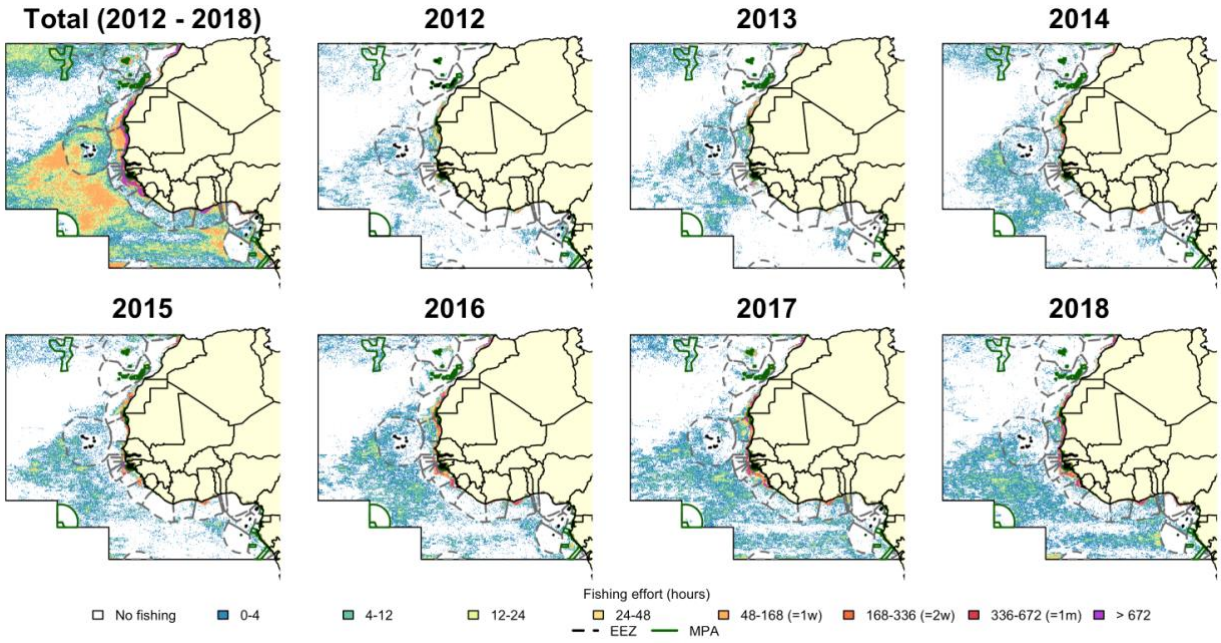
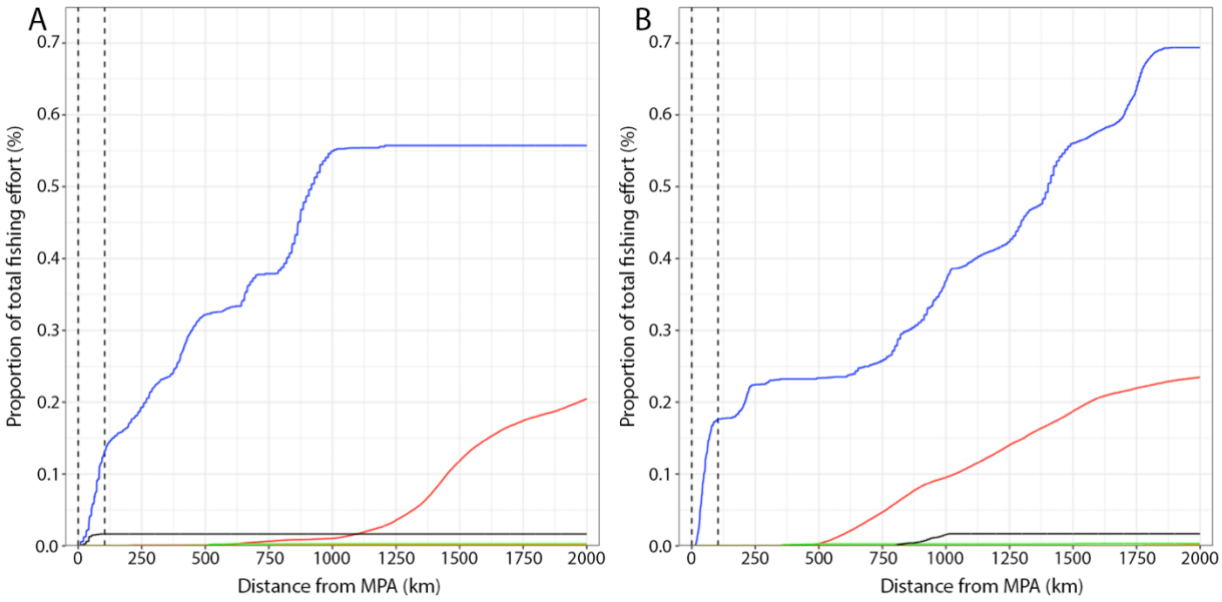
Appendices

Appendix 2.1



The total and annual fishing effort (in fishing hours) within the entire West African region for 2012 to 2018. The region is divided into a 0.1° grid and color indicates the amount of fishing hours within each cell. Exclusive Economic Zones (EEZ) are indicated with a grey dashed line, Marine Protected Areas (MPAs) are indicated in green. The percentage in the lower left corner indicates the proportion of fished grid cells.

Appendix 2.2



The cumulative fishing effort is the proportion of the total fishing effort over increasing distance from the boundary of the Banc d'Arguin National Park (PNBA) (A) and the Bijagós Archipelago (BA) (B). Vertical dashed lines indicate the 2.0x buffer zone around each MPA. Lines indicate different gear types, with trawlers (blue), drifting longlines (red), purse seines (green), fixed gear (orange), unknown gear (black) and other gear types (yellow).

Appendix 2.3

Overview of the fishing intensity (in k fishing hours) within each Exclusive Economic Zone and the high seas by each gear type.

Fishing hours per gear type in all Exclusive Economic Zones (x1000 fishing hours)

	Trawlers								Drifting Longlines								Fixed Gears							
EEZ/Year	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**TOT**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**TOT**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**TOT**
High Seas	1,47	0,41	0,81	0,86	1,72	2,66	0,99	**8,93**	91,37	152,21	183,23	201,84	247,87	323,60	327,55	**1527,67**	0,21	0,75	0,43	0,50	0,26	0,70	1,49	**4,34**
Mauritania	18,69	9,97	50,69	27,08	43,58	64,67	138,58	**353,26**	7,90	8,01	2,42	2,66	17,82	17,70	11,37	**67,87**	0,00	0,00	1,79	3,05	11,57	14,91	24,03	**55,35**
Western Sahara	17,75	41,53	33,59	45,28	70,50	69,88	64,09	**342,62**	0,38	1,62	7,66	11,21	10,38	6,41	3,09	**40,76**	0,00	0,00	1,99	4,18	2,86	3,56	4,72	**17,31**
Morocco	0,00	19,75	28,12	33,06	89,68	110,50	121,01	**402,12**	0,00	0,00	0,01	0,02	0,01	0,00	0,00	**0,05**	0,00	0,07	0,03	0,63	0,60	0,08	0,00	**1,41**
Guinea Bissau	10,92	3,70	8,14	86,42	97,70	108,59	58,42	**373,89**	0,04	0,01	0,04	0,01	0,00	0,00	0,81	**0,90**	0,00	0,00	0,92	0,21	0,00	0,00	0,00	**1,13**
Senegal	2,12	0,44	4,34	38,30	49,89	97,35	99,54	**291,97**	0,01	0,07	0,03	1,37	6,30	0,15	0,23	**8,15**	0,00	0,00	0,00	0,02	0,00	0,00	0,01	**0,03**
Ghana	9,10	6,21	21,95	24,61	47,79	37,02	46,53	**193,21**	0,01	0,02	1,70	0,54	0,05	0,01	1,32	**3,66**	0,00	0,00	0,18	0,27	3,25	3,42	3,80	**10,92**
Sierra Leone	0,00	1,48	2,88	11,89	35,38	40,63	43,32	**135,58**	0,02	0,00	0,66	0,01	1,39	0,01	0,13	**2,22**	0,00	0,00	0,08	0,04	10,69	9,08	4,82	**24,71**
Nigeria	0,00	0,00	0,00	0,00	0,00	28,15	140,34	**168,49**	0,02	0,06	0,31	0,00	0,00	0,33	0,29	**1,00**	0,00	0,00	0,00	0,07	0,67	6,11	2,31	**9,17**
Guinea	3,65	28,69	3,96	7,14	13,12	8,86	21,75	**87,18**	0,00	0,00	0,08	0,14	1,18	0,00	3,08	**4,48**	0,00	0,00	1,02	2,23	11,66	20,73	23,26	**58,91**
Portugal	0,02	0,04	0,01	0,03	0,00	0,01	0,01	**0,12**	1,86	5,03	9,91	10,13	9,47	5,91	3,89	**46,21**	0,00	0,47	1,34	1,31	0,76	0,48	0,93	**5,29**
Cape Verde	0,05	0,01	0,02	0,01	0,02	0,00	0,02	**0,13**	15,13	20,39	19,38	25,19	25,41	22,79	20,76	**149,05**	1,31	0,55	0,22	0,00	0,00	0,00	0,10	**2,18**
Spain	0,14	0,30	0,34	0,17	0,95	0,23	0,34	**2,46**	0,09	2,17	3,24	1,21	5,24	5,39	6,25	**23,57**	0,26	9,41	17,38	11,25	6,93	14,19	12,23	**71,65**
The Gambia	7,23	1,45	22,14	9,44	0,12	15,66	33,05	**89,08**	0,00	0,00	0,00	0,01	0,06	0,00	0,00	**0,07**	0,00	0,00	0,00	0,00	0,00	0,04	0,00	**0,04**
Republic of Congo	0,00	1,91	3,30	3,02	29,92	30,15	25,39	**93,69**	0,00	0,02	0,00	0,00	0,00	0,00	0,00	**0,03**	0,00	0,00	0,00	0,00	0,00	0,00	0,00	**0,00**
Côte d'Ivoire	0,20	0,06	1,72	8,32	23,42	12,45	7,18	**53,34**	0,01	0,01	0,07	0,15	0,00	0,00	0,56	**0,79**	0,00	0,00	0,00	0,03	0,00	1,99	0,00	**2,02**
Cameroon	0,00	0,00	0,00	1,03	4,59	5,51	4,66	**15,79**	0,00	0,00	0,35	0,00	0,00	0,00	0,00	**0,35**	0,00	0,00	3,00	3,99	5,44	6,70	10,56	**29,70**
Gabon	0,01	0,57	0,06	0,21	0,18	0,19	0,17	**1,39**	6,81	0,11	0,99	0,00	0,00	0,00	1,18	**9,08**	0,00	0,00	0,00	0,00	0,00	0,00	0,00	**0,00**
São Tomé and Principe	0,00	0,00	0,00	0,00	0,00	0,00	0,00	**0,00**	6,10	0,00	0,00	0,02	0,74	0,30	3,77	**11,40**	0,00	0,00	0,00	0,00	0,00	0,00	0,00	**0,00**
Liberia	0,00	0,11	0,00	0,33	0,01	0,00	2,53	**2,99**	0,00	0,00	0,00	0,02	0,07	1,77	0,10	**1,96**	0,00	0,00	0,00	0,00	0,00	0,00	0,00	**0,00**
Equatorial Guinea	0,00	0,00	0,01	0,01	0,93	1,01	1,80	**3,76**	0,45	0,02	0,00	0,00	0,00	0,00	0,03	**0,50**	0,00	0,00	0,00	0,00	0,00	0,00	0,01	**0,01**
Benin	0,00	0,00	0,00	0,00	0,00	0,01	0,00	**0,01**	0,00	0,00	0,00	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,00	0,00	0,00	0,01	0,00	**0,01**
Togo	0,00	0,00	0,00	0,00	0,00	1,96	3,03	**5,00**	0,00	0,00	0,00	0,01	0,00	0,00	0,00	**0,01**	0,00	0,00	0,00	0,00	0,00	0,00	0,00	**0,00**
Brasil	0,01	0,01	0,00	0,00	0,00	0,00	0,00	**0,03**	0,00	0,00	0,01	0,03	0,00	0,34	0,67	**1,05**	0,00	0,00	0,00	0,00	0,00	0,00	0,00	**0,00**
Ascension Island	0,00	0,00	0,00	0,00	0,00	0,00	0,00	**0,00**	0,35	0,00	0,00	0,00	0,27	0,00	0,00	**0,62**	0,00	0,00	0,00	0,00	0,00	0,00	0,00	**0,00**
Total (Gear)	**71,36**	**116,65**	**182,06**	**297,21**	**509,51**	**635,51**	**812,75**	**2625,04**	**130,54**	**190,20**	**230,09**	**254,55**	**326,28**	**384,72**	**385,08**	**1901,46**	**1,79**	**11,24**	**28,38**	**27,79**	**54,71**	**81,99**	**88,28**	**294,17**

Appendix 2.3 (continued) Overview of the fishing intensity (in k fishing hours) within each Exclusive Economic Zone and the high seas by each gear type.

Fishing hours per gear type in all Exclusive Economic Zones (x1000 fishing hours)

	Purse Seines								Other Gears								Unknown Gears								
EEZ/Year	12	13	14	15	16	17	18	TOT	12	13	14	15	16	17	18	TOT	12	13	14	15	16	17	18	TOT	Total (EEZ)
High Seas	1,41	0,80	4,37	11,52	20,87	16,19	19,34	**74,48**	1,41	1,44	3,49	2,99	0,68	2,52	2,08	**14,62**	1,87	2,33	2,54	1,20	1,20	0,91	2,29	**12,35**	**1642,39**
Mauritania	4,52	3,43	1,49	4,55	6,27	6,21	2,28	**28,75**	0,00	0,00	0,00	0,00	0,00	0,00	0,00	**0,00**	3,10	5,42	10,19	6,08	14,33	7,45	8,93	**55,49**	**560,72**
Western Sahara	0,40	0,10	1,34	1,22	0,76	0,99	1,28	**6,10**	0,00	0,00	0,00	0,53	0,38	0,01	0,00	**0,92**	0,65	1,48	1,38	3,67	1,89	1,72	0,55	**11,35**	**419,05**
Morocco	0,00	0,04	0,01	1,73	1,05	2,24	1,59	**6,65**	0,00	0,00	0,00	0,00	0,05	0,01	0,00	**0,06**	0,13	0,04	0,05	0,29	0,18	0,10	1,23	**2,03**	**412,32**
Guinea Bissau	0,03	0,00	0,02	0,29	0,44	0,44	0,18	**1,40**	0,00	0,00	0,00	0,00	0,00	0,00	0,00	**0,00**	0,06	0,01	0,00	1,12	3,53	1,25	2,74	**8,71**	**386,04**
Senegal	2,40	2,12	2,55	3,42	2,61	3,61	2,94	**19,65**	0,00	0,00	0,00	0,00	1,31	7,74	4,47	**13,53**	0,09	3,06	6,10	0,93	3,04	3,07	4,15	**20,45**	**353,79**
Ghana	0,08	0,31	0,29	0,62	2,60	3,62	**4,44**	**11,95**	0,00	0,24	0,62	0,27	2,35	6,83	6,18	**16,49**	0,27	0,00	1,42	2,59	4,69	4,36	20,10	**33,42**	**269,65**
Sierra Leone	0,01	0,04	0,01	0,50	1,48	4,96	3,13	**10,14**	0,00	0,00	0,00	0,10	0,00	0,00	0,00	**0,10**	0,00	0,00	0,00	1,70	4,10	4,85	8,49	**19,14**	**191,90**
Nigeria	0,00	0,00	0,00	0,00	0,00	0,66	0,00	**0,66**	0,00	0,00	0,00	0,00	0,00	0,06	0,90	**0,96**	0,01	0,00	0,00	0,00	0,00	0,00	1,19	**1,19**	**181,47**
Guinea	0,01	0,20	0,00	0,00	0,19	3,66	1,27	**5,32**	0,00	0,00	0,00	0,01	0,00	0,00	0,00	**0,01**	1,63	0,61	0,00	0,59	7,60	7,76	5,62	**23,81**	**179,72**
Portugal	0,00	0,13	0,92	1,79	2,07	1,46	1,62	**7,99**	0,00	0,79	6,18	23,57	22,10	29,21	19,68	**101,54**	0,00	1,15	1,01	1,33	0,18	0,73	0,58	**4,99**	**166,14**
Cape Verde	0,02	0,02	0,08	0,59	0,28	0,58	0,77	**2,34**	0,67	3,66	0,00	0,00	0,03	0,00	0,00	**4,35**	2,01	2,70	2,22	0,01	0,00	0,06	0,84	**7,84**	**165,89**
Spain	0,00	0,00	1,43	0,62	0,29	0,50	1,07	**3,93**	0,00	1,17	2,31	0,94	0,70	1,29	1,64	**8,03**	0,48	1,43	2,03	0,30	0,57	1,98	2,58	**9,37**	**119,01**
The Gambia	0,04	0,00	0,31	0,01	0,00	0,02	0,06	**0,43**	0,00	0,00	0,00	0,00	0,00	0,10	0,01	**0,10**	0,01	1,42	0,26	0,50	0,03	1,74	1,31	**5,26**	**94,99**
Republic of Congo	0,00	0,00	0,00	0,00	0,00	0,01	0,00	**0,01**	0,00	0,00	0,00	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,04	0,00	0,03	0,00	0,00	**0,08**	**93,80**
Côte d'Ivoire	0,16	0,17	0,79	2,08	4,17	2,43	**4,47**	**14,27**	0,00	0,00	0,06	0,06	0,17	0,40	0,05	**0,75**	0,00	0,05	0,02	0,75	1,61	2,38	0,84	**5,66**	**76,83**
Cameroon	0,00	0,00	0,00	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,00	0,00	0,00	0,00	0,12	**0,12**	0,00	0,00	0,01	0,00	0,00	0,00	6,16	**6,17**	**52,13**
Gabon	0,00	0,09	1,39	3,49	6,56	3,19	3,21	**17,92**	0,00	0,00	0,00	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,65	0,01	0,22	0,29	0,04	**1,20**	**29,59**
São Tomé and Principe	0,01	0,02	0,70	0,59	0,45	0,50	0,38	**2,65**	0,00	0,00	0,00	0,00	0,00	0,00	0,01	**0,01**	0,21	0,00	0,00	0,00	0,00	0,00	0,00	**0,21**	**14,27**
Liberia	0,02	0,00	0,01	0,04	1,12	**4,54**	2,54	**8,27**	0,00	0,00	0,00	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,00	0,07	0,07	0,10	0,02	**0,26**	**13,48**
Equatorial Guinea	0,01	0,01	0,00	0,00	0,13	0,23	0,13	**0,51**	0,00	0,00	0,00	0,00	0,00	0,00	0,00	**0,00**	0,00	1,01	1,09	0,00	0,76	0,01	3,59	**6,47**	**11,26**
Benin	0,00	0,00	0,00	0,00	0,00	2,02	0,75	**2,76**	0,00	0,00	0,06	0,00	0,57	2,77	1,09	**4,50**	0,00	0,00	0,00	0,00	0,00	0,34	0,23	**0,57**	**7,84**
Togo	0,00	0,00	0,00	0,00	0,00	0,02	0,02	**0,05**	0,00	0,00	0,00	0,00	0,01	0,04	0,04	**0,09**	0,00	0,00	0,00	0,00	0,00	0,00	0,03	**0,03**	**5,17**
Brasil	0,00	0,00	0,00	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,00	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,00	0,00	0,00	0,00	0,00	**0,00**	**1,08**
Ascension Island	0,00	0,00	0,00	0,01	0,00	0,00	0,00	**0,01**	0,00	0,00	0,00	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,00	0,00	0,00	0,00	0,00	**0,00**	**0,63**
Total (Gear)	**9,12**	**7,47**	**15,71**	**33,07**	**51,35**	**58,06**	**51,46**	**226,24**	**2,08**	**7,30**	**12,73**	**28,49**	**28,36**	**50,98**	**36,26**	**166,19**	**10,52**	**20,73**	**29,03**	**21,14**	**44,03**	**39,10**	**71,50**	**236,05**	**5449,15**

Appendix 4.1

The two predominantly used vessels in the small-scale fishery within the Bijagós Archipelago, the dug-out canoe (A; approximately 5 to 8 meters in length) and the larger pirogue (B; ~15 meters in length). Whereas the dug-out canoes are mostly solely human-powered, the pirogues are mostly used by one or multiple outboard engines.

