

Blue lines indicate the area meeting the ISRA Criteria; dashed lines indicate the suggested buffer for use in the development of appropriate place-based conservation measures

NORTHERN MACANAO ISRA

South American Atlantic Region

SUMMARY

Northern Macanao is located off northwestern Margarita Island in Venezuela. This area is characterised by shallow coastal shelf waters and extending to the shelf slope. It is influenced by seasonal upwelling driven by trade winds and the Caribbean Current. Within this area there are: **threatened species** (e.g., Chola Guitarfish *Pseudobatos percellens*); **range-restricted species** (David's Angelshark *Squatina david*); and **reproductive areas** (e.g., Sickelfin Devil Ray *Mobula tarapacana*).

- – VENEZUELA – – 0-600 metres – – 1,348.3 km²

CRITERIA

Criterion A – Vulnerability; Criterion B – Range Restricted; Sub-criterion C1 – Reproductive Areas





DESCRIPTION OF HABITAT

Northern Macanao is located off the northwest coast of Margarita Island in eastern Venezuela. It includes coastal shelf waters and parts of the slope leading into a deep canyon that separates northern Margarita Island from the Los Hermanos Archipelago. The area is influenced by upwelling events driven by trade winds and the westward flowing Caribbean Current (Rueda-Roa & Muller-Karger 2013). The principal upwelling season is from December-April with a secondary pulse from June-August (Rueda-Roa & Muller-Karger 2013). The upwelling season broadly corresponds to the wet/rainy seasons from December-February and June-August (Leal Salcedo 2008). Sea surface temperatures vary from 22-27°C (Aparicio 2003).

This Important Shark and Ray Area is benthic and pelagic and is delineated from surface waters (O m) to 600 m based on the bathymetry of the area.

ISRA CRITERIA

CRITERION A - VULNERABILITY

Four Qualifying Species considered threatened with extinction according to the IUCN Red List of Threatened Species regularly occur in the area. These are the Endangered Spinetail Devil Ray (Marshall et al. 2022b), Sicklefin Devil Ray (Marshall et al. 2022a), and Chola Guitarfish (Pollom et al. 2020); and the Vulnerable Bullnose Eagle Ray (Carlson et al. 2021).

CRITERION B - RANGE RESTRICTED

This area holds the regular presence of the David's Angelshark as a resident range-restricted species. David's Angelsharks are regularly captured in this area (Tagliafico et al. 2017; LA Zambrano pers. obs. 2025). The species has a small range spanning from Panama to Suriname and is restricted to the North Brazil Shelf and the Caribbean Sea Large Marine Ecosystems (Acero et al. 2019). A fishery landings survey conducting weekly trips from January 2006 to December 2007 recorded 346 individuals captured throughout the year in this area (Tagliafico et al. 2017). They were initially identified as Atlantic Angelsharks Squatina dumeril but examinations of photos confirm them as David's Angelsharks (NR Ehemann & LA Zambrano pers. obs. 2025). The majority (58%) of the 77 females were mature (including eight gravid specimens) and most of the males (89%) were mature (Tagliafico et al. 2017). Fishers reported capturing David's Angelsharks in a depth range spanning from 60-300 m, off north Margarita Island, within this area (Tagliafico et al. 2017).

Contemporary observations of David's Angelsharks in this area were made during a landing survey in 2015, when large quantities of individuals were captured (LA Zambrano pers. obs. 2025). Fishers described the locations of captures, which fell within the same area as the historical study indicated (Tagliafico et al. 2017; LA Zambrano pers. obs. 2025). Many females were also gravid in this study (LA Zambrano pers. obs. 2025), suggesting that this area may be important for their reproduction.

SUB-CRITERION C1 - REPRODUCTIVE AREAS

Northern Macanao is an important reproductive area for five ray species.

