florestas, Brasília, DF, Brasil. ISBN: 9788577380763

Hazin, F. H. V.; Boeckmann, C. E.; Leal, E. C. 1993. Distribution and relative abundance of the blue shark, *Prionace glauca*, in the south-western quatorial Atlantic. IV Reunião do Grupo de Trabalho sobre Pesca e Pesquisa de Tubarões e Raias no Brasil. Resumos... Recife, PE. p. 34.

Holden, M.J. (1974). **Problems in the rational exploitation of elasmobranch population and some suggested solutions.** In *Sea Fisheries Research*. (Ed. F.R.Harden-Jones), 117-137 pp. (Halsted Press: New York).

IUCN (2006) – *Red List of Threatened Species*. (disponível em: <http://www.iucnredlist.org>). Acessado em: set. 2006.

Lessa, R.P., Bezerra-Jr., J.L., Nascimento E.D., Pereira, A.A., 2009. Oceanografia Biológica: Composição, distribuição e abundância do ictioneuston na ZEE da Região Nordeste do Brasil. (Fabio Hazin, Ed) . Programa REVIZEE, SCORE-NORDESTE, Vol. 2.166-194p.

Lessa, R.P., Santana, F.M., Rincón, G., Gadig, O.B.F., & El-deir, A.C. (1999). **Biodiversidade de elasmobrânquios do Brasil. Relatório para o Programa Nacional da Diversidade Biológica (PRONABIO) – Necton – Elasmobrânquios**, Ministério do Meio Ambiente, dos Recursos Hídricos e da Amazônia Legal (MMA). Recife, 119 p.

Leite, T. S.; Haimovici, M.; Molina, W.; Warnke, K. 2008. Morphological and genetic description of *Octopus insularis* new species (Cephalopoda: Octopodidae), a cryptic species in the *Octopus vulgaris* complex from the tropical Southwestern Atlantic. *Journal of Molluscan Studies*. v. 74, p.63-74.

MMA (2004) – *Lista nacional das espécies da fauna brasileira ameaçadas de extinção*. Ministério do Meio Ambiente, Brasília, DF, Brasil. (disponível em: [http://www.meioambiente.es.gov.br/download/](http://www.meioambiente.es.gov.br/download/Nova%20Lista%20Fauna%20Amea%C3%A7ada%20MMA2003.pdf) Nova List a Fauna Ameaçada MMA2003.pdf) . Acessado em: nov. 2007

Marcovaldi, M. Â.; Lopez, G. G.; Soares, L. S. e; Bellini, C.; Santos, A. S. dos; Lopez, M. Avaliação do estado de conservação da tartaruga marinha *Eretmochelys imbricata* (Linnaeus, 1766) no Brasil. Revista Biodiversidade Brasileira Ano I, n. 1, 20-27. 2011
<https://www2.icmbio.gov.br/revistaeletronica/index.php/BioBR/article/viewFile/88/74>

- Marcovaldi, M.A. & Marcovaldi, G. G. dei. Marine turtles of Brazil: the history proof and structure of Projeto TAMAR-IBAMA. *Biological Conservation* 91, 35-41. 1999
- Mazzoleni, R. C. & Schwingel, P. R. (2002) – Aspectos da biologia das espécies capturadas por espinhel pelágico na região sul das ilhas de Trindade e Martin Vaz no verão de 2001. *Notas Técnicas da FACIMAR*, 6: 51-57.
- Paiva, P. C., Young, P. S. & Echeverría, C. A. (2007) –The Rocas Atoll, Brazil: a preliminary survey of the crustacean and polychaete fauna. *Arquivos do Museu Nacional* 65(3): 241-250, Rio de Janeiro, RJ, Brasil.
- Rocha, L. A. (2003) – Patterns of distribution and processes of speciation in Brazilian reef fishes. *Journal of Biogeography*, 30(8): 1161-1171. (<http://dx.doi.org/10.1046/j.1365-2699.2003.00900.x>).
- Sanches, T. M. & Bellini, C. (1999) – Juvenile *Eretmochelys imbricata* and *Chelonia mydas* in the Archipelago of Fernando de Noronha, Brazil. *Chelonian Conservation and Biology*, 3(2): 308-311.
- Sampaio, C. L. S., Carvalho-Filho, A., Feitoza, B. M., Ferreira, C. E. L., Floeter, S. R., Gasparini, J. L., Rocha, L. A. & Sazima, I. (2006) – Peixes recifais endêmicos e ameaçados das ilhas oceânicas brasileiras e do complexo recifal dos Abrolhos. In: Alves, R. J. V. & Castro, J. W. de A. (orgs.). *Ilhas oceânicas brasileiras: da pesquisa ao manejo*, p. 215-234, MMA Secretaria de Biodiversidade e Florestas, 298 p., Brasília, DF, Brasil. ISBN: 8587166913
- Santana, F.M.; Duarte-Neto, P.; Lessa, R. L.;. 2009. Demographic analysis of the night shark (*Carcharhinus signatus*, Poey, 1868) in the equatorial Southwestern Atlantic Ocean. *Fisheries Research*, Volume 100, Issue: 3, Pages: 210-214.
- Serafini, T. Z.; França, G. B.; Andriguetto-Filho, J. M. Ilhas oceânicas brasileiras: biodiversidade conhecida e sua relação com o histórico de uso e ocupação humana. *Journal of Integrated Coastal Zone Management*. v. 10, p. 281-301, 2010.
- Silva JR, J.M. 2005. Ecologia comportamental do golfinho-rotador (*Stenella longirostris*) em Fernando de Noronha. Tese de Doutorado. Universidade Federal de Pernambuco, Recife, 2005. 120p
- Silva Jr, J. M. da (2009) – Projeto Golfinho Rotador: pesquisa e conservação do golfinho-rotador *Stenella longirostris* Gray, 1828 (Cetacea: Delphinidae) no Arquipélago de Fernando de Noronha, Brasil. In: Mohr, L. V., Castro, J. W. A., Costa, P. M. S. & Alves, R. J. V. (orgs.). *Ilhas oceânicas brasileiras: da pesquisa ao manejo*. Vol. II, p. 293-319, MMA Secretaria de Biodiversidade e Florestas, Brasília, DF, Brasil. ISBN: 9788577380763
- Soto, J. M. R. (1997) – Tubarões e raias (Chondrichthyes) encontrados no Arquipélago Fernando de Noronha durante as expedições de Arfenor I e II. *Revista Alcance*, 4: 71-80, Universidade do Vale do Itajaí, Itajaí, SC, Brasil.
- Travassos, P; Hazin, F.; Zagaglia, J; Advinclula, R; Schober, J, 1999. Thermohaline structure around seamounts and islands of Northeast Brazil. *Archive of Fishery and Marine Research*, v 47, n 2/3, 211-222 p.
- Almeida, A.de P. A.; Santos, A. J. B.; Thomé, J. C. A.; Bellini, C.; Baptistotte, C.; Marcovaldi, M. Â.; Santos, A. S.dos; Lopez, M. Avaliação do estado de conservação da tartaruga marinha *Chelonia mydas* (Linnaeus, 1758) no Brasil. *Revista Biodiversidade Brasileira* Ano I, n. 1, 12-19 2011
<https://www2.icmbio.gov.br/revistaeletronica/index.php/BioBR/article/view/87/73>

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