Appendix 4.2 Interview questionnaire (translated from Portuguese).

A. General information			
Date:		Interviewers:	
Start time:		Notetaker:	
End time:		Location:	
Notes/comments:			

B. Demography		
B1.a	From which Island are you?	
B1.b	Have you always fished on this island or have you ever moved?	
B1.c	Since how long have you been fishing?	
B1.d	Are you still active/when did you stop?	

C. Technical information		
C1. Vessel specifications		
C1.a	What type of boat do you use (e.g. pirogue, canoe, metal boat)?	
C1.b	What is the power of the boat engine (horsepower, sails)?	
C1.c	How long is the boat (in meters)?	
C1.d	Approximately how many boats are operational on your island?	

C2. Specifications of fishing material; *<u>Starting with the fishing gear you use most</u>, on an average fishing trip, what types of fishing gear do you use?*

#	***Type of fishing gear***		**In the year past**	**When started fishing**
C2.a (*<u>5x to C2.e</u>*)		How many sets of this fishing gear do you have on your boat?		
		Can you tell me how many hooks, the mesh size, the net size, the height of the net, etc.?		
		What material is it made of?		
		What do you use this fishing material for (which species)?		
		On an average fishing trip, how long do you leave your fishing gear in the water?		

C3. Specifications of the fishing area; *Starting with the area you go to the most, can you show me where you fish on the map? And what are the names of these areas?*

#	*Fishing area*	For each fishing area, indicate:	In the year past	When started fishing
C3.a (*7x to C3.g*)		Why are you going to this area? (or why not anymore?)		
		What months of the year do you go here?		
		On average, how many hours do you fish per week here?		
		Approximately how many fishers fish in this area?		

C4. Species- specific information.

#	*Teleost species*		In the year past	When started fishing
C4.a (*4x to C4.d for each teleost group*)	Group 1 (photo 63, 67, 64, 78, 65, 61) Group 2 (photo 69, 82, 50, 72) Group 3 (photo 53, 52) Group 4 (photo 55, 56) Group 5 (photo 79, 75, 77)	How many do you catch per trip (individuals)?		
		How many kilograms of this species group in total per trip?		
		What is their average length (in cm)?		
		Where do you catch these species?		
		Which gear do you use to catch this species?		
		In which months do you catch this species?		
		In which months do you not catch this species?		
#	*Elasmobranch species*		In the year past	When started fishing
C4.f (*5x to C4.j for each group*)	Group 6 (photo 12, 2) Group 7 (photo 9, 13, 8, 11) Group 8 (photo 19) Group 9 (photo 9) Group 10 (photo 26, 27, 90)	How many do you catch per trip (individuals)?		
		How many kilograms of this species group in total per trip?		
		What is their average length (in cm)?		
		Do you process the fish in any way (e.g., cleaning)? How do you sell them (e.g., whole, without tail, in parts)?		

	What is or was the price per kilo? And who do you sell it to?	Whole body: Meat: Cartilage: Fins: Liver: Skin:	Whole body: Meat: Cartilage: Fins: Liver: Skin:
	Why do you catch this species?		
	Where do you catch these species?		
	Which gear do you use to catch this species?		
	In which months do you catch this species?		
	In which months do you not catch this species?		

C5. Species that disappeared

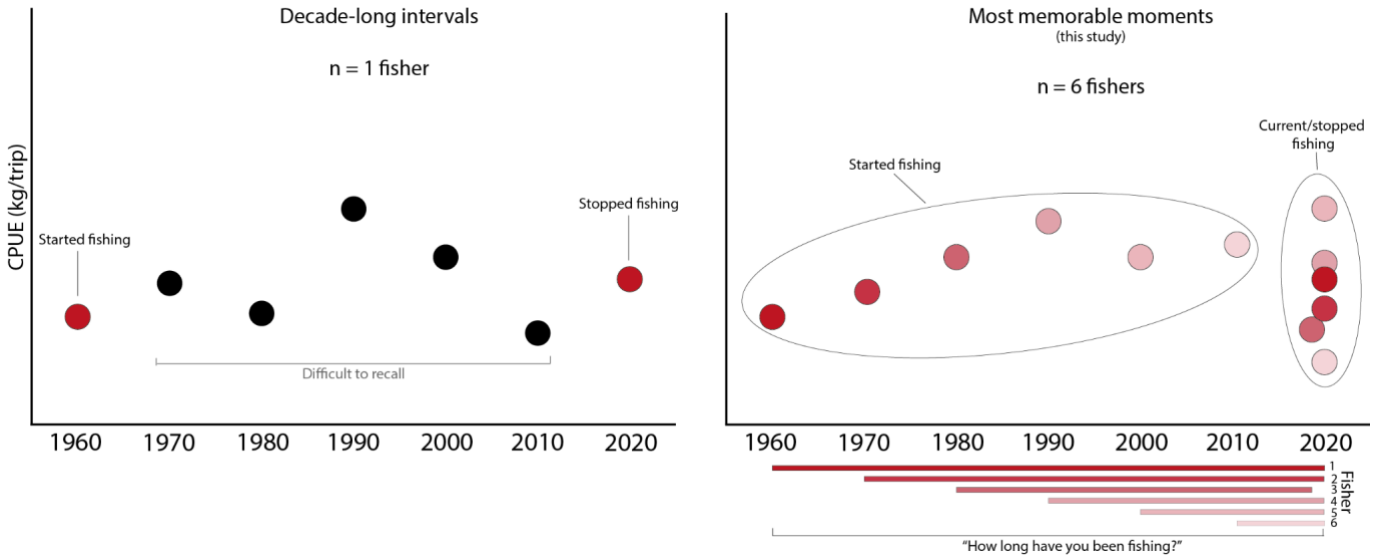
#	Did you ever catch or still catch this species?	Why do you think this species is no longer caught?	When was the last time you caught this species?	Where was this?
C5.a Photo 43				
C5.b Photo 31				
C5.c Photo 18				
C5.d Photo 17				

D. Additional questions

D1. Open questions

D1.a	What are the biggest challenges in your daily life as fisher?	
D1.b	Is there anything else you want to share with us?	

Appendix 4.3



Conceptual comparison of traditional interview methods to elucidate fisher ecological knowledge (left), compared to the method we describe addressing only the most memorable moments in the fisher's career (right), when one started fishing and the current situation (or the year one stopped).

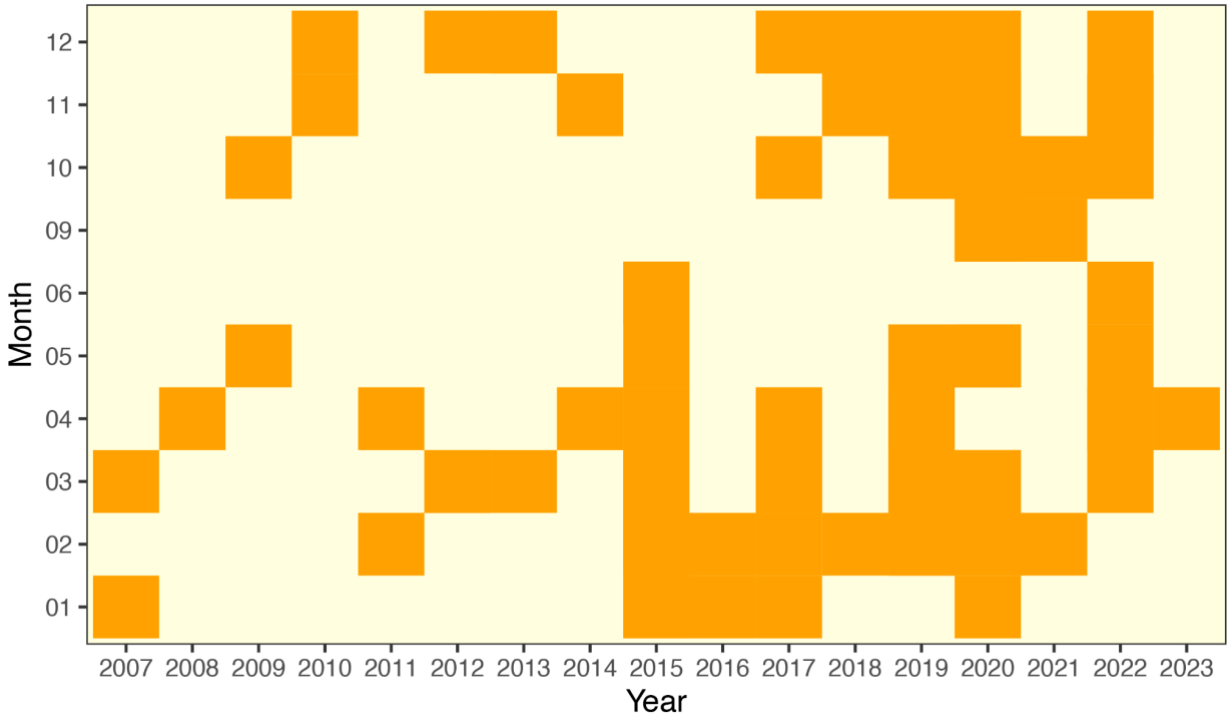
Appendix **4.4**

Specification of species groups and the species included in each, with their respective scientific, Creole, Bijagó, and English names.

Species group	**Scientific name**	**Creole name**	**Bijagó name**	**English name**
Benthic rays	*Hypanus spp.* *Dasyatis spp.* *Fontitrygon spp.* *Gymnura spp.*	Pis reia Pis reia Pis reia Pis reia	Ebala Ebala Ebala Ebala ebenten	Stingrays Stingrays Whiprays Butterfly rays
Benthopelagic rays	*Aetomylaeus bovinus* *Rhinoptera marginata*	Pis manjoty Pis pumba	 Ebala-ecota	Bull ray Lusitanian cownose ray
Guitarfishes	*Rhinobatos spp.* *Glaucostegus cemiculus*	Kasapai Kasapai	Esapai Esapai	Guitarfishes Blackchin guitarfish
Requiem sharks	*Carcharhinus spp.* *Rhizoprionodon acutus*	Caudo Caudo	Narangui Narangui	Requiem sharks Milk shark
Hammerhead sharks	*Sphyrna spp.*	Pis berga		Hammerhead sharks
Small benthic teleosts	*Eucinostomus melanopterus* *Pomadasys jubelini* *Pomadasys rogerii* *Lethrinus atlanticus* *Mugil spp.* *Galeoides decadactylus* *Pagrus caeruleostictus*	Pis prata Corcor Corcor Simpoti Tainha Barbinhu Sinapa	Nikindima Ecoli Ecoli Umsinpoti Cacandja Edohc Xinapa	Flagfin mojarra Sompat grunt Pigsnout grun Atlantic emperor Mullet Lesser African threadfin Bluespotted seabream
Large benthic teleosts	*Arius spp./Calarius spp.* *Epinephelus aeneus* *Psettodes belcheri* *Lobotes surinamensis*	Bagre Garoupa Pis bande Bentana de mar fora		Sea catfishes White grouper Spottail spiny turbot Tripletail
Benthopelagic teleosts	*Alectis alexandrina* *Caranx spp.*	Prato de aluminio Sereia	Caicu Edene	Alexandria pompano Jacks
Small pelagic teleosts	*Ethmalosa fimbriata* *Sardinella spp.*	Djafal Yaiboi	Calapad Calapad	Bonga shad Sardinella
Large pelagic teleosts	*Pseudolithus elongatus* *Scomberomorus tritor* *Sphyraena spp.*	Djoto Cachureta Bicuda	Exaló Caxuleta Cató	Bobo croaker West African Spanish mackerel Barracuda

Appendix 4.5

For each year, multiple satellite images were available for multiple months (orange). Only for the year 2008 and 2023 images from one month were available. As for 2023 new images were not available at time of data analysis, we excluded this year from the analysis.



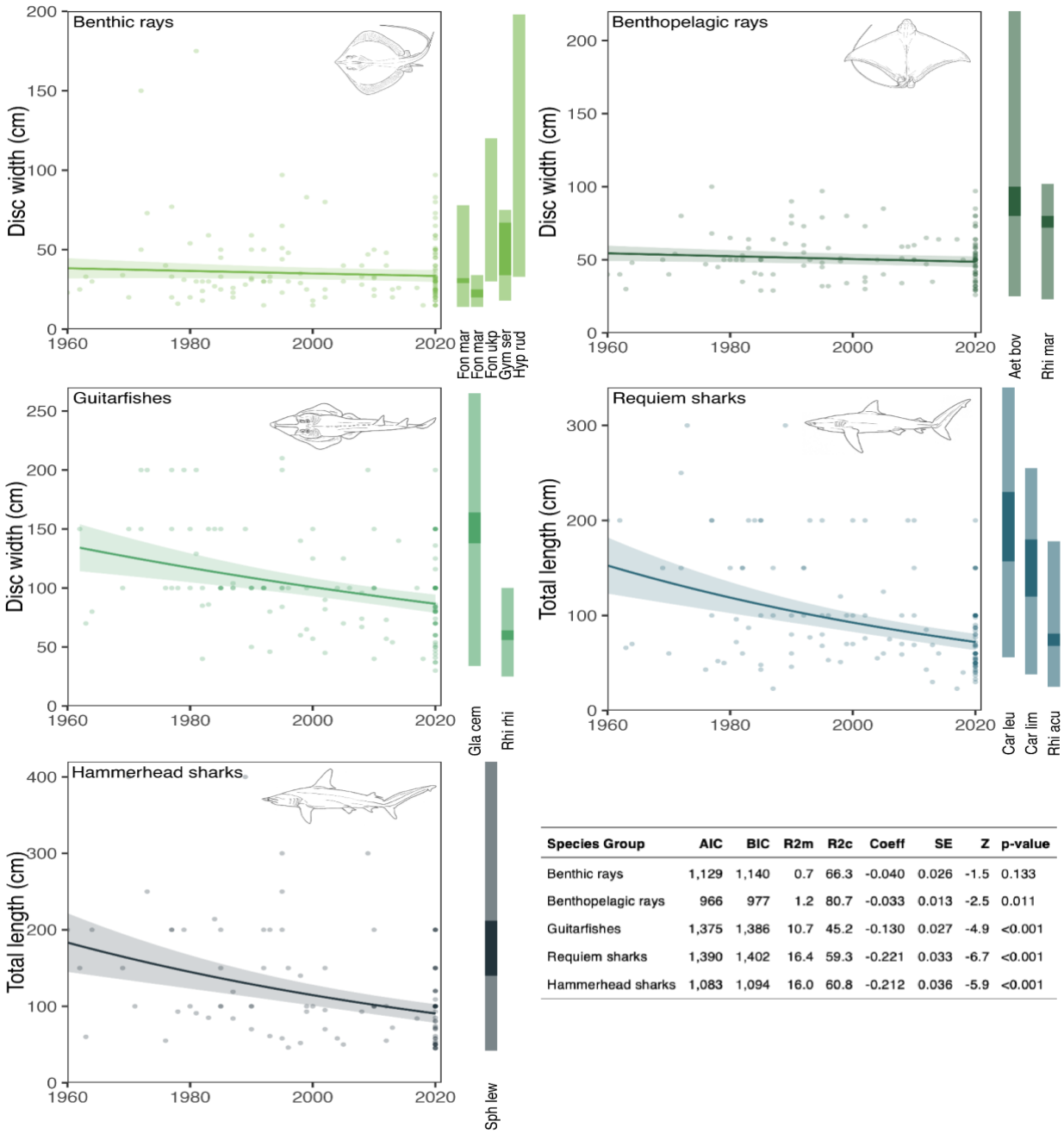
Appendix 4.6 Overview of the residence (island) and experience (in years) of interviewed fishers.

Region	Interviews (N)	Fisher experience (years)
Bolama	5	10 - 49 (28.8 ± 16.3)
Bubaque	4	30 - 47 (38.5 ± 7.5)
Canhabaque	7	25 - 56 (36.3 ± 11)
Caravela	5	10 - 35 (22.2 ± 11.3)
Galinhas	3	6 - 36 (20 ± 15.1)
João Vieira	0	-
Orango	1	31
Soga	2	21 - 38 (29.5 ± 12)
Uno	13	6 - 52 (29.9 ± 13)
Mainland	11	10 - 40 (23.9 ± 10.5)
Abroad	2	7
Total	**75**	**6 - 56 (29.3 ± 12.4)**

Appendix 4.7 Species group model diagnostics.

Species Group	AIC	BIC	R_2	X^2	p
Benthic rays	1,366	1,523	34.2	50.3	<0.001
Benthopelagic rays	1,146	1,320	73.7	55.7	<0.001
Guitarfishes	747	889	64.4	200.3	<0.001
Requiem sharks	949	1,115	58.8	147.0	<0.001
Hammerhead sharks	665	807	75.4	123.9	<0.001

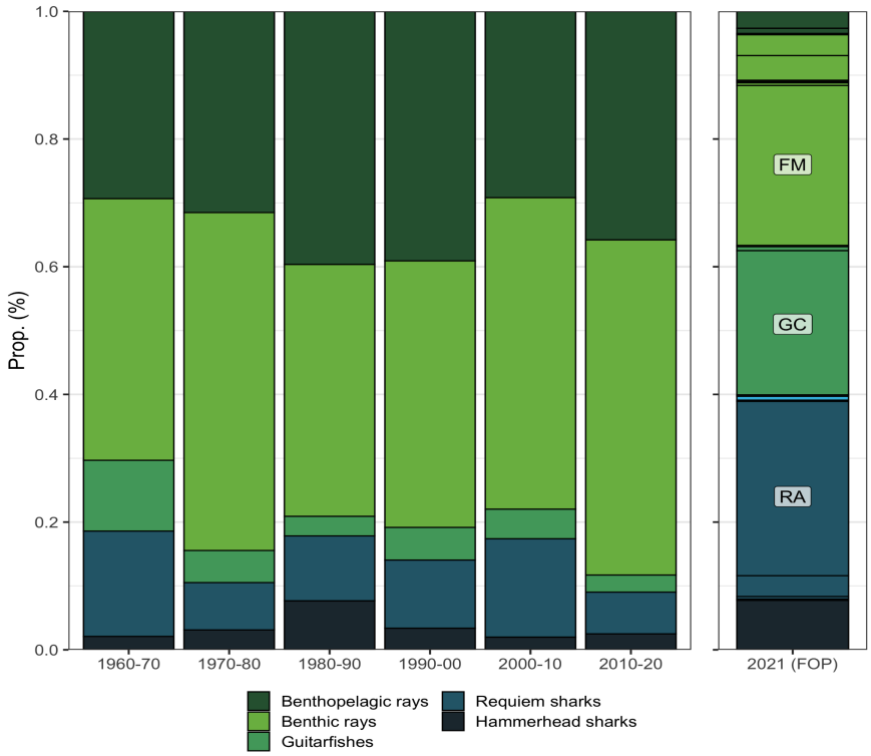
Appendix 4.8



Species Group	AIC	BIC	R2m	R2c	Coeff	SE	Z	p-value
Benthic rays	1,129	1,140	0.7	66.3	-0.040	0.026	-1.5	0.133
Benthopelagic rays	966	977	1.2	80.7	-0.033	0.013	-2.5	0.011
Guitarfishes	1,375	1,386	10.7	45.2	-0.130	0.027	-4.9	<0.001
Requiem sharks	1,390	1,402	16.4	59.3	-0.221	0.033	-6.7	<0.001
Hammerhead sharks	1,083	1,094	16.0	60.8	-0.212	0.036	-5.9	<0.001

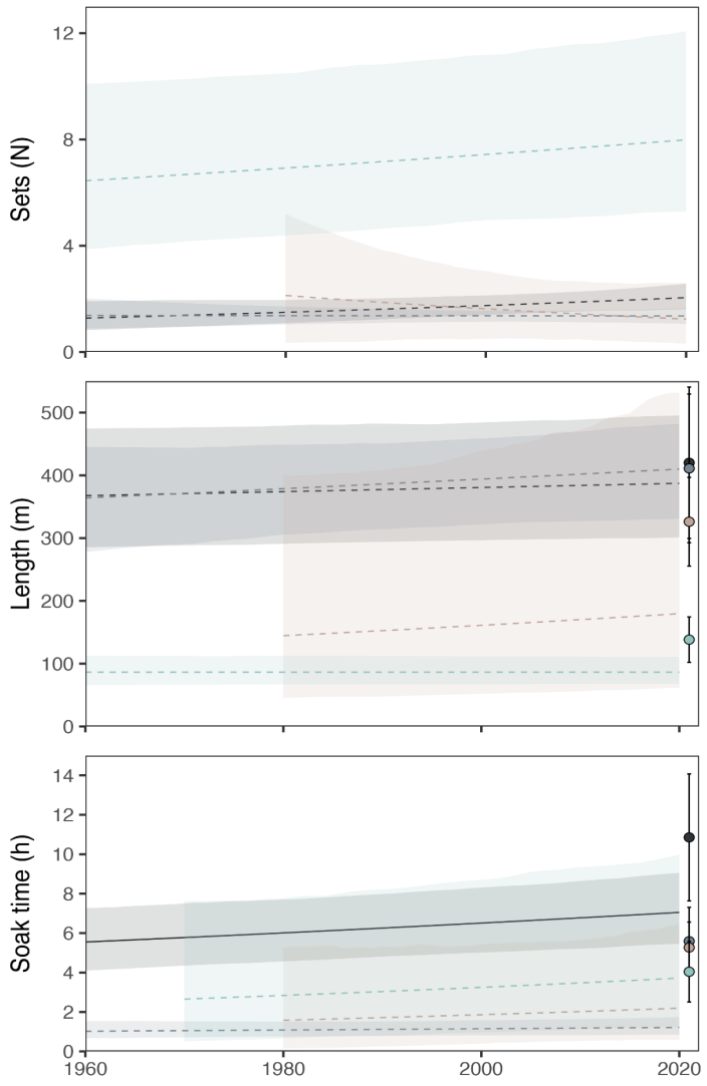
Changes in the estimated total length (sharks) and disc width (rays) for the five elasmobranch species groups (sharks in blue, rays in green). Bars indicate the size ranges (size and birth and maximum reported size) for the most common species in each species group for comparison, dark bars indicate the size at maturity range (male/female combined).