Landing surveys were conducted over 20 years (2005–2025) in La Pared and Robledal in northern Margarita Island where fishers sell their catch from fisheries using drifting and bottom-set gillnets. Fishers also indicated the location of their catches, which were within this area (Tagliafico et al. 2014; González-González & Ehemann 2019; NR Ehemann & LA Zambrano et al. unpubl. data 2025).

Smooth Butterfly Rays were assessed during 86 landing site visits in La Pared during 2006, 2007, 2013, 2014, and 2015 (Tagliafico et al. 2014; González-González & Ehemann 2019; LA Zambrano et al. unpubl. data 2025). A total of 128 specimens were recorded of which 88% were females. Most females were mature (74%; n = 84) and 26 (31%) of these were pregnant. Pregnant females with a visibly distended abdomen were dissected and they had 2–5 midterm and full term embryos (LA Zambrano & NR Ehemann unpubl. data 2025). A comparative study on the species in northeastern Brazil that examined 905 individuals found that 75% were juvenile and only 10 females were pregnant (Yokota et al. 2012). Additionally, informal observations from La Guardia on Margarita Island, outside this area, indicate that mostly immature males are captured there (LA Zambrano et al. pers. obs. 2025), highlighting the importance of Northern Macanao for the gestation of Smooth Butterfly Rays.

Spinetail Devil Rays are regularly captured in this area. A landing survey with most effort (42% of visits) in 2015 and 2017 included 35 site visits and recorded mobulid catches in 69% (n = 24) of these (LA Zambrano et al. unpubl. data 2025). A total of 36 Spinetail Devil Rays were recorded with most specimens (75%; n = 27) being females. Of these, seven (26%) were pregnant while 10 (37%) were in the regressing postpartum phase, having recently given birth (LA Zambrano et al. unpubl. data 2025). Additionally, seven of the 20 measured individuals had a size of <160 cm disc width (DW). The size-at-birth for the species ranges from 90–160 cm DW (Last et al. 2016), indicating that these are likely to be neonates or young-of-the-year (YOY). Combined, these results show that this area is important for the gestation, potential pupping, and early life stages of Spinetail Devil Rays.

The same landing survey reported Sicklefin Devil Rays (n = 24) captured in this area in 2015 (LA Zambrano et al. unpubl. data 2025). Of the 12 females, four were pups and seven were pregnant. The size-at-birth for the species is 105-139 cm DW (Last et al. 2016). More than a third of specimens (38.5%) measuring <139 cm DW were therefore classified as neonates. Additional records of full-term embryos from this area were available from 1999 (Cervigón & Alcalá 1999), initially misidentified as *Mobula hypostoma* (Ehemann et al. 2022), and in 2007 (Ehemann et al. 2022). Northern Macanao is an important reproductive area for Sicklefin Devil Rays, for which pregnant females and neonates have rarely been documented globally.

Bullnose Eagle Rays are regularly captured in this area. Weekly surveys of fishery landings were conducted between October 2005-December 2007 and between January-December 2013 from a total of 225 fishing trips (Tagliafico et al. 2016). A total of 187 Bullnose Eagle Rays were examined and ranged in size from 22.8-118 cm DW. Around 10% of the catches were neonates (<30 cm DW) or YOY (<40 cm DW). The size-at-birth for the species is ~25 cm DW (Last et al. 2016). Additionally, two gravid females and one post-gravid female were captured in this area (Tagliafico et al. 2016). A second survey conducted 21 landing site visits to La Pared between May-December 2014 (LA Zambrano et al. unpubl. data 2025). A total of 210 specimens were recorded, of which 53% were females. A quarter of females (24%; n = 27) were pregnant. Although the species is captured year-round, most pregnant individuals (93%) were caught in May (n = 7), August (n = 10), and September (n = 8), indicating some seasonality in the reproductive cycle. Embryos at different stages of development were observed, including full-term embryos (LA Zambrano et al. unpubl. data 2025). These results show that the area is important for the gestation, potential pupping, and early life stages of Bullnose Eagle Rays.