Appendix 4.9



Changes in species composition with decade-long increments from 1960 to 2020 based on interview responses. Landing site survey (FOP) species composition is also provided, but is based on vessels only catching sharks and rays. Ray species groups are indicated in green, shark species groups in blue. The top three species in the FOP data are indicated: *Fontitrygon margarita/margaritella* (FM), *Glaucostegus cemiculus* (GC), and *Rhizoprionodon acutus* (RA).

Appendix 4.10



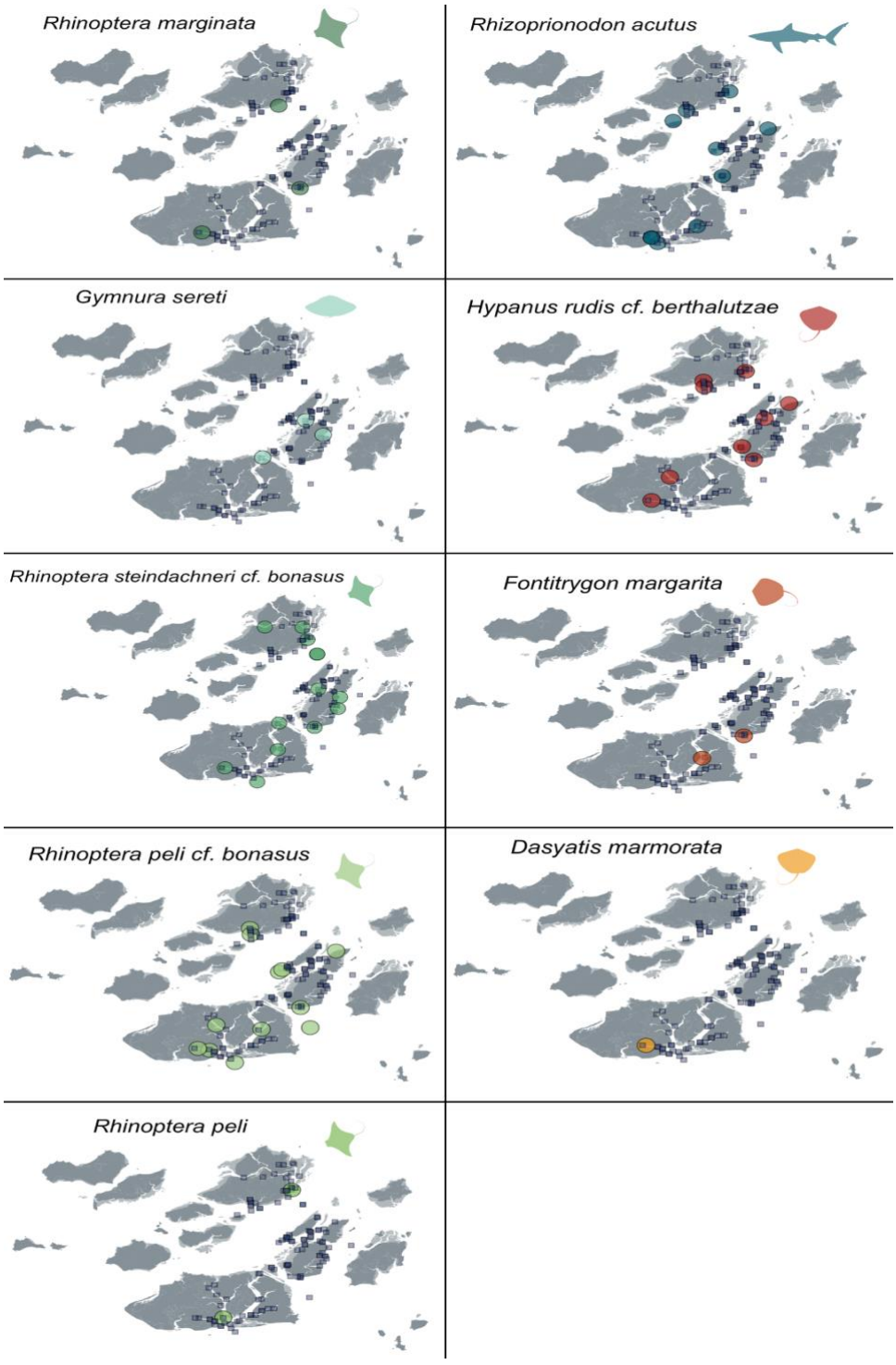
Model	Dist.	Variable	b	s.e.	z	p
Multifilament (L)	P	Year	0.14	0.07	1.92	0.06
Multifilament (S)	P	Year	0.00	0.08	-0.06	0.95
Monofilament (S)	P	Year	-0.22	0.24	-0.89	0.37
Longlines	P	Year	0.06	0.04	1.57	0.12

Model	Dist.	Variable	b	s.e.	z	p
Multifilament (L)	NB	Year	0.01	0.01	1.33	0.18
Multifilament (S)	NB	Year	0.04	0.03	1.13	0.26
Monofilament (S)	NB	Year	0.09	0.10	0.89	0.37
Longlines	P	Year	0.00	0.02	0.00	1.00

Model	Dist.	Variable	b	s.e.	z	p
Multifilament (L)	P	Year	0.07	0.03	2.43	0.02
Multifilament (S)	P	Year	0.05	0.05	1.12	0.26
Monofilament (S)	P	Year	0.13	0.27	0.49	0.63
Longlines	P	Year	0.11	0.10	1.13	0.26

Generalized linear mixed models to determine changes in the number of gear sets (top), gear length (middle), and gear soak time (bottom) for each gear type: large multifilament nets (dark gray), small multifilament nets (light gray), small monofilament nets (brown), and longlines (turquoise). Points with 95% confidence intervals indicate measurements taken during thelanding site survey in 2021, which sampled only fishing vessels catching sharks and rays.

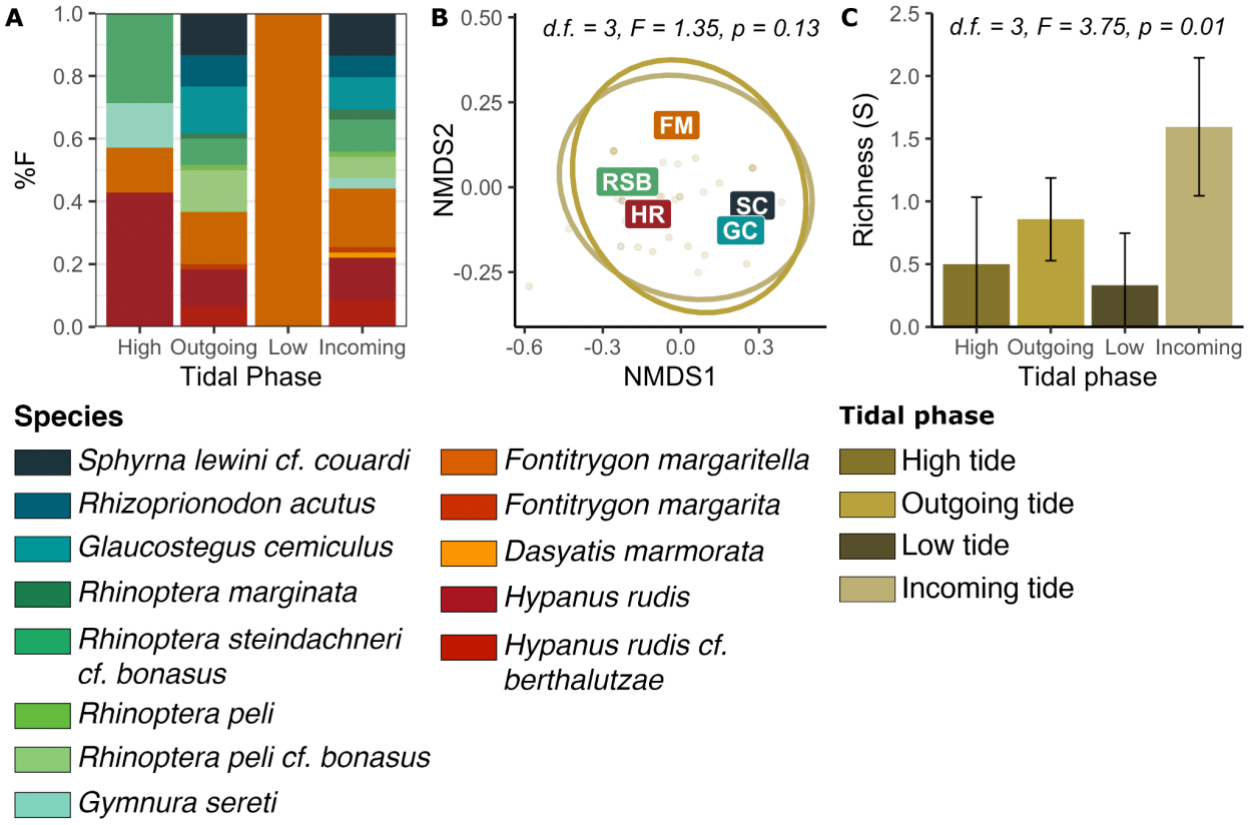
Appendix 5.1



Supplementary to Figure 5.3, with the locations where the relatively rare species were detected.

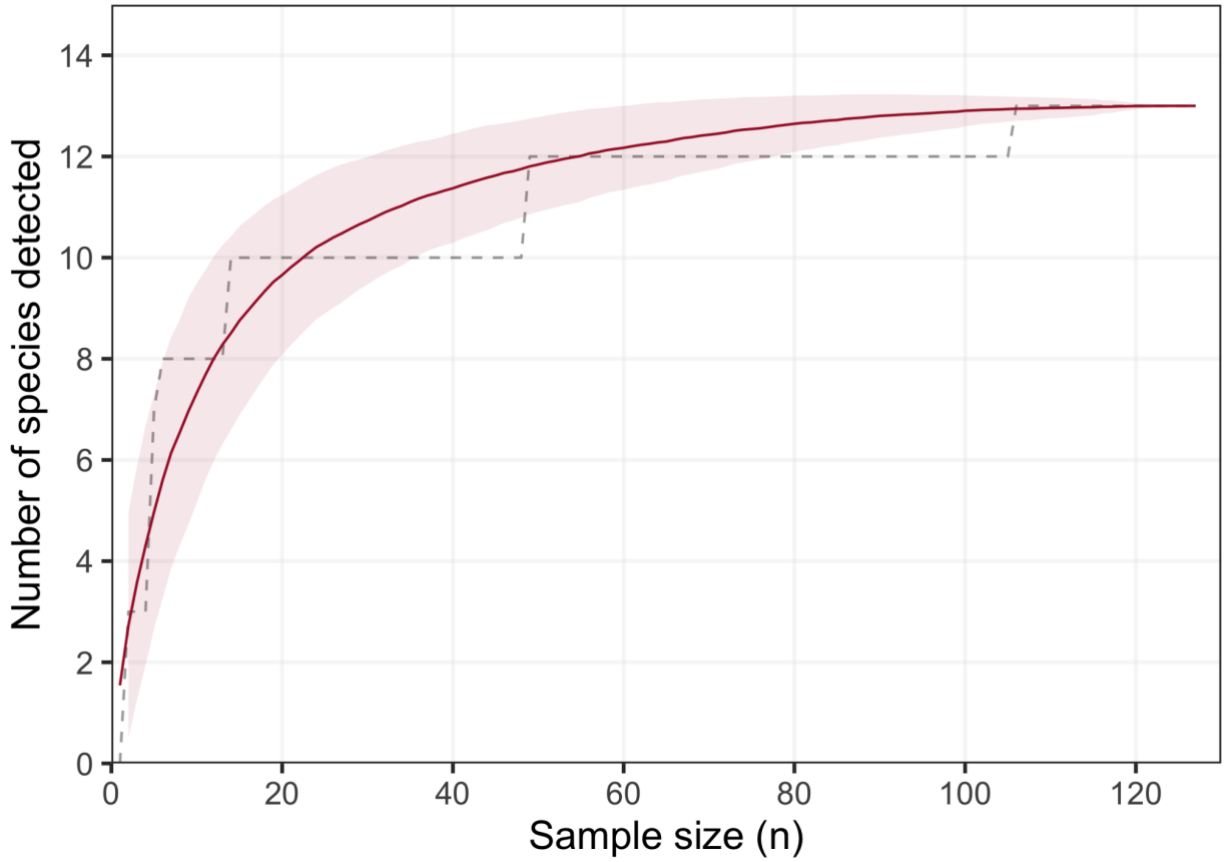
Sampling points where the species was absent are indicated by small blue squares.

Appendix 5.2



The influence of tidal phase on the frequency of occurrence of a species (%F; A), species composition (NMDS; B), and the species richness (S; C). Species are indicated by their different colors, with the five most common species indicated in the NMDS (FM = *Fontitrygon margaritella*, RSB = *Rhinoptera steindachneri cf. bonasus*, HR = *Hypanus rudis*, SC = *Sphyrna lewini cf. couardi*, GC = *Glaucostegus cemiculus*).

Appendix 5.3



Species accumulation curve with the number of species detected as a function of total sampling effort. The observed species richness is indicated by the dashed black line. The estimated species richness is indicated in red, with the shaded area indicating the standard deviation after 1000 permutations.

Appendix 5.4 Model comparison of the species richness model. Model selection was done based on Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC).

Coefficients	AIC	Δ AIC	BIC	Δ BIC
Season x (MPA + GebaDist.) + MangroveDist. + TidalPhase	355.9	14.7	387.2	20.6
Season x MPA + GebaDist. + MangroveDist. + TidalPhase	354.5	13.3	382.9	15.6
Season x MPA + MangroveDist. + TidalPhase	353.1	11.9	378.7	12.1
Season + MPA + MangroveDist. + TidalPhase	352.3	11.1	375.1	8.5
Season + MangroveDist. + TidalPhase	**341.2**	**0.0**	**366.6**	**0.0**
Season + TidalPhase	350.9	9.7	368.0	1.4

Appendix 5.5 Overview of the variables included in the best-fit species richness model (**Appendix 5.4**).

Independent variable	**SS**	**D.f.**	**F**	**p**
Season	4.48	1	**4.46**	**0.04**
Distance from mangrove	2.55	1	2.54	0.11
Tidal phase	11.29	3	3.75	**0.01**
Residuals	*121.39*	*121*		

Appendix 5.6 Model comparison of the species-specific models.. Model selection was conducted based on Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC).

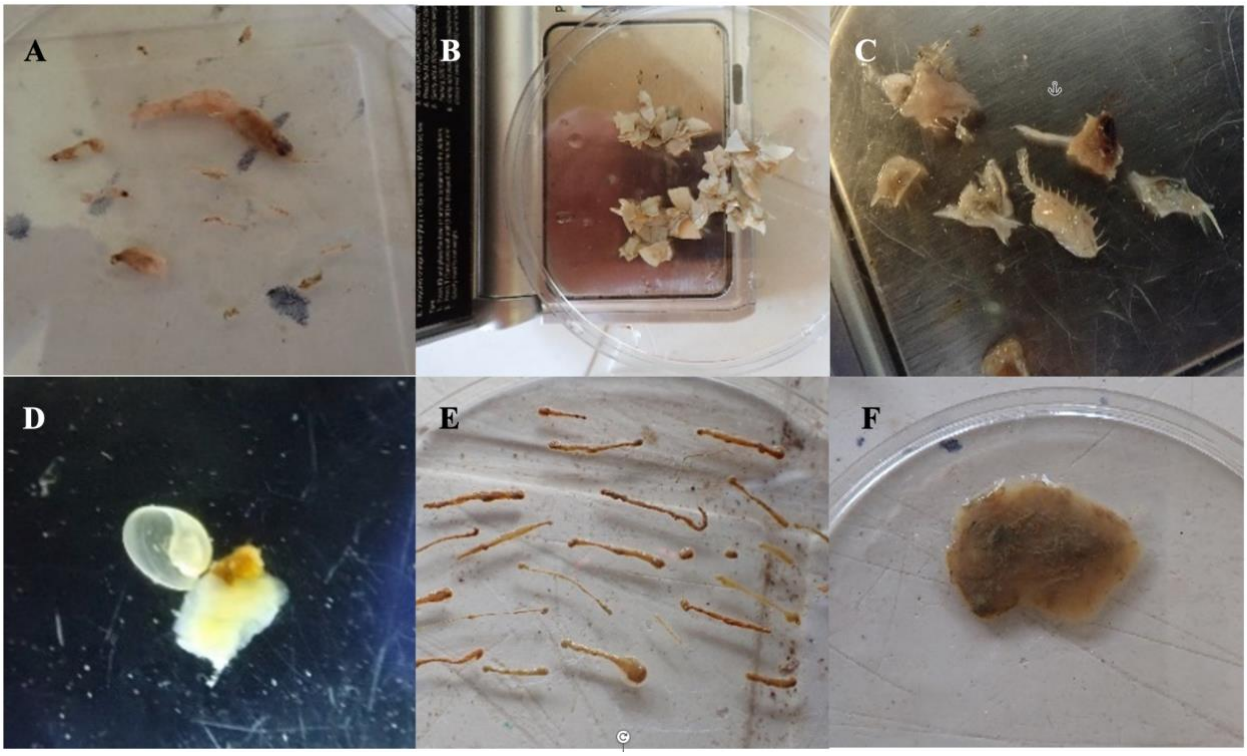
Species	Variables	AIC	BIC
Fontitrygon margaritella	Season x (MPA + GebaDist.) + MangroveDist. + TidalPhase	125.39	148.14
	Season x GebaDist. + MPA + MangroveDist. + TidalPhase	123.43	143.34
	Season + GebaDist. + MPA + MangroveDist. + TidalPhase	121.55	138.61
	Season + MPA + MangroveDist. + TidalPhase	119.92	134.14
	Season + MangroveDist. + TidalPhase	119.33	130.70
	MangroveDist. + TidalPhase	**119.86**	**128.39**
Hypanus rudis	Season x GebaDist. + MPA + MangroveDist. + TidalPhase	111.10	131.01
	Season + GebaDist. + MPA + MangroveDist. + TidalPhase	109.10	126.17
	Season + MPA + MangroveDist. + TidalPhase	107.11	121.33
	Season + MangroveDist. + TidalPhase	105.42	116.80
	MangroveDist. + TidalPhase	103.88	112.41
	MangroveDist.	**104.39**	**110.07**
Glaucostegus cemiculus	Season x (MPA + GebaDist.) + MangroveDist. + TidalPhase	90.28	113.03
	Season x (MPA + GebaDist.) + MangroveDist.	88.28	108.19
	Season x GebaDist. + MPA + MangroveDist.	86.73	103.79
	Season x GebaDist. + MangroveDist.	**84.74**	**98.96**
	Season + GebaDist. + MangroveDist.	86.31	97.69
	Season + MangroveDist.	86.47	95.00
	Season	86.82	92.51
Sphyrna lewini cf. couardi	Season x (MPA + GebaDist.) + MangroveDist. + TidalPhase	97.15	119.91
	Season x GebaDist. + MPA + MangroveDist. + TidalPhase	95.65	115.56
	Season x GebaDist. + MangroveDist. + TidalPhase	93.76	110.83
	Season x GebaDist. + TidalPhase	92.42	106.65
	Season x GebaDist.	91.77	103.14
	Season + GebaDist.	91.71	100.25
	Season	**89.74**	**95.43**

Rhinoptera steindachneri cf. bonasus	Season x (MPA + GebaDist.) + MangroveDist. + TidalPhase	88.46	111.22
	Season x MPA + GebaDist. + MangroveDist. + TidalPhase	86.72	106.63
	Season x MPA + MangroveDist. + TidalPhase	84.86	101.92
	Season + MPA + MangroveDist. + TidalPhase	83.79	98.01
	Season + MangroveDist. + TidalPhase	81.92	93.30
	Season + MangroveDist.	**81.09**	**89.62**
	MangroveDist.	82.34	88.03
Rhinoptera peli	GebaDist. + MangroveDist. + TidalPhase	28.22	39.60
	GebaDist. + MangroveDist.	26.33	34.87
	MangroveDist.	**24.37**	**30.05**
Rhizoprionodon acutus	MPA + GebaDist. + MangroveDist. + TidalPhase	78.78	93.00
	GebaDist. + MangroveDist. + TidalPhase	76.79	88.16
	GebaDist. + MangroveDist.	74.81	83.34
	GebaDist.	**72.90**	**78.59**
Hypanys rudis cf. berthalutzae	MPA + GebaDist. + MangroveDist. + TidalPhase	73.55	87.78
	MPA + MangroveDist. + TidalPhase	71.57	82.94
	MangroveDist. + TidalPhase	69.59	78.13
	TidalPhase	**67.85**	**73.54**

Appendix 5.7 Analyses of variance for selected species-specific models (**Appendix 5.6**).

Species	**Coefficient**	**d.f.**	**X^2**	**p-value**	
Fontitrygon margaritella	**MangroveDist**	**1**	**4.51**	**0.03**	*
	TidalPhase	**1**	**4.86**	**0.03**	*
Hypanus rudis	MangroveDist	1	3.27	0.07	.
Glaucostegus cemiculus	**Season**	**1**	**11.1**	**0.00**	***
	GebaDist.	1	2.16	0.14	
	MangroveDist.	**1**	**4.01**	**0.045**	*
	Season x GebaDist.	1	3.57	0.06	
Sphyrna lewini cf. couardi	**Season**	**1**	**10.44**	**0.00**	**
Rhinoptera steindachneri cf. bonasus	Season	1	3.25	0.07	.
	MangroveDist.	**1**	**5.89**	**0.02**	*
Rhinoptera peli	MangroveDist.	1	0.21	0.65	
Rhizoprionodon acutus	GebaDist.	1	1.11	0.29	
Hypanus rudis cf. berthalutzae	TidalPhase	1	1.1	0.29	

Appendix 6.1



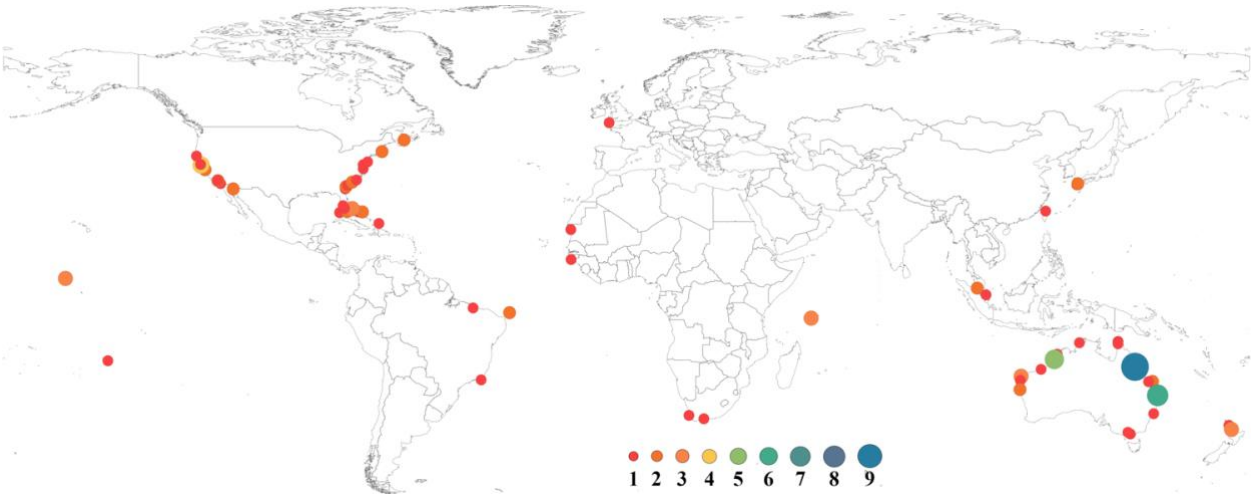
Representative photo of each taxa group found in stomach content. (A) crustaceans. (B) bivalves. (C) teleosts. (D) other molluscs. (E) polychaetes. (F) unidentified.

Appendix 6.2 Life stage and stomach content weights in grams for each specimen.

Life stage	Unidentified (g)	Crustacea (g)	Worm (g)	Bivalve (g)	Mollusk (g)	Teleost (g)	Total content (g)
Adult	0.369	0.27	0.001	0	0	0	0.569
Adult	3.6	0.14	1.17	0	0	0	5.41
Adult	0.49	0.85	0.06	0	0	0	1.34
Adult	0.8	0.4	0.2	0	0	0	1.8
Adult	1.1	1.3	0.4	0	0	0	3.1
Adult	0.23	0.78	0.33	0	0	0	1.12
Adult	0.05	0.06	0	0	0	0	0.12
Adult	0.24	0.29	1.24	0	0	0	2.01
Adult	1.44	2.05	0	1.75	0	0	6.35
Adult	0.23	0.36	0.04	0	0.02	0	0.62
Adult	0.05	0.71	0.05	0	0	0	0.86
Adult	0.28	0.33	0.04	0	0	0	0.67
Adult	1.38	0.96	1.04	0	0	0	4.3
Adult	0	0	0	0	2.83	0	2.83
Adult	0.229	0.001	0.21	0	0.24	0	0.759
Adult	0.6	2.21	0.45	0	0	0	3.26
Adult	0.61	0.04	0.27	0.88	0	0.83	3.239
Adult	0.76	1.12	0	0	0	1.9	4.34
Adult	0	1.65	0	0	0	0	1.65
Adult	0.28	1.39	0	0.41	0	0	1.98
Adult	0.47	0.63	0	0	0	0	1.1
Adult	0	1.47	0	0	0	0	1.47
Adult	0.11	0.09	0	0.04	0	1.31	1.55
Adult	0.14	0.45	0	0.23	0	0	0.74
Juvenile	0.5	0.16	0.11	0	0	0	1.19
Juvenile	0.16	0	0.15	0	0	0	0.18
Juvenile	1.06	0.04	0	0	0	0	2.09
Juvenile	0.409	0.52	0.12	0.001	0	0	1.149
Juvenile	0.11	0.03	0	0	0	0	0.14
Juvenile	1.21	0.26	0.08	0	0.03	0	1.83
Juvenile	0.399	0.04	0.001	0	0	0	0.519
Juvenile	0.888	0.76	0.001	0.001	0	0	2.278
Juvenile	0.2	0.03	0.06	0	0	0	0.29
Juvenile	0.21	0.67	0.12	0	0	0	0.9
Juvenile	0.95	0.19	0	0	0	0	1.18
Juvenile	1.339	0.34	0	0	0.001	0	1.909
Juvenile	0.3	0.03	0.03	0	0	0	0.36
Juvenile	0.589	0.13	0.001	0	0	0	0.979
Juvenile	0.22	0.04	0.07	0	0	0	0.52
Juvenile	1.68	0	0.04	0.1	0	0	2.58
Juvenile	1.02	0	0.13	0	0	0	1.17

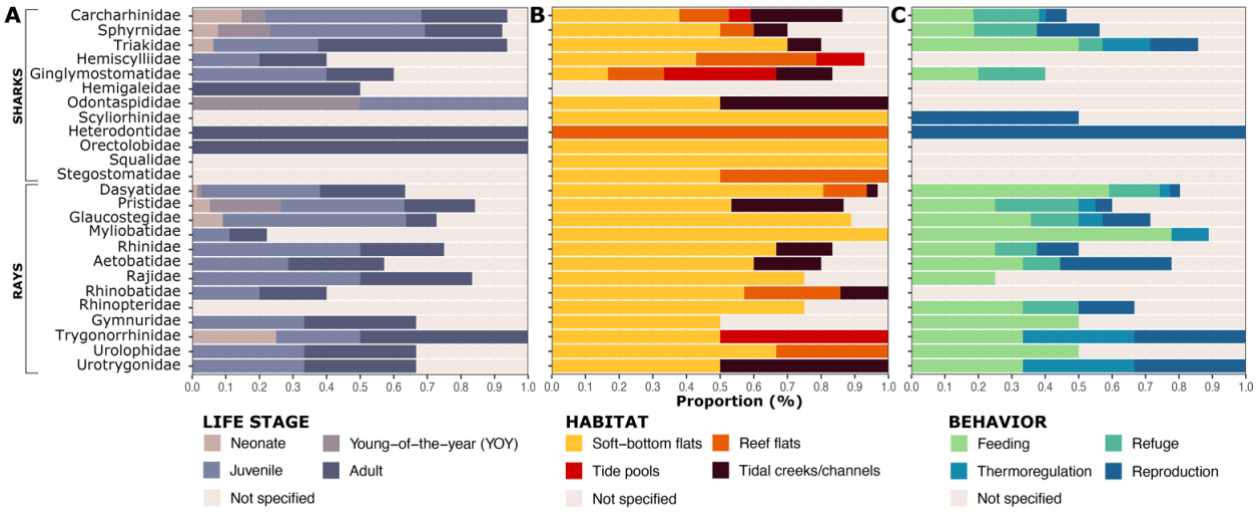
Juvenile	0.029	0.28	0.05	0.001	0	0	0.359
Juvenile	0.73	0.01	0.09	0	0	0	1.56
YOY	0.23	0.1	0.23	0	0	0	0.58
YOY	0.179	0.001	0	0	0	0	0.319
YOY	0.51	0.04	0	0	0	0	0.56
YOY	0.26	0	0	0	0	0	0.26
YOY	0.049	0.06	0.001	0	0	0	0.159
YOY	1.01	0.14	0	0	0	0	1.19
YOY	0.16	0.05	0.15	0	0	0	0.38
YOY	0.28	0.17	0	0	0	0	0.45
YOY	0.2	0	0.07	0	0	0	0.27
YOY	0.289	0.001	0.03	0	0	0	0.389
YOY	0.52	0.04	0.05	0	0	0	0.71
YOY	0.38	0	0	0	0	0	0.38
YOY	0.17	0.03	0	0	0	0	0.23
YOY	0.36	0.02	0	0	0	0	0.39
YOY	0.139	0.001	0	0	0	0	0.139
YOY	0.67	0.08	0.19	0	0	0	0.95
YOY	0.119	0	0.001	0	0	0	0.129
YOY	0.137	0.001	0.001	0	0.001	0	0.197
YOY	0.278	0.001	0.001	0	0	0	0.328
YOY	0.17	0.06	0	0	0	0.01	0.24
YOY	0.098	0.001	0.001	0	0	0	0.148
YOY	0.24	0.04	0	0	0	0	0.28

Appendix 7.1



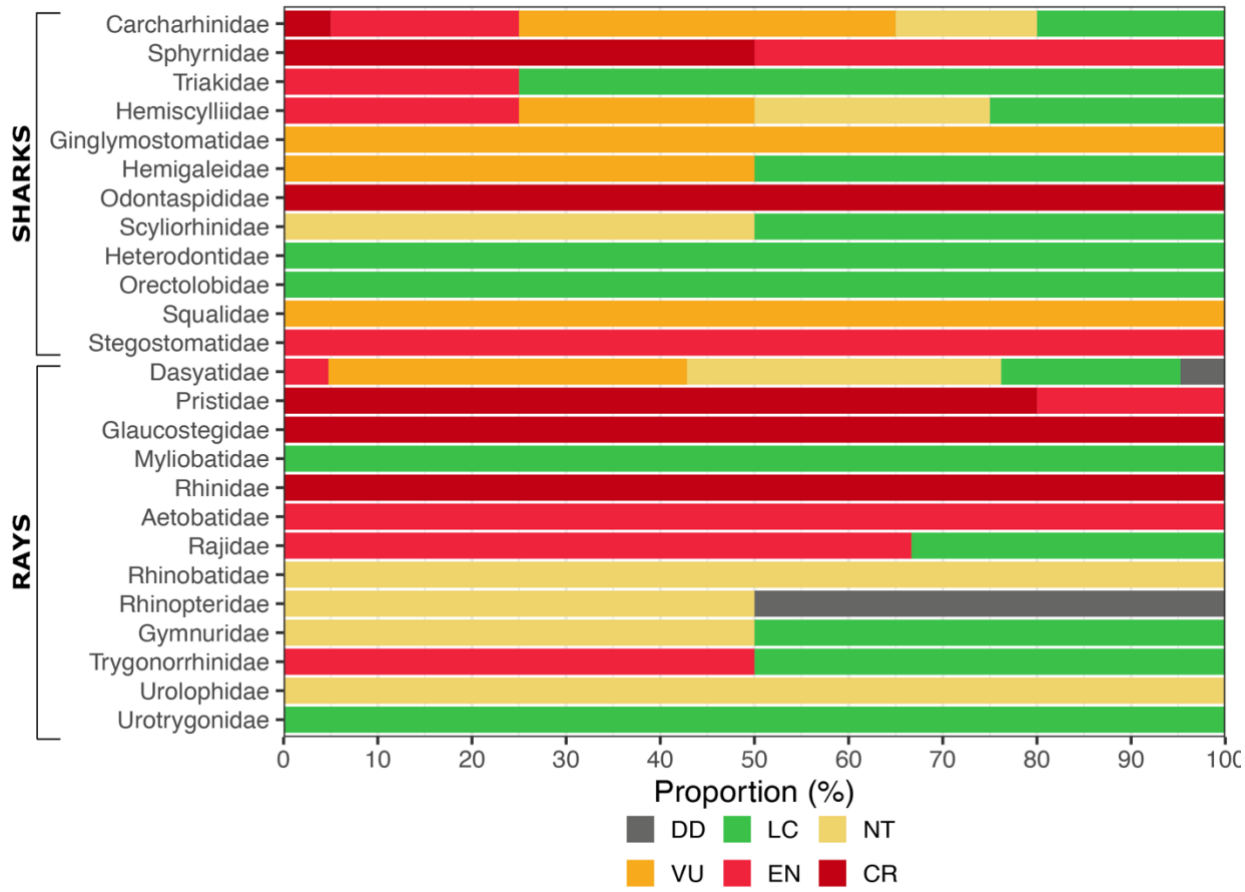
Global distribution of selected studies (n = 119) describing the intertidal habitat use of elasmobranchs. Color and size scale indicate the number of publications.

Appendix 7.2



The relative number of observations for each shark (top) and ray (bottom) family for different life stages (A), intertidal habitats (B), and behavior/purposes (C).

Appendix 7.3



IUCN Red List conservation status of all elasmobranch species described to use intertidal habitats. Proportion of species within a certain conservation status group is given for each shark and ray family. IUCN Red List categories: DD = Data Deficient, LC = Least Concern, NT = Near Threatened, VU = Vulnerable, EN = Endangered, and CR = Critically Endangered. A species is considered to be threatened if it belongs to one of the three highest conservation categories (VU, EN, CR).

Appendix 7.4 Overview of intertidal habitat use of shark and ray species. Life-stages: NE = Neonate, YO = Young-of-the-year, JU = Juvenile, AD = Adult, ? = not specified. Habitat: SB = soft-bottom flats, RF = reef-flats, TP = tide pools, TC = tidal channels, ? = not specified. Behavior: OC = occurrence, FE = feeding, RE = reproductive, RF = refuge, TH = thermoregulation.