The Chola Guitarfish is one of the most captured ray species year-round in this area (Tagliafico et al. 2013; LA Zambrano et al. unpubl. data 2025). Weekly surveys of fishery captures between January-December 2007 examined a total of 210 specimens (159 females and 51 males; Tagliafico et al. 2013). Most individuals were mature (81%), and 27% of females were gravid. Females were captured throughout the year, but there were two seasonal peaks for pregnant individuals in February-March and in September. A total of 96 embryos were recorded with a size range of 2-19 cm total length (TL), with a maximum of four embryos per litter (Tagliafico et al. 2013). A second study examining fishery landings in La Pared, in this area, conducted 12 visits in 2015 and 2024 (LA Zambrano et al. unpubl. data 2025). A total of 95 specimens were recorded including 79 females, of which almost half (45%) were pregnant. They carried 2-6 embryos, and different stages of development were observed, including full-term embryos (LA Zambrano et al. unpubl. data 2025). Together, this information supports the continued importance of this area for the reproduction for Chola Guitarfish.

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QUALIFYING SPECIES

Scientific Name	Common Name	IUCN Red List Category	Global Depth Range (m)	ISRA Criteria/Sub-criteria Met								
				A	В	Cı	C2	C3	C4	C5	Dı	D2
SHARKS												
Squatina david	David's Angelshark	NT	100-326		Х							
RAYS												
Gymnura micrura	Smooth Butterfly Ray	NT	0-40			Х						
Mobula mobular	Spinetail Devil Ray	EN	O-1,112	Х		Х						
Mobula tarapacana	Sicklefin Devil Ray	EN	0-1,896	Х		Х						
Myliobatis freminvillei	Bullnose Eagle Ray	VU	O-122	Х		Х						
Pseudobatos percellens	Chola Guitarfish	EN	0-110	Х		Х						



SUPPORTING SPECIES

Scientific Name	Common Name	IUCN Red List Category						
SHARKS								
Galeocerdo cuvier	Tiger Shark	NT						
Mustelus higmani	Smalleye Smoothhound	EN						
Mustelus norrisi	Narrowfin Smoothhound	NT						
Sphyrna lewini	Scalloped Hammerhead	CR						
RAYS								
Hypanus americanus	Southern Stingray	NT						
Hypanus guttatus	Longnose Stingray	NT						

IUCN Red List of Threatened Species Categories are available by searching species names at <u>www.iucnredlist.org</u> Abbreviations refer to: CR, Critically Endangered; EN, Endangered; VU, Vulnerable; NT, Near Threatened; LC, Least Concern; DD, Data Deficient.



REFERENCES

Acero A, Tavera J, Charvet P, Lasso Alcará O, Mejia-Falla PA, Navia AF, Rincon G. 2019. Squatina david. The IUCN Red List of Threatened Species 2019: e.T116880357A116880434. https://dx.doi.org/10.2305/IUCN.UK.2019-1.RLTS.T116880357A116880434.en

Aparicio R. 2003. Revisión de las características oceanográficos de la plataforma nororiental de Venezuela. In: Freón P, Mendoza J, eds. La sardina (Sardinella aurita), su medio ambiente y explotación en el oriente de Venezuela. Paris: Institut de Reserche pour le Développement, 171-205.

Carlson J, Charvet P, Avalos C, Blanco-Parra MP, Briones Bell-Iloch A, Cardenosa D, Chiaramonte GE, Cuevas JM, Derrick D, Espinoza E, et al. 2021. *Myliobatis freminvillei* (amended version of 2020 assessment). *The IUCN Red List of Threatened Species* 2021: e.T161568A201183089. https://dx.doi.org/10.2305/IUCN.UK.2021-2.RLTS.T161568A201183089.en

Cervigón F. Alcalá A. 1999. Los peces marinos de Venezuela, Volumen 5. Tiburones y rayas. Caracas: Fundación Museo del Mar.