				Life-stage(s)					Habitat					Behavior				
Reference	**Species**	**Site**	**Country**	NE	YO	JU	AD	?	SB	RF	TP	TC	?	OC	FE	RE	RF	TH
Ackerman *et al.*, 2000	*Triakis semifasciata*	Tomales Bay	United States			x	x		x					x	x			
Adkins *et al*., 2016	*Anoxypristis cuspidata*	Cleveland Bay	Australia			x			x					x				
	Carcharhinus amboinensis	Cleveland Bay	Australia			x			x					x				
	Carcharhinus fitzroyensis	Cleveland Bay	Australia			x	x		x					x				
	Carcharhinus tilstoni	Cleveland Bay	Australia			x	x		x					x				
	Glaucostegus typus	Cleveland Bay	Australia			x			x					x				
	Rhinoptera neglecta	Cleveland Bay	Australia					x	x					x				
	Rhizoprionodon taylori	Cleveland Bay	Australia			x	x		x					x				
	Rhynchobatus australiae	Cleveland Bay	Australia			x	x		x					x				
	Sphyrna lewini	Cleveland Bay	Australia			x			x					x				
	Urogymnus granulatus	Cleveland Bay	Australia			x			x					x				
Bangley *et al.*, 2016	*Carcharhinus plumbeus*	Herb River, Georgia	United States					x				x		x				
	Carcharhinus leucas	Pamlico Sound, North Carolina	United States			x						x		x				
Barletta and Blaber, 2007	*Carcharhinus leucas*	Embley Estuary	Australia			x	x					x		x				
	Himantura uarnak	Embley Estuary	Australia			x	x		x					x				
	Negaprion acutidens	Embley Estuary	Australia			x	x					x		x				
	Pastinachus sephen	Embley Estuary	Australia			x	x		x					x				

	Rhynchobatus australiae	Embley Estuary	Australia			x						x		x				
	Taeniura lymma	Embley Estuary	Australia			x	x		x					x				
Beckman, 2017	*Neotrygon australiae*	Moreton Bay	Australia					x	x					x	x			
Brinton and Curran, 2017	*Hypanus sabinus*	Herb River and Romerly Marsh Creek	United States					x				x		x			x	
Campos *et al.*, 2009	*Mustelus henlei*	Tomales Bay	United States				x		x					x	x		x	
Carlisle and Starr, 2009	*Triakis semifasciata*	Elkhorn Slough	United States			x	x		x					x	x			x
Carlisle and Starr, 2010	*Triakis semifasciata*	Elkhorn Slough	United States			x	x		x					x	x			x
Cerutti-Pereyra *et al.*, 2014	*Glaucostegus typus*	Mangrove Bay	Australia			x			x					x	x		x	
	Himantura uarnak	Mangrove Bay	Australia			x			x					x	x		x	
	Pastinachus ater	Mangrove Bay	Australia			x			x					x	x		x	
	Urogymnus asperrimus	Mangrove Bay	Australia			x			x					x	x		x	
Chin *et al.*, 2012	*Carcharhinus melanopterus*	Cleveland Bay	Australia			x	x		x	x				x				
	Chiloscyllium punctatum	Cleveland Bay	Australia					x	x	x				x				
	Negaprion acutidens	Cleveland Bay	Australia					x	x	x				x				
	Stegostoma tigrinum	Cleveland Bay	Australia					x	x	x				x				
Chin *et al.*, 2013	*Carcharhinus melanopterus*	Cleveland Bay	Australia					x		x				x			x	
Chin *et al.*, 2016	*Carcharhinus melanopterus*	Cleveland Bay	Australia	x		x	x		x					x	x		x	
Christie, 2015	*Heterodontus portusjacksoni*	Point Cooke Marine Sanctuary	Australia				x		x	x				x		x		
Chong *et al.*, 1990	*Chiloscyllium indicum*	Klang-Langat Delta	Malaysia			x	x		x					x				
Clements *et al.* 2022	*Fontitrygon margaritella*	Bijagos Archipelago	Guinea-Bissau		x	x	x		x					x	x			
Cole *et al.* 2022	Dasyatis sp.	Myall River mouth	Australia					x					x	x				
	Trygonoptera sp.	Myall River mouth	Australia					x					x	x				
	Trygonorrhina sp.	Myall River mouth	Australia					x					x	x				
Compagno, 1984	*Carcharhinus sealei*	Not specified	Not specified					x					x	x				

Compagno and Ebert, 2007	*Rostroraja alba*	Not specified	Not specified					x					x	x				
Conrath and Musick, 2010	*Carcharhinus plumbeus*	Eastern Shore of Virginia	United States		x	x			x			x		x	x		x	
Cross and Curran, 2000	*Dasyatis spp.*	Chowan Creek	United States					x	x					x	x			
Dadswell *et al.* 2020	*Leucoraja ocellata*	Minas Basi, Nova Scotia	Canada			x	x		x					x				
	Leucoraja erinacea	Minas Basi, Nova Scotia	Canada			x	x		x					x				
	Squalus acanthias	Minas Basi, Nova Scotia	Canada					x	x					x				
D'Andrea *et al.*, 2004	*Dasyatis spp.*	Debidue Flat	United States					x	x					x	x			
da Silva *et al.*, 2022	*Mustelus mustelus*	Langebaan Lagoon	South Africa			x	x					x		x				
Davy *et al.*, 2015	*Urogymnus granulatus*	Pioneer Bay	Australia			x			x					x	x		x	x
Dwyer *et al.*, 2020	*Carcharhinus leucas*	Wenlock and Ducie River	Australia			x			x			x		x				
	Glyphis glyphis	Wenlock and Ducie River	Australia			x			x			x		x				
Ebert and Ebert, 2005	*Triakis semifasciata*	Humboldt Bay	United States	x			x		x					x	x	x		
Ebert, 2003	*Mustelus henlei*	Not specified	Not specified					x					x	x				
Espinoza *et al.*, 2011	*Mustelus californicus*	Bolsa Chica	United States			x	x		x					x	x			
Everett, 1991	*Dasyatis spp.*	Bodega Harbor	United States					x	x					x	x			
Farrugia *et al.*, 2011	*Pseudobatos productus*	Bolsa Chica	United States			x	x		x					x				
Filmalter *et al.*, 2013	*Negaprion acutidens*	St. Joseph Atoll	Seychelles			x				x				x				
Freitas *et al.*, 2006	*Negaprion brevirostris*	Atol das Rocas	Brazil	x	x	x					x	x		x				
Fürsich *et al.*, 1991	*Dasyatis spp.*	Bahía la Choya, Sonora	Mexico					x	x					x	x			
George *et al.*, 2019	*Carcharhinus melanopterus*	Pioneer Bay	Australia			x			x	x				x	x		x	
Gibson, 2001	*Ginglymostoma cirratum*	Tamarindo	Costa Rica					x					x	x				
Grant, 1983	*Dasyatis spp.*	Debidue Flat	United States					x	x					x	x			
Green, 1968	*Ray spp.*	Moreton Bay	Australia					x	x									x
Gregory *et al.*, 1979	*Myliobatis tenuicaudatus*	Northern New Zealand	New Zealand					x	x					x	x			

Grubbs *et al.*, 2007	*Carcharhinus plumbeus*	Virginia's Eastern Shore	United States	x		x						x		x				
Guttridge *et al.*, 2010	*Negaprion brevirostris*	Bimini	Bahamas			x						x		x				
Guttridge *et al.*, 2011	*Negaprion brevirostris*	Bimini	Bahamas	x		x						x		x				
Guttridge *et al.*, 2012	*Negaprion brevirostris*	Bimini	Bahamas	x		x						x		x	x		x	
Guttridge *et al.*, 2015	*Pristis pectinata*	Andros/Bimini	The Bahamas		x							x		x				
Harborne *et al.*, 2016	*Aetobatus narinari*	Eleuthera	Bahamas					x				x		x				
	Carcharhinus limbatus	Eleuthera	Bahamas					x				x		x				
	Ginglymostoma cirratum	Eleuthera	Bahamas					x				x		x				
	Negaprion brevirostris	Eleuthera	Bahamas					x				x		x	x		x	
Harry *et al.*, 2011	*Aetobatus narinari*	Great Barrier Reef World Heritage	Australia					x					x	x				
	Anoxypristis cuspidata	Great Barrier Reef World Heritage	Australia					x					x	x				
	Carcharhinus amboinensis	Great Barrier Reef World Heritage	Australia	x		x							x	x				
	Carcharhinus dussumieri	Great Barrier Reef World Heritage	Australia				x						x	x				
	Carcharhinus fitzroyensis	Great Barrier Reef World Heritage	Australia			x	x						x	x				
	Carcharhinus leucas	Great Barrier Reef World Heritage	Australia	x		x							x	x				
	Carcharhinus melanopterus	Great Barrier Reef World Heritage	Australia	x		x	x						x	x				
	Carcharhinus sorrah	Great Barrier Reef World Heritage	Australia			x	x						x	x				
	Carcharhinus tilstoni	Great Barrier Reef World Heritage	Australia	x		x	x						x	x				
	Chiloscyllium punctatum	Great Barrier Reef World Heritage	Australia					x					x	x				
	Hemitrygon fluviorum	Great Barrier Reef World Heritage	Australia					x					x	x				
	Eusphyra blochii	Great Barrier Reef World Heritage	Australia				x						x	x				
	Galeocerdo cuvier	Great Barrier Reef World Heritage	Australia			x							x	x				

	Glaucostegus typus	Great Barrier Reef World Heritage	Australia					x					x	x				
	Hemigaleus australiensis	Great Barrier Reef World Heritage	Australia				x						x	x				
	Hemipristis elongata	Great Barrier Reef World Heritage	Australia					x					x	x				
	Maculabatis astra	Great Barrier Reef World Heritage	Australia					x					x	x				
	Loxodon macrorhinus	Great Barrier Reef World Heritage	Australia				x						x	x				
	Negaprion acutidens	Great Barrier Reef World Heritage	Australia	x		x							x	x				
	Pristis zijsron	Great Barrier Reef World Heritage	Australia					x					x	x				
	Rhinoptera spp.	Great Barrier Reef World Heritage	Australia					x					x	x				
	Rhizoprionodon acutus	Great Barrier Reef World Heritage	Australia			x	x						x	x				
	Rhizoprionodon taylori	Great Barrier Reef World Heritage	Australia			x	x						x	x				
	Rhynchobatus spp.	Great Barrier Reef World Heritage	Australia					x					x	x				
	Sphyrna lewini	Great Barrier Reef World Heritage	Australia			x							x	x				
	Sphyrna mokarran	Great Barrier Reef World Heritage	Australia			x	x						x	x				
Heard *et al.*, 2020	*Sphyrna lewini*	Taoyuan Algal Reef	Taiwan			x				x				x				
Henderson *et al.*, 2010	*Negaprion brevirostris*	South Caicos	Turks and Caicos	x		x			x					x		x		
Heupel *et al.*, 2010	*Carcharhinus leucas*	Florida Everglades	United States	x	x							x		x				
Hines *et al.*, 1997	*Myliobatis tenuicaudatus*	Wiroa Island	New Zealand					x	x					x	x			
Hollensead *et al.*, 2016	*Pristis pectinata*	Mud Bay	United States			x	x		x					x	x			
Hopkins and Cech, 1994	*Myliobatis californicus*	Tomales Bay	United States					x	x					x				
Howard and Dörjes, 1972	*Dasyatis spp.*	Nannygoat flat	United States					x	x					x	x			
Howard *et al.*, 1977	*Hypanus americanus*	Georgia	United States					x	x					x	x			
	Hypanus sabinus	Georgia	United States					x	x					x	x			
	Hypanus say	Georgia	United States				x		x					x	x			

Huish and Benedict, 1977	*Carcharhinus obscurus*	Cape Fear	United States		x						x	x				
Ip *et al.*, 2020	*Carcharhinus melanopterus*	Big Sister Island Lagoon	Singapore				x		x			x				
	Taeniura lymma	Big Sister Island Lagoon	Singapore				x		x			x				
Jirik and Lowe, 2012	*Urobatis halleri*	Anaheim Bay	United States		x	x					x	x		x		x
Kanno *et al.*, 2019	*Carcharhinus melanopterus*	Pioneer Bay	Australia		x			x				x				
	Glaucostegus typus	Pioneer Bay	Australia				x	x				x				
	Negaprion acutidens	Pioneer Bay	Australia		x			x				x				
	Neotrygon spp.	Pioneer Bay	Australia				x	x				x				
	Pastinachus ater	Pioneer Bay	Australia		x			x				x			x	
	Pateobatis fai	Pioneer Bay	Australia				x	x				x				
	Taeniura lymma	Pioneer Bay	Australia				x	x				x				
	Urogymnus granulatus	Pioneer Bay	Australia		x			x				x	x		x	
Kneebone *et al.*, 2012	*Carcharias taurus*	Duxbury Bay	United States	x	x			x			x	x				
Kneebone *et al.*, 2018	*Carcharias taurus*	Duxbury Bay	United States	x	x			x			x	x				
Knip *et al.*, 2011	*Carcharhinus amboinensis*	Cleveland Bay	Australia	x	x			x				x	x			
Last and Stevens, 2009	*Chiloscyllium punctatum*	Not specified	Not specified				x	x	x			x				
Last *et al.*, 2010	*Chiloscyllium hasselti*	Not specified	Not specified				x	x	x	x		x				
	Chiloscyllium punctatum	Not specified	Not specified				x	x	x	x		x				
Lea *et al.*, 2016	*Carcharchinus melanopterus*	St. Joseph Atoll	Seychelles		x	x		x	x			x	x		x	
	Nebrius ferrugineus	St. Joseph Atoll	Seychelles		x	x		x	x			x	x		x	
	Negaprion acutidens	St. Joseph Atoll	Seychelles		x	x		x	x			x	x		x	
Lea *et al.*, 2020	*Carcharhinus melanopterus*	St. Joseph Atoll	Seychelles		x	x		x	x	x		x	x		x	
	Negaprion acutidens	St. Joseph Atoll	Seychelles		x	x		x	x	x		x	x		x	
Lear *et al.*, 2019	*Pristis pristis*	Fitzroy river estuary	Australia	x	x					x		x				

Lim *et al.*, 2019	*Brevitrygon heterura*	Klang Strait	Malaysia			x	x		x					x	x			
	Hemitrygon bennetti	Klang Strait	Malaysia			x	x		x					x	x			
	Telatrygon biasa	Klang Strait	Malaysia			x	x		x					x	x			
Lyle, 1987	*Carcharhinus melanopterus*	Darwin Harbor	Australia		x	x	x		x					x				
	Carcharhinus fitzroyensis	Darwin Harbor	Australia			x	x		x					x				
	Carcharhinus cautus	Darwin Harbor	Australia			x	x		x					x				
Lynn-Myrick, and Flessa, 1996	*Myliobatis californicus*	Bahía la Choya, Sonora	Mexico					x	x					x	x			
	Pseudobatos productus	Bahía la Choya, Sonora	Mexico					x					x	x				
	Urobatis halleri	Bahía la Choya, Sonora	Mexico					x	x					x	x			
Martins *et al.*, 2020a	*Urogymnus granulatus*	Pioneer Bay	Australia			x			x	x				x	x		x	
Martins *et al.*, 2020b	*Pastinachus ater*	Pioneer Bay	Australia			x			x	x				x	x		x	
Matern *et al.*, 2000	*Myliobatis californicus*	Tomales Bay	United States			x	x		x					x	x			x
McCurdy *et al.*, 2005	*Leucoraja ocellata*	Starrs Point, Nova Scotia	Canada			x			x					x	x			
Morgan *et al.*, 2017	*Pristis zijsron*	Western Australia	Australia	x	x	x						x		x				
Munroe *et al.*, 2014	*Rhizoprionodon taylori*	Cleveland Bay	Australia			x	x		x					x				
Murchie *et al.*, 2010	*Negaprion brevirostris*	Eleuthera	Bahamas	x	x	x			x			x		x				
Musa *et al.*, 2018, 2020	*Scyliorhinus canicula*	Not specified	Not specified	x			x						x	x		x		
Nay *et al.*, 2020	*Hemiscyllium ocellatum*	Heron Island	Australia					x		x	x			x				
Nunes *et al.*, 2011	*Gymnura micrura*	Ilha do Maranhão and Ilha do Medo	Brazil					x					x	x				
O'Shea *et al.*, 2012	*Himantura spp.*	Mangrove Bay	Australia					x	x	x				x	x			
	Pastinachus ater	Mangrove Bay	Australia					x	x	x				x	x			
	Taeniura lymma	Mangrove Bay	Australia					x	x	x				x	x			
	Urogymnus asperrimus	Mangrove Bay	Australia					x	x	x				x	x			

Oh *et al.*, 2017	*Carcharhinus melanopterus*	Mangrove Bay	Australia	x		x			x	x				x			x	x
	Negaprion acutidens	Mangrove Bay	Australia	x		x			x	x				x			x	x
Papastamatiou *et al.*, 2009	*Carcharhinus melanopterus*	Palmyra Atoll	Northern Line Islands			x	x		x					x	x		x	
Papastamatiou *et al.*, 2010	*Carcharhinus melanopterus*	Palmyra Atoll	Northern Line Islands			x	x		x			x		x				
Papastamatiou *et al.*, 2015	*Pristis pectinata*	Florida Bay	United States			x	x		x			x		x				
Pardo *et al.*, 2015	*Hemitrygon fluviorum*	Moreton Bay	Australia			x	x		x					x	x			
	Maculabatis toshi	Moreton Bay	Australia			x	x		x					x	x			
	Neotrygon kuhlii	Moreton Bay	Australia			x	x		x					x	x			
Peverell *et al.*, 2006	*Glyphis glyphis*	Cape York Peninsula	Australia			x						x		x				
Pierce *et al.*, 2011	*Aetobatus narinari*	Moreton Bay	Australia			x	x		x					x	x	x		
	Aptychotrema rostrata	Moreton Bay	Australia			x	x		x					x	x			
	Chiloscyllium punctatum	Moreton Bay	Australia			x	x		x					x				
	Hemitrygon fluviorum	Moreton Bay	Australia			x	x		x					x	x			
	Glaucostegus typus	Moreton Bay	Australia	x		x			x					x	x	x		
	Gymnura australis	Moreton Bay	Australia			x	x		x					x	x			
	Pateobatis fai	Moreton Bay	Australia				x		x					x	x			
	Maculabatis toshi	Moreton Bay	Australia			x	x		x					x	x			
	Himantura uarnak	Moreton Bay	Australia				x		x					x	x			
	Neotrygon kuhlii	Moreton Bay	Australia	x		x	x		x					x	x	x		
	Orectolobus maculatus	Moreton Bay	Australia				x		x					x				
	Rhynchobatus laevis	Moreton Bay	Australia			x	x		x					x	x			
	Trygonoptera testacea	Moreton Bay	Australia			x	x		x					x	x	x		
Pillans *et al.*, 2008	*Glyphis garricki*	Logan and Albert Rivers	Australia	x		x	x					x		x				
	Glyphis glyphis	Logan and Albert Rivers	Australia	x		x	x					x		x				
Pillans *et al.*, 2020	*Carcharhinus leucas*	Logan and Albert Rivers	Australia	x		x						x		x	x		x	

Pillans *et al.*, 2021	*Negaprion acutidens*	Mangrove Bay	Australia			x	x		x					x	x			
Pridmore *et al.*, 1990	*Myliobatis tenuicaudatus*	Manukau Harbour	New Zealand					x	x					x	x			
Rieucau *et al.*, 2018	*Carcharhinus melanopterus*	Moorea	French Polynesia				x			x				x				
Rummer *et al.*, 2009	*Ginglymostoma cirratum*	Loggerhead Key	United States			x					x			x				
Russo, 1975	*Mustelus henlei*	San Francisco Bay	United States					x					x	x	x			
Sasekumer *et al.*, 1992	*Telatrygon zugei*	Selangor Coast	Malaysia					x	x			x		x				
	Atelomycterus marmoratus	Selangor Coast	Malaysia					x	x					x				
Simpfendorfer *et al.*,2010	*Pristis pectinata*	Southwest Florida	United States			x			x			x		x	x		x	x
Smith and Curran, 2017	*Sphyrna tiburo*	Wassaw Sound	United States	x		x	x					x		x				
Smith and Merriner, 1985	*Rhinoptera bonasus*	Lower Chesapeake Bay	United States					x	x					x	x			
Smith, 2005	*Triakis semifasciata*	La Jolla, California	United States				x		x					x		x		
Stevens *et al.*, 2008	*Pristis clavata*	Northern Australia	Australia				x		x					x	x		x	
	Pristis zijsron	Northern Australia	Australia				x		x					x			x	
Takeuchi and Tamaki, 2014	*Hemitrygon akajei*	Tomioka Bay	Japan					x	x					x	x			
Takeuchi *et al.*, 2013	*Hemitrygon akajei*	Shirakawa	Japan					x	x					x	x			
Thorburn and Morgan, 2004	*Glyphis sp.*	King Sound	Australia			x	x					x		x				
Thorburn *et al.*, 2007	*Pristis pristis*	King Sound	Australia			x						x		x	x		x	
Thrush *et al.*, 1991	*Myliobatis tenuicaudatus*	Manukau Harbor	New Zealand					x	x					x	x			
Thrush *et al.*, 1994	*Myliobatis tenuicaudatus*	Manukau Harbor	New Zealand					x	x					x	x			
Tobin *et al.*, 2014	*Aetobatus narinari*	Cleveland Bay	Australia					x	x					x	x	x	x	
	Anoxypristis cuspidata	Cleveland Bay	Australia		x				x					x	x	x	x	
	Carcharhinus amboinensis	Cleveland Bay	Australia		x	x			x					x	x	x	x	
	Carcharhinus fitzroyensis	Cleveland Bay	Australia			x	x		x					x	x	x	x	

	Carcharhinus tilstoni	Cleveland Bay	Australia		x		x		x					x	x	x	x	
	Dasyatis spp.	Cleveland Bay	Australia					x	x					x	x	x	x	
	Eusphyra blochii	Cleveland Bay	Australia		x				x					x	x	x	x	
	Glaucostegus typus	Cleveland Bay	Australia					x	x					x	x	x	x	
	Rhinoptera neglecta	Cleveland Bay	Australia					x	x					x	x	x	x	
	Rhizoprionodon acutus	Cleveland Bay	Australia			x			x					x	x	x	x	
	Rhizoprionodon taylori	Cleveland Bay	Australia		x				x					x	x	x	x	
	Rhynchobatus australiae	Cleveland Bay	Australia			x			x					x	x	x	x	
	Sphyrna lewini	Cleveland Bay	Australia		x				x					x	x	x	x	
	Sphyrna mokarran	Cleveland Bay	Australia			x			x					x	x	x	x	
van der Laan and Wolff, 2006	*Rhinobatos spp.*	Banc d'Arguin	Mauritania					x	x					x				
	Sphyrna spp.	Banc d'Arguin	Mauritania					x	x					x				
Vaudo and Heithaus, 2009	*Glaucostegus typus*	Cape Rose Flats, Shark Bay	Australia			x			x					x	x			x
	Himantura spp.	Cape Rose Flats, Shark Bay	Australia			x			x					x	x			x
Vaudo and Heithaus, 2012	*Glaucostegus typus*	Cape Rose Flats, Shark Bay	Australia			x			x					x	x			
	Himantura uarnak	Cape Rose Flats, Shark Bay	Australia			x	x		x					x	x			
Vidal-Martínez *et al.*, 2017	*Carcharhinus melanopterus*	Palmyra Atoll	Northern Line Islands			x	x		x					x				
Wetherbee *et al.*, 2007	*Negaprion brevirostris*	Atol das Rocas	Brazil			x				x	x	x		x				
White and Potter, 2004	*Rhizoprionodon acutus*	Herald Bight, Shark Bay	Australia			x			x		x			x				
White *et al.*, 2013	*Anoxypristis cuspidata*	Cleveland Bay	Australia					x	x					x				
	Glaucostegus typus	Cleveland Bay	Australia			x	x		x					x				
	Rhynchobatus spp.	Cleveland Bay	Australia					x	x					x				
Whitty *et al.*, 2008	*Glyphis spp.*	Fitzroy River Estuary	Australia					x				x		x				
Whitty, 2011	*Glyphis garricki*	Fitzroy River Estuary	Australia	x		x						x		x				
Wosnick *et al.*, 2019	*Zapteryx brevirostris*	Praia Brava	Brazil	x			x				x			x		x		x

Yamaguchi *et al.*, 2005	*Aetobatus flagellum*	Ariake Sound	Japan	x x	x	x x x
Zann, 1973	Dasyatis spp.	Heron Island	Australia	x	x	x x

Appendix 8.1 - Species lists of study areas

Species list for both study areas based on shorebird counts (Banc d'Arguin: 1979-2020, Bijagós Archipelago: 1987-2020) and fisheries data (Banc d'Arguin: 2006-2020, Bijagós Archipelago: 2021). The abbreviation of each species (Abb.) is given, together with the IUCN Red List status of a species (LC = Least Concern, NT = Near Threatened, VU = Vulnerable, EN = Endangered, CR = Critically Endangered) and its population change on a global level (Dec = Decrease, Inc = Increase, Sta = Stable, Unk = Unknown). The presence (Pres.) of the species in the Banc d'Arguin and the Bijagós Archipelago indicates if the species was sampled (and included; Samp.) in this study.

				IUCN Red List		Banc d'Arguin		Bijagós	
	Common name	**Scientific name**	**Abb.**	**Status**	**Pop. change**	**Pres.**	**Samp.**	**Pres.**	**Samp.**
Shorebirds	Common Sandpiper	*Actitis hypoleucos*	*Act hyp*	LC	Dec	X		X	X
	Ruddy Turnstone	*Arenaria interpres*	*Are int*	LC	Dec	X		X	X
	Stone Curlew	*Burhinus oedicnemus*	*Bur oed*	LC	Dec	X			
	Sanderling	*Calidris alba*	*Cal alb*	LC	Unk	X		X	X
	Dunlin	*Calidris alpina*	*Cal alp*	LC	Dec	X		X	
	Red Knot	*Calidris canutus*	*Cal can*	NT	Dec	X	X	X	X
	Curlew Sandpiper	*Calidris ferruginea*	*Cal fer*	NT	Dec	X	X	X	X
	Little Stint	*Calidris minuta*	*Cal min*	LC	Inc	X		X	
	Ruff	*Calidris pugnax*	*Cal pug*	LC	Dec	X			
	Kentish Plover	*Charadrius alexandrinus*	*Cha ale*	LC	Dec	X		X	
	Common Ringed Plover	*Charadrius hiaticula*	*Cha hia*	LC	Dec	X	X	X	X
	Cream-coloured Courser	*Cursorius cursor*	*Cur cur*	LC	Dec	X			
	Eurasian Oystercatcher	*Haematopus ostralegus*	*Hae ost*	NT	Dec	X	X	X	
	Bar-tailed Godwit	*Limosa lapponica*	*Lim lap*	NT	Dec	X	X	X	X
	Black-tailed Godwit	*Limosa limosa*	*Lim lim*	NT	Dec	X			
	Eurasian Curlew	*Numenius arquata*	*Num arq*	NT	Dec	X		X	
	Eurasian Whimbrel	*Numenius phaeopus*	*Num pha*	LC	Dec	X	X	X	X
	Grey Plover	*Pluvialis squatarola*	*Plu squ*	LC	Dec	X	X	X	X
	Avocet	*Recurvirostra avosetta*	*Rec avo*	LC	Unk	X			
	Spotted Redshank	*Tringa erythropus*	*Tri ery*	LC	Sta	X			
	Common Greenshank	*Tringa nebularia*	*Tri neb*	LC	Sta	X		X	X
	Marsh Sandpiper	*Tringa stagnatilis*	*Tri sta*	LC	Dec	X			
	Common Redshank	*Tringa totanus*	*Tri tot*	LC	Unk	X		X	X
Sharks	Spinner Shark	*Carcharhinus brevipinna*	*Car bre*	VU	Dec	X			
	Bull Shark	*Carcharhinus leucas*	*Car leu*	VU	Dec			X	X
	Blacktip Shark	*Carcharhinus limbatus*	*Car lim*	VU	Dec	X		X	X
	Dusky Shark	*Carcharhinus obscurus*	*Car obs*	EN	Dec	X			
	Tiger Shark	*Galeocerdo cuvier*	*Gal cuv*	NT	Dec	X		X	
	Atlantic Nurse Shark	*Ginglymostoma cirratum*	*Gin cir*	VU	Dec	X	X	X	X
	Barbeled Houndshark	*Leptocharias smithii*	*Lep smi*	VU	Dec	X	X	X	
	Common Smoothhound	*Mustelus mustelus*	*Mus mus*	EN	Dec	X			
	Lemon Shark	*Negaprion brevirostris*	*Neg bre*	VU	Dec	X			
	Atlantic Weasel Shark	*Paragaleus pectoralis*	*Par pec*	EN	Dec	X	X		
	Milk Shark	*Rhizoprionodon acutus*	*Rhi acu*	VU	Dec	X	X	X	X
	Scalloped Hammerhead	*Sphyrna lewini*	*Sph lew*	CR	Dec	X	X	X	X
	Great Hammerhead	*Sphyrna mokarran*	*Sph mok*	CR	Dec	X			
	Smooth Hammerhead	*Sphyrna zygaena*	*Sph zyg*	VU	Dec	X	X		
Rays	Duckbill Eagle Ray	*Aetomylaeus bovinus*	*Aet bov*	CR	Dec	X	X	X	
	Brown Stingray	*Bathytoshia lata*	*Bat lat*	VU	Dec	X		X	
	Marbled Stingray	*Dasyatis marmorata*	*Das mar*	NT	Dec	X	X		
	Common Stingray	*Dasyatis pastinica*	*Das pas*	VU	Dec	X			
	Daisy Whipray	*Fontitrygon margarita*	*Fon mar*	VU	Dec	X	X	X	X
	Pearl Whipray	*Fontitrygon margaritella*	*Fon mar*	NT	Dec	X	X	X	X
	Thorny Whipray	*Fontitrygon ukpam*	*Fon ukp*	CR	Dec			X	X
	Blackchin Guitarfish	*Glaucostegus cemiculus*	*Gla cem*	CR	Dec	X	X	X	X
	Spiny Butterfly Ray	*Gymnura altavela*	*Gym alt*	EN	Dec	X	X		
	Seret's Butterfly Ray	*Gymnura sereti*	*Gym ser*	EN	Dec	X		X	X
	Smalltooth Stingray	*Hypanus rudis*	*Hyp rud*	CR	Dec			X	X
	Common Eagle Ray	*Myliobatis aquila*	*Myl aqu*	CR	Dec	X			
	African Brown Skate	*Raja parva*	*Raj par*	NT	Dec	X			
	Whitespotted Guitarfish	*Rhinobatos albomaculatus*	*Rhi alb*	CR	Dec	X			
	Spineback Guitarfish	*Rhinobatos irvinei*	*Rhi irv*	CR	Dec		X		
	Common Guitarfish	*Rhinobatos rhinobatos*	*Rhi rhi*	CR	Dec	X	X	X	
	Lusitanian Cownose Ray	*Rhinoptera marginata*	*Rhi mar*	CR	Dec	X	X	X	X
	African Wedgefish	*Rhynchobatus luebberti*	*Rhy lue*	CR	Dec	X			
	Round Stingray	*Taeniurops grabatus*	*Tae gra*	NT	Dec			X	

Appendix 8.2 - Banc d'Arguin intertidal presence of mesopredators

We used tracking and fisheries data to determine the presence of shorebirds and elasmobranchs in different elevational zones in the Banc d'Arguin. We then determined the probability of presence of each species group in the subtidal, intertidal and supratidal zones using generalized additive mixed models. The observed presence (Obs.) of shorebirds was highest in the intertidal (87.3%) and supratidal zones (77.8%), which is supported by the model predictions with a mean probability (Prob.) of 76.2 ± 3.4% and 77.8 ± 3.4% (mean ± s.e.) respectively. For sharks and rays, the highest observed presence was in the subtidal (27.8% and 38.8%, respectively) and intertidal zones (19.3% and 27.3%), which was also supported by model predictions (subtidal: 40.9 ± 4.9% and 47.0 ± 6.0%, intertidal 23.9 ± 3.7% and 34.5 ± 5.0% for sharks and rays respectively).

	Subtidal		**Intertidal**		**Supratidal**	
Species Group	Obs. N (%)	Prob. (%) (mean ± s.e.)	Obs. N (%)	Prob. (%) (mean ± s.e.)	Obs. N (%)	Prob. (%) (mean ± s.e.)
Shorebirds	428 (48.4)	11.3 ± 2.1	1,967 (87.3)	76.2 ± 3.4	3,567 (78.6)	77.8 ± 3.4
Sharks	222 (27.8)	40.9 ± 4.9	119 (19.3)	23.9 ± 3.7	-	0.4 ± 0.2
Rays	310 (38.8)	47.0 ± 6.0	168 (27.3)	34.5 ± 5.0	-	0.2 ± 0.1

Smooth terms of all three species group generalized additive mixed models were significant. Elevation explained 34.4%, 10.4%, and 10.7% of the deviance for shorebirds, sharks and rays, respectively.

Species Group	**Smooth term**	**d.f.**	**X^2**	**p-value**	**Deviance explained (%)**
Shorebirds	Elevation	5.97	908.17	<0.001	34.38
Sharks	Elevation	4.88	60.01	<0.001	10.40
Rays	Elevation	5.79	52.64	<0.001	10.68

Appendix 8.3 - Prey group details

Overview of prey group sample sizes. Sample sizes based on sampling efforts for this study are shown with additional stable isotope information supplemented with other published studies from the region.

Area	Species group		This study	Other studies	Total	Reference(s)
Banc d'Arguin	Bivalves	Bivalves	175	27	202	2,1
	Cephalopods	Cephalopods		58	58	2,3
	Crustaceans	Crabs	66	9	75	1
		Other crustaceans	9	5	14	1
		Shrimps	4	3	7	1
	Detritus	Detritus	3		3	
	Gastropods	Large gastropods	14	19	33	2
		Medium gastropods	13	18	31	2
		Small gastropods	1	7	8	2,1
	Polychaetes	Polychaetes (deposit)	20	7	27	2
		Polychaetes (filter)	4		4	
		Polychaetes (predatory)	10	18	28	2
	Producers	Algae	13		13	
		Microphytobenthos	7	3	10	1
		POM	1	6	7	1,2
		Seagrass	15		15	
	Sediment	Sediment	23		23	
	Teleosts	Benthopelagic teleosts	83	66	149	2
		Demersal teleosts	106	116	222	2
		Pelagic teleosts	21	15	36	2
	Zooplankton	Zooplankton	2	2	4	1
Bijagós Archipelago	Bivalves	Bivalves	83	21	104	1
	Cephalopods	Cephalopods		53	53	3
	Crustaceans	Crabs	113	11	124	1
		Hermit crabs	23		23	
		Mud shrimps	23	2	25	1

		Shrimps	22	3	25	[1]
	Detritus	Detritus	30		30	
	Gastropods	Small gastropods	6		6	
	Polychaetes	Polychaetes	12		12	
		Polychaetes (deposit)	20	10	30	[1]
		Polychaetes (filter)	10		10	
		Polychaetes (predatory)	23	12	35	[1]
	Producers	Algae	15		15	
		Mangrove	16		16	
		Microphytobenthos	21	4	25	[1]
		POM	4	4	8	[1]
	Sediment	Sediment	11		11	
	Teleosts	Benthopelagic teleosts	113		113	
		Demersal teleosts	103		103	
		Fish larvae and juveniles	20		20	
		Pelagic teleosts	54		54	
	Zooplankton	Zooplankton	3	1	4	[1]

[1.] Catry et al. (2016), [2.] Carlier et al. (2015) & Petersen et al. (2016), [3.] Merten et al. (2017).

Appendix 8.4 - Mesopredator niche characteristics

Overview of sampled (meso)predators from the Banc d'Arguin and the Bijagós Archipelago. For each species, the sample size (n), size range (total length for sharks, disc width for rays; in centimeters), Bayesian Standard Ellipse Area (SEA_b; i.e., total niche space occupied by a species), Eccentricity (E: values close to 0 indicate variation in niche space is driven by both axes/isotopes, values close to 1 indicate one axis/isotope determines variation), Theta (θ: values close to 0 indicate that variation is driven by the x-axis/13C, values close to -90/90 indicate variation is driven by the y-axis/d15N), trophic position (TP) and alpha (α: ratio between 0 and 1 indicating the relative contribution of benthic primary producers compared to pelagic producers) are given. Values in parentheses indicate the 95% credible interval of the Bayesian posterior estimates for SEA_b, TP and α.

Area	Group	Species	n	Size range (cm)	SEA_b	E	θ	TP	α
Banc d'Arguin	Sharks	*Ginglymostoma cirratum*	8	109-181	9.7 (5.2-25.9)	0.98	-36.01	4.3 (3.9-4.8)	0.3 (0.1-0.6)
		Leptocharias smithii	37	57-78	3.2 (2.3- 4.4)	0.93	-61.91	4.1 (4.0-4.3)	0.1 (0.0-0.1)
		Paragaleus pectoralis	25	66-129	7.4 (4.7-10.7)	0.91	-34.14	4.3 (4.1-4.4)	0.2 (0.1-0.3)
		Rhizoprionodon acutus	30	28-107	4.9 (3.2- 6.9)	0.91	-52.16	4.6 (4.5-4.7)	0.1 (0.1-0.2)
		Sphyrna lewini	13	80-126	1.6 (0.8- 2.5)	0.71	67.41	5.1 (4.9-5.2)	0.0 (0.0-0.1)
		Sphyrna zygaena	28	73-160	2.9 (1.9- 4.0)	0.74	-67.80	4.3 (4.2-4.4)	0.0 (0.0-0.1)
	Rays	*Aetomylaeus bovinus*	24	40-135	5.8 (3.6- 8.4)	0.89	-39.37	3.6 (3.4-3.7)	0.1 (0.1-0.2)
		Dasyatis marmorata	20	26-86	8.6 (5.0-12.5)	0.44	-60.05	3.8 (3.6-4.0)	0.1 (0.0-0.2)
		Dasyatis sp.	27	38-139	8.9 (5.7-12.7)	0.93	-65.88	3.5 (3.3-3.7)	0.3 (0.2-0.4)
		Fontitrygon margarita	24	22-39	6.3 (3.9- 9.3)	0.86	-34.92	3.5 (2.9-4.0)	0.2 (0.0-0.4)
		Fontitrygon margaritella	5	25-31	2.4 (1.7-12.6)	0.99	-50.75	3.4 (3.3-3.5)	0.2 (0.1-0.3)
		Glaucostegus cemiculus	47	18-60	8.6 (6.3-11.3)	0.91	-55.55	3.7 (3.6-3.9)	0.3 (0.2-0.4)
		Gymnura altavela	21	48-157	5.1 (3.1- 7.5)	0.90	-46.12	4.3 (4.2-4.5)	0.1 (0.0-0.2)
		Rhinobatos irvinei	15	20-35	3.9 (2.1- 6.1)	0.81	-50.94	3.6 (3.4-3.8)	0.3 (0.2-0.3)
		Rhinobatos rhinobatos	11	19-46	5.9 (3.2-11.8)	0.97	-37.57	3.8 (3.6-4.1)	0.2 (0.1-0.4)
		Rhinoptera marginata	16	60-83	3.0 (1.7- 4.7)	0.91	-64.95	4.0 (3.8-4.1)	0.0 (0.0-0.1)
	Waders	*Calidris canutus*	181		10.1 (8.6-11.5)	0.89	4.84	3.0 (2.9-3.1)	0.0 (0.0-0.1)
		Calidris ferruginea	8		17.7 (6.5-36.8)	0.99	10.45	3.0 (2.5-3.4)	0.3 (0.0-0.8)
		Charadrius hiaticula	9		6.1 (3.6-15.0)	0.98	30.82	3.2 (2.8-3.6)	0.4 (0.1-0.7)
		Haematopus ostralegus	6		1.6 (0.5- 3.2)	0.96	-14.88	3.5 (3.3-3.7)	0.1 (0.0-0.2)
		Limosa lapponica	25		32.4 (19.3-45.5)	0.70	37.90	3.4 (3.1-3.8)	0.1 (0.0-0.3)
		Numenius phaeopus	19		3.2 (1.8- 4.7)	0.91	3.63	3.6 (3.4-3.7)	0.2 (0.1-0.3)
		Pluvialis squatarola	22		21.9 (13.1-31.4)	0.81	22.89	3.2 (2.9-3.5)	0.4 (0.1-0.6)
Bijagós Archipelago	Sharks	*Carcharhinus leucas*	6	83-122	2.1 (1.0- 6.4)	0.98	-43.07	3.9 (3.6-4.3)	0.7 (0.4-0.9)
		Carcharhinus limbatus	24	62-149	1.4 (0.8- 1.9)	0.66	3.17	4.5 (4.2-4.8)	0.5 (0.3-0.7)
		Ginglymostoma cirratum	5	123-190	2.2 (0.6- 4.1)	0.90	9.29	4.6 (4.3-4.9)	0.6 (0.3-0.8)
		Rhizoprionodon acutus	35	40-106	1.2 (0.8- 1.6)	0.75	-75.35	4.3 (4.0-4.7)	0.4 (0.2-0.6)
		Sphyrna lewini	40	44-198	2.3 (1.6- 3.1)	0.93	74.58	4.5 (4.2-4.8)	0.5 (0.3-0.7)
	Rays	*Fontitrygon margarita*	58	12-84	5.2 (3.9- 6.6)	0.84	-42.88	3.5 (3.2-3.8)	0.7 (0.4-1.0)
		Fontitrygon margaritella	161	12-43	7.6 (6.5- 8.8)	0.60	-1.54	3.7 (3.3-3.9)	0.8 (0.5-1.0)
		Fontitrygon ukpam	5	39-58	1.3 (1.9-16.1)	1.00	25.72	2.9 (2.4-3.4)	0.3 (0.1-0.7)
		Glaucostegus cemiculus	141	11-88	6.2 (5.1- 7.2)	0.63	-20.99	3.9 (3.7-4.1)	0.8 (0.5-0.9)
		Gymnura sereti	23	29-74	7.2 (4.4-10.2)	0.85	13.03	3.9 (3.7-4.2)	0.7 (0.4-0.9)
		Hypanus rudis	9	55-88	10.5 (3.9-18.4)	0.90	16.90	3.7 (3.4-4.1)	0.7 (0.4-0.9)
		Rhinoptera marginata	25	32-82	4.4 (2.8- 6.3)	0.70	-19.09	3.5 (3.2-3.7)	0.7 (0.4-0.9)
	Waders	*Actitis hypoleucos*	10		4.2 (1.9- 7.3)	0.97	12.80	3.2 (2.8-3.6)	0.5 (0.1-0.8)
		Arenaria interpres	10		1.5 (0.8- 3.0)	0.96	-28.15	3.8 (3.5-4.2)	0.3 (0.0-0.5)
		Calidris alba	9		2.2 (0.9- 3.9)	0.94	-14.16	3.4 (3.1-3.6)	0.9 (0.5-1.0)
		Calidris canutus	10		1.4 (0.7- 2.3)	0.94	-4.50	3.0 (2.7-3.4)	0.3 (0.1-0.6)
		Calidris ferruginea	10		4.1 (1.8- 7.0)	0.85	-65.20	3.4 (3.1-3.8)	0.9 (0.4-1.0)
		Charadrius hiaticula	10		1.8 (0.8- 3.0)	0.63	33.85	3.4 (3.2-3.6)	0.8 (0.4-0.9)
		Limosa lapponica	6		4.5 (1.5- 9.2)	0.90	-31.53	3.4 (3.0-3.8)	0.7 (0.2-1.0)
		Numenius phaeopus	6		22.4 (7.4-47.4)	0.94	24.84	2.3 (2.0-2.9)	0.4 (0.0-0.9)
		Pluvialis squatarola	10		1.6 (0.9- 3.6)	0.97	-49.14	3.3 (3.0-3.6)	0.9 (0.5-1.0)
		Tringa nebularia	8		4.1 (1.5- 7.3)	0.89	6.88	3.8 (3.4-4.2)	0.3 (0.0-0.6)
		Tringa totanus	10		3.6 (1.6- 6.1)	0.91	18.17	3.3 (3.0-3.7)	0.7 (0.2-0.9)