Ehemann N, Acosta-Rodríguez E, Tagliafico A, Pelletier N, Stevens G. 2022. Manta and devil ray species occurrence and distribution in Venezuela, assessed through fishery landings and citizen science data. *Journal of Fish Biology* 101(1): 213–225. https://doi.org/10.1111/jfb.15088

González-González LDV, Ehemann NR. 2019. Length-weight relationships of six elasmobranch species captured at the artisanal fishery of Margarita Island, Venezuela. *Journal of Applied Ichthyology* 35: 594-596. https://doi.org/10.1111/jai.13832

Last PR, White WT, de Carvalho MR, Séret B, Stehmann MFW, Naylor GJP. 2016. Rays of the world. Clayton South: CSIRO Publishing.

Leal Salcedo R. 2008. Análisis de la erosividad de la lluvia en la isla de Margarita (Venezuela) a través de datos de precipitación horaria. *Investigaciones Geográficas* 44: 167–185. https://doi.org/10.14198/INGEO2007.44.09

Marshall A, Barreto R, Bigman JS, Carlson J, Fernando D, Fordham S, Francis MP, Herman K, Jabado RW, Liu KM, et al. 2022a. *Mobula tarapacana* (amended version of 2019 assessment). *The IUCN Red List of Threatened Species* 2022: e.T60199A214371388. https://dx.doi.org/10.2305/IUCN.UK.2022-1.RLTS.T60199A214371388.en

Marshall A, Barreto R, Carlson J, Fernando D, Fordham S, Francis MP, Herman K, Jabado RW, Liu KM, Rigby CL, et al. 2022b. *Mobula mobular* (amended version of 2020 assessment). *The IUCN Red List of Threatened Species* 2022: e.T110847130A214381504. https://dx.doi.org/10.2305/IUCN.UK.2022-1.RLTS.T110847130A214381504.en

Pollom R, Charvet P, Avalos C, Blanco-Parra MP, Derrick D, Espinoza E, Faria V, Herman K, Mejía-Falla PA, Motta F, et al. 2020. *Pseudobatos percellens*. *The IUCN Red List of Threatened Species* 2020: e.T161373A887217. https://dx.doi.org/10.2305/IUCN.UK.2020-3.RLTS.T161373A887217.en

Rueda-Roa DT, Muller-Karger FE. 2013. The southern Caribbean upwelling system: Sea surface temperature, wind forcing and chlorophyll concentration patterns. Deep Sea Research Part I: Oceanographic Research Papers 78: 102-114. https://doi.org/10.1016/j.dsr.2013.04.008

Tagliafico A, Eheman N, Rangel MS, Rago N. 2016. Exploitation and reproduction of the bullnose ray (*Myliobαtis freminvillei*) caught in an artisanal fishery in La Pared, Margarita Island, Venezuela. *Fishery Bulletin* 114(2): 144–152. https://doi.org/10.7755/FB.114.2.2

Tagliafico A, Rago N, Rangel MS. 2013. Fishery and biology of *Rhinobatos percellens* (Rajiformes: Rhinobatidae) caught by the artisanal fishery at la Pared beach, Venezuela. *Revista de Biología Tropical* 61(1): 149–160.

Tagliafico A, Rago N, Rangel MS. 2014. Length-weight relationships of 21 species of Elasmobranchii from Margarita Island, Venezuela. *Journal of Research in Biology* 4(7): 1458–1464.

Tagliafico A, Rangel S, Broadhurst MK. 2017. Reproductive aspects of the Atlantic angel shark Squatina dumeril in the southern Caribbean Sea. Journal of Fish Biology 91(4): 1062–1071. https://doi.org/10.1111/jfb.13401 **Yokota L, Goitein R, Gianeti MD, Lessa RTP. 2012.** Reproductive biology of the smooth butterfly ray Gymnura micrura. Journal of Fish Biology 81(4): 1315–1326. https://doi.org/10.1111/j.1095-8649.2012.03413.x