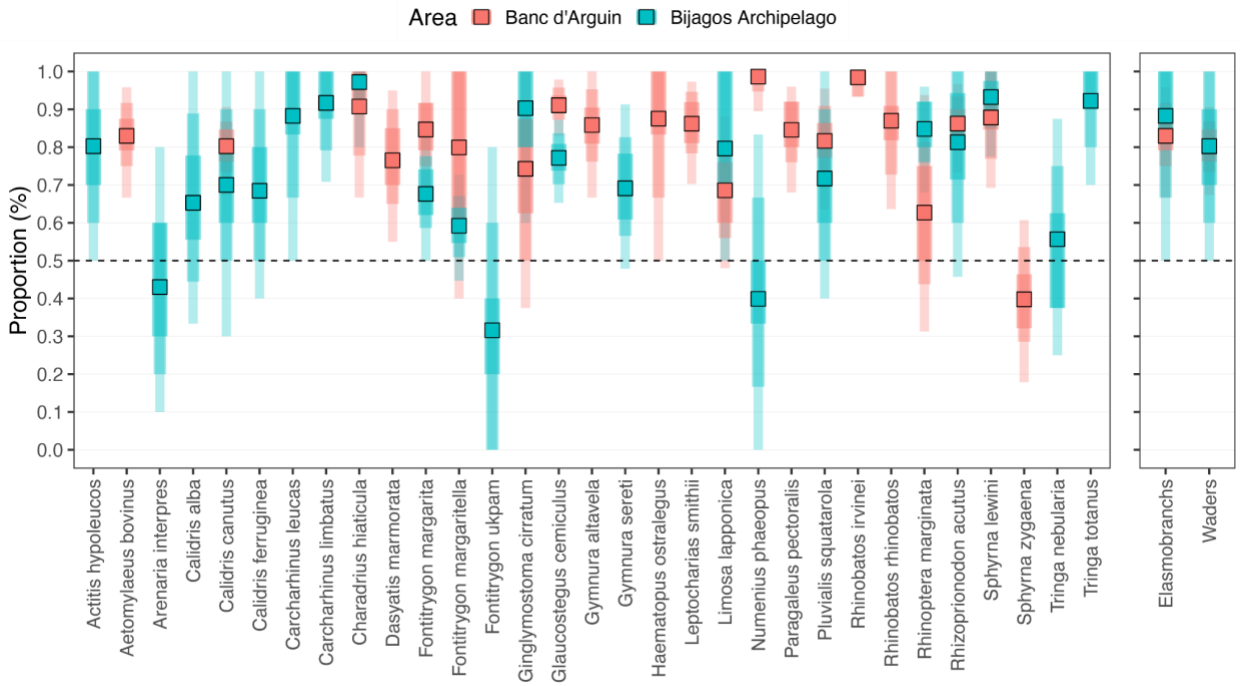
Appendix 8.5 - Mixing model details

Gelman-Rubin diagnostics for convergence for all mesopredator mixing models. We ran each model with chain lengths of 100,000, 300,000, 1,000,000, and 3,000,000 iterations and determined the proportion of variables with a Gelman-Rubin (GR) diagnostic of >1.1 (Phillips *et al.* 2014). A value of 0.00 means total convergence of the mixing model as all variables are GR <1.1. We used the model with a chain length of 3,000,000 iterations as all species models converged for both areas. Gray cells indicate the prey species of which species groups were included in the model for each mesopredator.

		Markov Chain length (x100.000)				Polychaetes	Bivalves	Gastropods	Crustaceans	Demersal teleosts	Benthopelagic teleosts	Cephalopods	Stingrays	Benthopelagic rays	Guitarfish	Sharks
Area	**Species**	**1**	**3**	**10**	**30**											
Banc d'Arguin	*Aetomylaeus bovinus*	2.08	4.17	0.00	0.00											
	Calidris canutus	6.93	1.98	0.00	0.00											
	Charadrius hiaticula	0.00	0.00	0.00	0.00											
	Dasyatis marmorata	0.00	0.00	0.00	0.00											
	Fontitrygon margarita	6.38	2.13	0.00	0.00											
	Fontitrygon margaritella	0.00	0.00	0.00	0.00											
	Ginglymostoma cirratum	2.22	2.22	0.00	0.00											
	Glaucostegus cemiculus	5.48	1.37	0.00	0.00											
	Gymnura altavela	4.17	0.00	0.00	0.00											
	Haematopus ostralegus	0.00	0.00	0.00	0.00											
	Leptocharias smithii	24.69	18.52	2.47	0.00											
	Limosa lapponica	0.00	0.00	0.00	0.00											
	Numenius phaeopus	7.50	2.50	0.00	0.00											
	Paragaleus pectoralis	14.49	2.90	1.45	0.00											
	Pluvialis squatarola	0.00	0.00	0.00	0.00											
	Rhinobatos irvinei	4.88	0.00	0.00	0.00											
	Rhinobatos rhinobatos	0.00	0.00	0.00	0.00											
	Rhinoptera marginata	10.00	5.00	2.50	0.00											
	Rhizoprionodon acutus	12.68	4.23	1.41	0.00											
	Sphyrna lewini	20.00	14.55	0.00	0.00											
	Sphyrna zygaena	30.00	31.43	7.14	0.00											
Bijagos Archipelago	*Actitis hypoleucos*	0.00	0.00	0.00	0.00											
	Arenaria interpres	9.38	3.12	0.00	0.00											
	Calidris alba	0.00	0.00	0.00	0.00											
	Calidris canutus	0.00	6.25	0.00	0.00											
	Calidris ferruginea	0.00	0.00	0.00	0.00											
	Carcharhinus leucas	2.50	2.50	0.00	0.00											
	Carcharhinus limbatus	14.04	3.51	0.00	0.00											
	Charadrius hiaticula	0.00	0.00	0.00	0.00											
	Fontitrygon margarita	2.53	2.53	0.00	0.00											
	Fontitrygon margaritella	3.30	2.75	0.00	0.00											
	Fontitrygon ukpam	0.00	0.00	0.00	0.00											
	Ginglymostoma cirratum	8.33	2.78	0.00	0.00											
	Glaucostegus cemiculus	3.64	1.21	0.00	0.00											
	Gymnura sereti	0.00	0.00	0.00	0.00											
	Limosa lapponica	0.00	0.00	0.00	0.00											
	Numenius phaeopus	0.00	0.00	0.00	0.00											
	Pluvialis squatarola	0.00	0.00	0.00	0.00											
	Rhinoptera marginata	0.00	0.00	0.00	0.00											
	Rhizoprionodon acutus	19.12	23.53	1.47	0.00											
	Sphyrna lewini	12.16	5.41	0.00	0.00											
	Tringa nebularia	0.00	0.00	0.00	0.00											
	Tringa totanus	0.00	0.00	0.00	0.00											

Appendix 8.6 - Coverage of predator isotopic space by potential prey

To determine if the food web in each study area was sufficiently sampled for each predator species (i.e., if the sampled prey species covered the TDF-corrected niche space of the predator; Stock *et al.* 2018), we determined the coverage of predator isotopic tracer values by the isotopic space of selected prey. For this, we used 1,000 Monte Carlo iterations of the convex hull between the means of predator isotopic values and determined the coverage of resampled predator isotopic values for each iteration. We then determined if most predator tracer values (>50%) were covered by the isotopic space of prey species as input to the mixing model. This indicated that the means of *Arenaria interpres*, *Fontitrygon ukpam*, *Numenius phaeopus* in the Bijagós Archipelago and *Sphyrna zygaena* in the Banc d'Arguin were below 50%. As their 95% credible intervals were not different from 50% (i.e., included 50% coverage), we still included these species in the mixing model results but indicated their uncertainty with an asterisk (*) in Figure 8.4.



Appendix 8.7 - Trophic Discrimination Factors

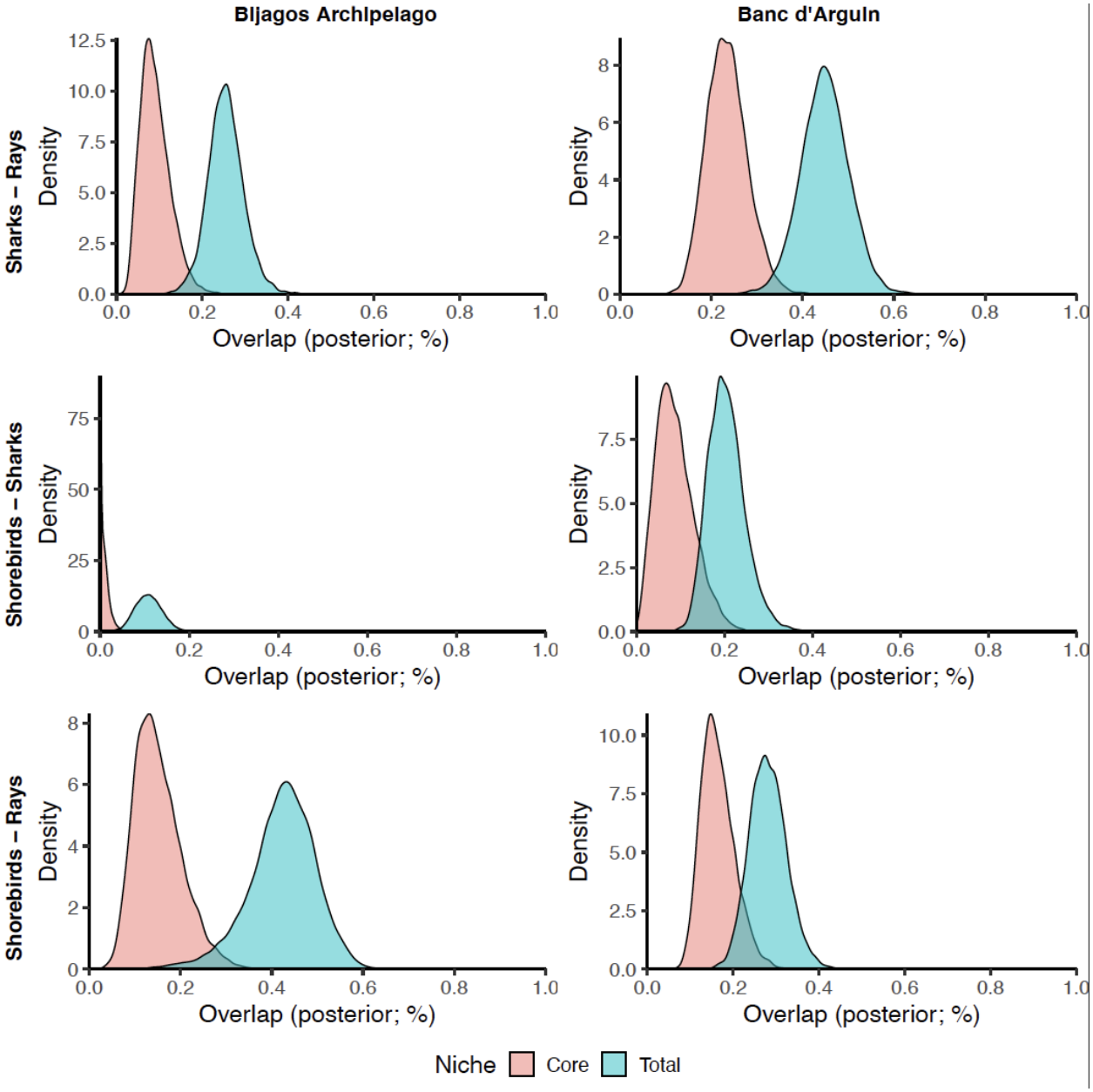
For sharks and rays, three primary studies describing different Trophic Discrimination Factors (TDFs) are often cited in studies utilizing stable isotope analysis. Kim *et al.* (2011), Caut *et al.* (2009, and Hussey *et al.* (2010) describe TDFs for ^{13}C and ^{15}N in muscle tissue based on (semi-)controlled feeding studies. The former two studies are based on relatively small shark species, whereas the latter is based on two larger shark species. Hence, the former two are often used in stable isotope analysis studies to study small-bodied sharks, early life stages, and rays (see table). For this reason, we used these TDFs to determine the trophic position (Appendix 8.9) of sharks and rays in this study and also used these TDFs for the isotopic mixing models (Appendix 8.11). We do, however, show the influence of other TDFs and combinations of TDFs on the posterior estimates of trophic position (Supplementary Information 7). For shorebirds, TDFs of a controlled feeding study of red knots (*Calidris canutus*) were available. As this is one of the focal species of this study, we used the TDFs described by Oortwijn *et al.* 2023.

Species	**Reference**	**$\Delta^{13}C$ (SD; ‰)**	**$\Delta^{15}N$ (SD; ‰)**	**Used for (example references):**	**This study (Y/N)**
Triakis semifasciata	Kim *et al.* 2011	1.7 (0.5)	3.7 (0.4)	Sharks (multi-species)[1,3] Small/juvenile sharks[2,3] Stingrays[3,4]	Y
Scyliorhinus canicula	Caut *et al.* 2009	0.8 (0.1)	2.8 (0.1)	Sharks (multi-species)[1] Small/juvenile sharks[5]	Y
Carcharias taurus *Negaprion brevirostris*	Hussey *et al.* 2010	0.9 (0.3)	2.3 (0.2)	Sharks (multi-species)[1] Large-bodied/adult sharks[6,7]	N
Calidris canutus	Oortwijn *et al.* 2023	2.9 (0.1)	3.3 (0.3)	Shorebirds	Y

[1.] Bird, C. S., *et al.* (2018). *Nature Ecology & Evolution*. https://doi.org/10.1038/s41559-017-0432-z
[2.] Carlisle, A. B., *et al.* (2021). *Scientific Reports*. https://doi.org/10.1038/s41598-021-89903-z
[3.] Tilley, A., *et al.* (2013). *PLoS ONE*. https://doi.org/10.1371/journal.pone.0079560
[4.] Martins, A. P. B., *et al.* (2022). *Marine and Freshwater Research*. https://doi.org/10.1071/mf21292
[5.] Caut, S., *et al.* (2013). *Marine Ecology Progress Series*. https://doi.org/10.3354/meps10478
[6.] Raoult, V., *et al.* (2019). *Journal of Fish Biology*. https://doi.org/10.1111/jfb.14160
[7.] Hussey, N., *et al.* (2012). *Global Perspectives on the Biology and Life History of the White Shark*. https://doi.org/10.1201/b11532-5

Appendix 8.8 - Species group niche space overlap

The posterior distributions for group overlap (Figures 8.2C and 8.3C) are based on mean species-pair niche overlap. Generally, overlap in the core niche (red: 40% of individuals of each species) is highest between shorebirds and rays. However, the overlap of total niche space (blue: 95% of individuals of each species) is higher between sharks and rays in the Banc d'Arguin.

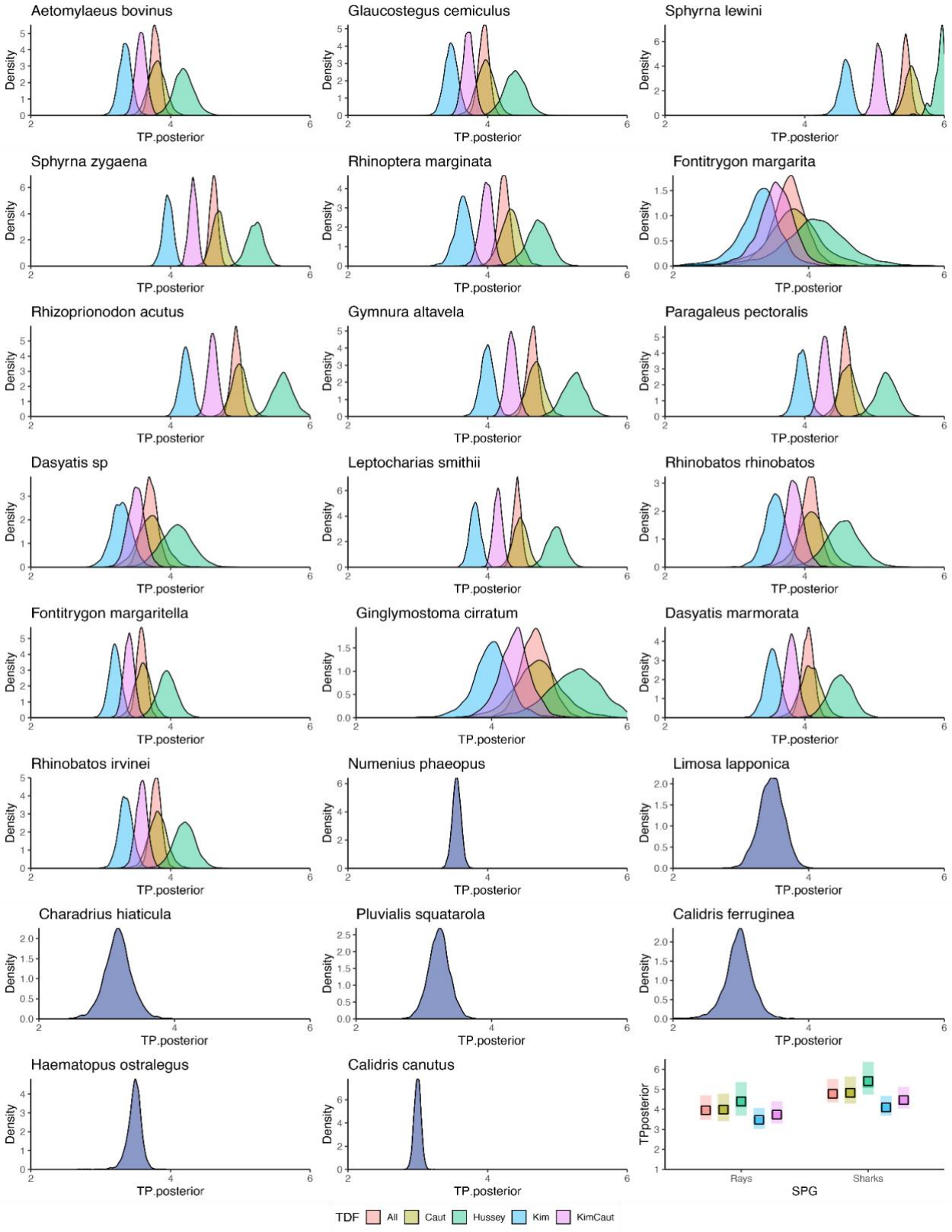


Appendix 8.9 - Trophic position and alpha estimates

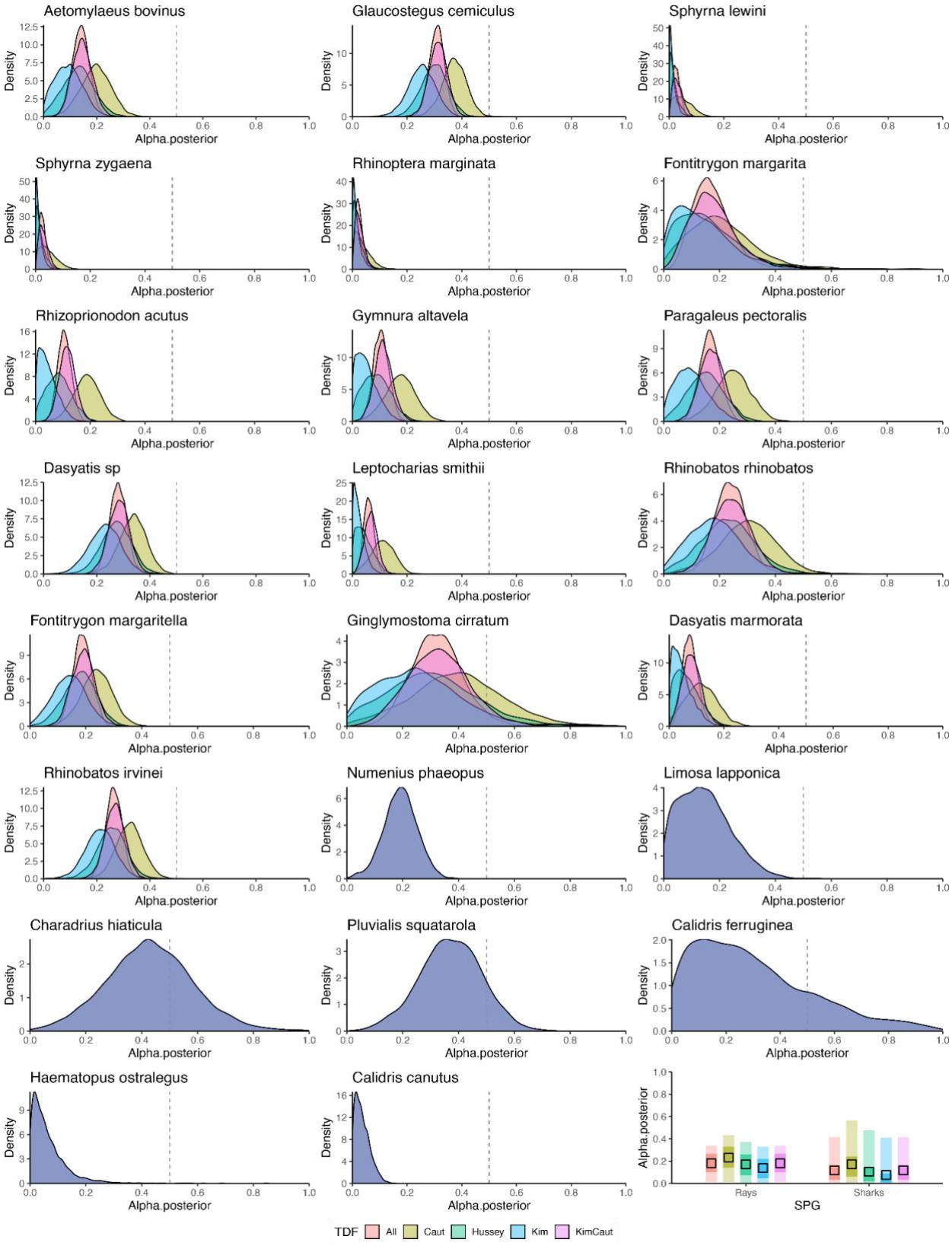
The estimates for trophic position (TP) and alpha (α) based on the trophic discrimination factors (TDFs) of Kim et al. (2011) and Caut *et al.* (2009) are provided. We compared the posterior distributions of the trophic position and α based on different (combinations of) TDFs (Appendix 8.7) for each species group and in each study area. For sharks and rays, these are TDFs described by Kim *et al.* (2011), Caut *et al.* (2009), and Hussey *et al.* (2010), and a combination of TDFs described for small-bodied species (Kim et al. 2011 and Caut *et al.* 2009; used in this study) and all TDFs. For shorebirds, TDFs of a controlled feeding study of red knots (*Calidris canutus*) were available. As this is one of the focal species of this study, we used the TDFs described by Oortwijn *et al.* 2023.

The posterior estimates of trophic niches for sharks and rays differed slightly with different TDFs used, with the TDFs based on larger-bodied sharks (described by Hussey *et al.* 2010) resulting in higher trophic position estimates compared to the TDF-combination used in this study (TDFs described by Kim *et al.* 2010 and Caut *et al.* 2009; Appendix 8.7). The posterior alpha (α) estimates differed less across different TDFs, with no influence on the analysis outcomes.

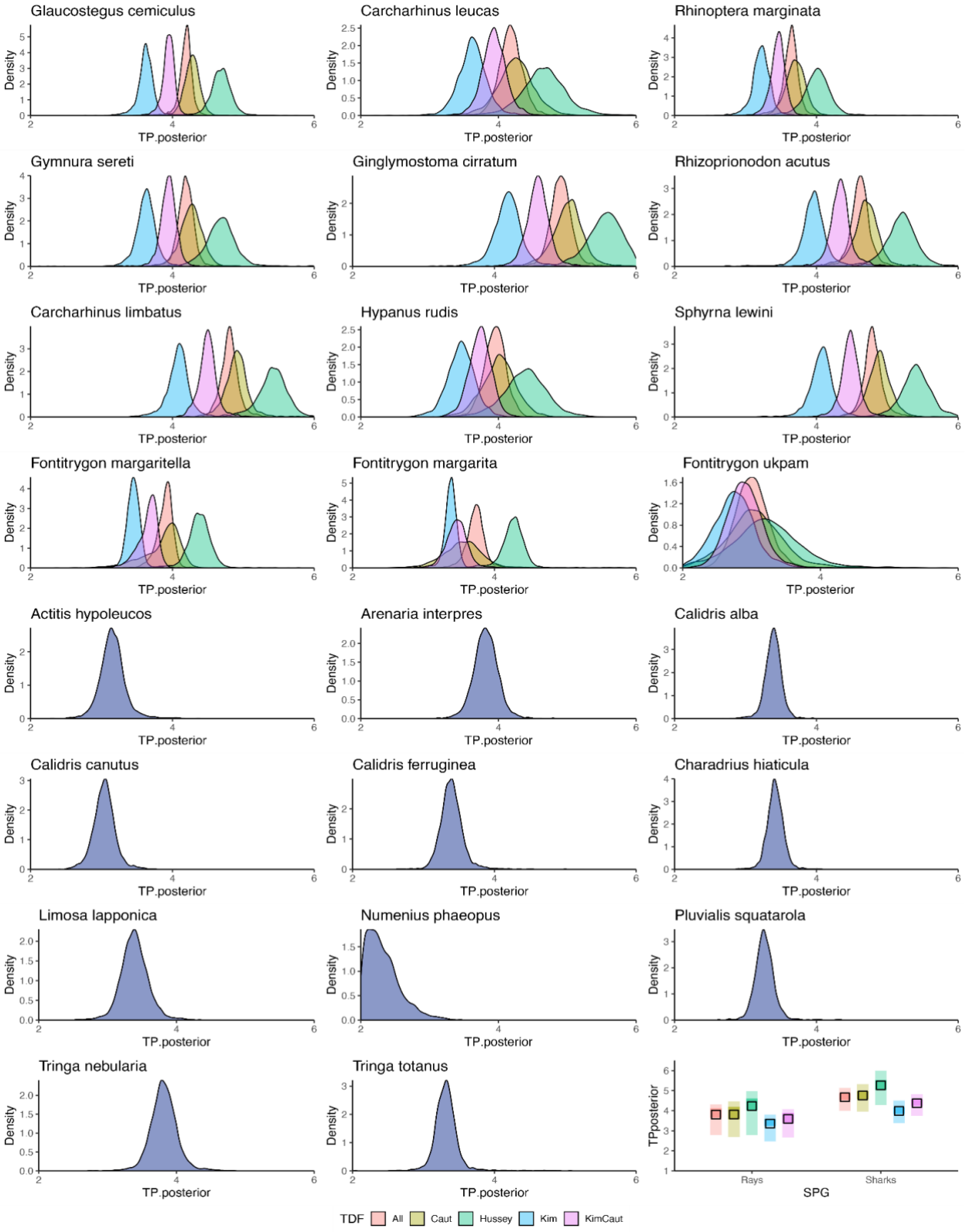
Banc d'Arguin: *posterior distribution of trophic position estimates*



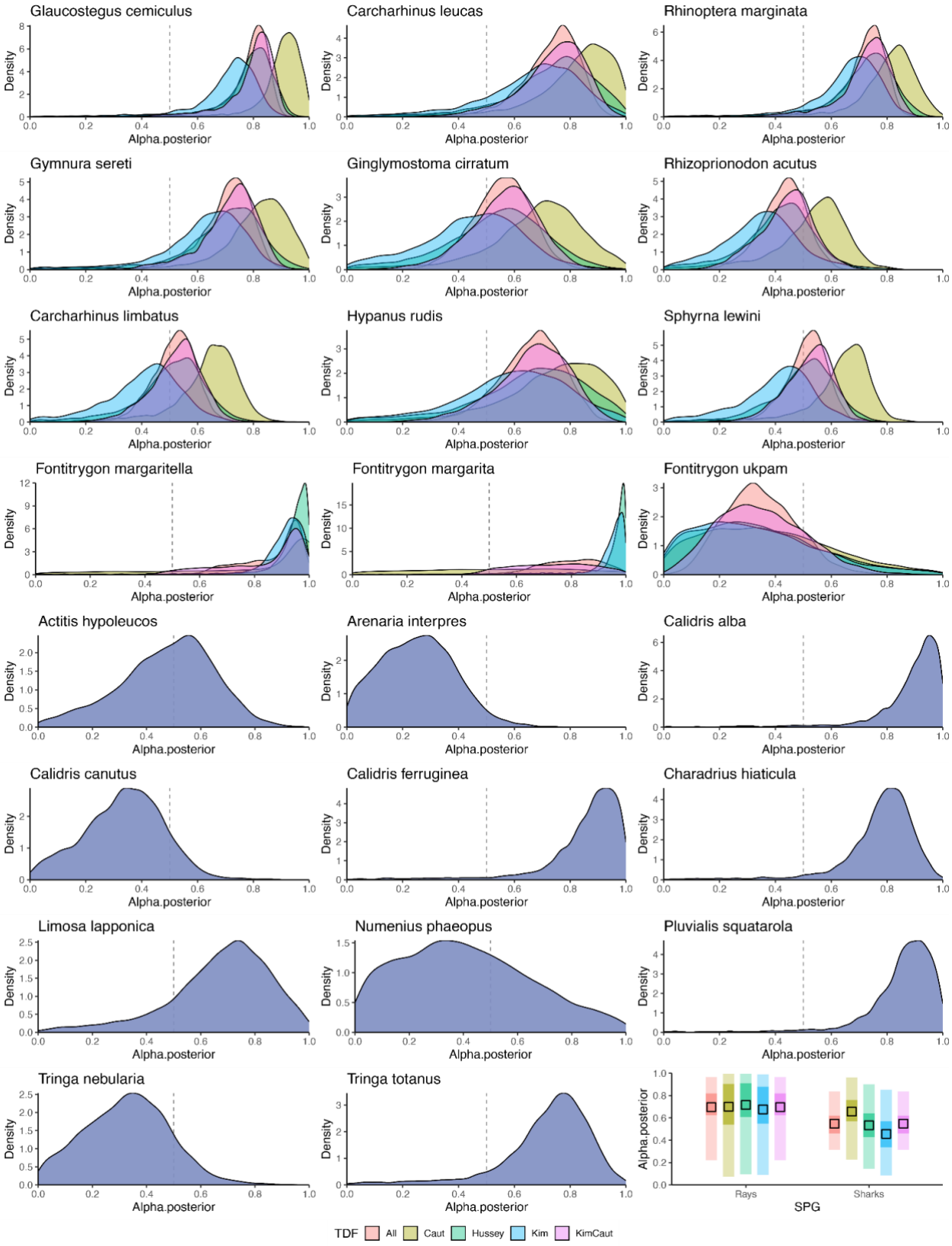
Banc d'Arguin: *posterior distribution of alpha (α) estimates*



Bijagós Archipelago: *posterior distribution of trophic position estimates*



Bijagós Archipelago: *posterior distribution of alpha (α) estimates*



Appendix 8.10 - Species niche space overlap with species group

The overlap between a species of shorebird, shark and ray and other species groups was calculated to determine which other species groups occupied most of the niche space of the species. Here, we show the posterior distribution (mean and 95% credible intervals; black dot and red bar, respectively) of this overlap for each species in the two study areas. We show the proportion of the total (i.e., 95% of niche space) and core (i.e., 40% of niche space) niche space of that species that overlapped with other species of shorebird, shark or ray.

Banc d'Arguin

	Total (95%)			Core (40%)		
Species	**Sharks**	**Rays**	**Shorebirds**	**Sharks**	**Rays**	**Shorebirds**
Aetomylaeus bovinus	0.6 (0.4-0.8)	1.0 (0.9-1.0)	0.9 (0.6-1.0)	0.0 (0.0-0.2)	1.0 (0.8-1.0)	0.4 (0.0-0.8)
Calidris canutus	0.5 (0.4-0.6)	0.7 (0.6-0.8)	1.0 (0.9-1.0)	0.1 (0.0-0.2)	0.6 (0.5-0.8)	0.7 (0.2-1.0)
Calidris ferruginea	0.3 (0.0-0.4)	0.3 (0.1-0.6)	0.7 (0.3-1.0)	0.1 (0.0-0.3)	0.2 (0.0-0.5)	0.6 (0.0-1.0)
Charadrius hiaticula	0.3 (0.1-0.5)	0.4 (0.2-0.7)	1.0 (0.8-1.0)	0.0 (0.0-0.3)	0.0 (0.0-0.1)	0.9 (0.4-1.0)
Dasyatis marmorata	0.6 (0.5-0.8)	0.9 (0.7-1.0)	0.8 (0.5-1.0)	0.3 (0.0-0.6)	0.9 (0.6-1.0)	0.2 (0.0-0.6)
Dasyatis sp.	0.6 (0.4-0.8)	0.9 (0.7-1.0)	0.9 (0.7-1.0)	0.1 (0.0-0.4)	0.9 (0.6-1.0)	0.6 (0.4-0.9)
Fontitrygon margarita	0.5 (0.3-0.7)	0.9 (0.8-1.0)	0.9 (0.7-1.0)	0.0 (0.0-0.1)	0.8 (0.5-1.0)	0.5 (0.1-0.9)
Fontitrygon margaritella	0.5 (0.0-1.0)	1.0 (0.7-1.0)	0.8 (0.5-1.0)	0.0 (0.0-0.0)	0.9 (0.5-1.0)	0.3 (0.0-0.9)
Ginglymostoma cirratum	0.6 (0.3-0.9)	0.6 (0.3-0.9)	0.8 (0.5-1.0)	0.4 (0.0-0.9)	0.2 (0.0-0.6)	0.5 (0.1-0.9)
Glaucostegus cemiculus	0.8 (0.6-0.9)	0.9 (0.8-1.0)	0.9 (0.7-1.0)	0.4 (0.1-0.7)	0.8 (0.6-1.0)	0.7 (0.4-1.0)
Gymnura altavela	1.0 (0.9-1.0)	0.9 (0.7-1.0)	0.8 (0.6-1.0)	0.9 (0.7-1.0)	0.4 (0.1-0.8)	0.2 (0.0-0.6)
Haematopus ostralegus	1.0 (0.7-1.0)	1.0 (0.9-1.0)	1.0 (1.0-1.0)	0.4 (0.0-0.9)	0.8 (0.1-1.0)	1.0 (0.7-1.0)
Leptocharias smithii	0.9 (0.8-1.0)	1.0 (0.9-1.0)	0.8 (0.6-1.0)	0.7 (0.3-1.0)	0.9 (0.6-1.0)	0.1 (0.0-0.5)
Limosa lapponica	0.3 (0.2-0.4)	0.4 (0.3-0.5)	0.8 (0.5-0.9)	0.1 (0.0-0.3)	0.3 (0.1-0.4)	0.7 (0.5-0.9)
Numenius phaeopus	0.6 (0.3-1.0)	0.6 (0.5-0.8)	1.0 (1.0-1.0)	0.2 (0.0-0.8)	0.0 (0.0-0.2)	1.0 (1.0-1.0)
Paragaleus pectoralis	0.9 (0.7-1.0)	0.8 (0.7-1.0)	0.8 (0.6-1.0)	0.7 (0.4-0.9)	0.7 (0.4-1.0)	0.3 (0.0-0.7)
Pluvialis squatarola	0.3 (0.1-0.4)	0.3 (0.2-0.5)	0.9 (0.7-1.0)	0.1 (0.0-0.3)	0.1 (0.0-0.2)	0.7 (0.3-1.0)
Rhinobatos irvinei	0.7 (0.5-1.0)	1.0 (1.0-1.0)	1.0 (0.8-1.0)	0.1 (0.0-0.4)	1.0 (0.9-1.0)	0.7 (0.3-1.0)
Rhinobatos rhinobatos	0.8 (0.6-1.0)	0.9 (0.7-1.0)	0.9 (0.6-1.0)	0.5 (0.2-0.8)	0.9 (0.7-1.0)	0.6 (0.1-1.0)
Rhinoptera marginata	0.8 (0.6-1.0)	1.0 (0.9-1.0)	0.7 (0.4-1.0)	0.3 (0.0-0.7)	0.7 (0.3-1.0)	0.0 (0.0-0.4)
Rhizoprionodon acutus	0.9 (0.8-1.0)	0.8 (0.6-1.0)	0.8 (0.5-1.0)	0.8 (0.5-1.0)	0.3 (0.0-0.7)	0.1 (0.0-0.5)
Sphyrna lewini	0.9 (0.7-1.0)	0.6 (0.3-0.9)	0.6 (0.1-1.0)	0.4 (0.0-1.0)	0.0 (0.0-0.1)	0.0 (0.0-0.0)
Sphyrna zygaena	0.9 (0.8-1.0)	1.0 (1.0-1.0)	0.8 (0.4-1.0)	0.7 (0.3-1.0)	0.7 (0.4-1.0)	0.0 (0.0-0.4)

Bijagós Archipelago

	Total (95%)			Core (40%)		
Species	**Sharks**	**Rays**	**Shorebirds**	**Sharks**	**Rays**	**Shorebirds**
Actitis hypoleucos	0.2 (0.0-0.4)	0.9 (0.6-1.0)	0.8 (0.6-1.0)	0.0 (0.0-0.2)	0.8 (0.3-1.0)	0.3 (0.0-0.9)
Arenaria interpres	0.4 (0.2-0.6)	1.0 (0.9-1.0)	0.9 (0.6-1.0)	0.0 (0.0-0.2)	0.2 (0.0-0.9)	0.5 (0.0-1.0)
Calidris alba	0.0 (0.0-0.1)	0.5 (0.1-0.9)	0.9 (0.7-1.0)	0.0 (0.0-0.0)	0.0 (0.0-0.0)	0.7 (0.1-1.0)
Calidris canutus	0.3 (0.1-0.5)	1.0 (1.0-1.0)	0.9 (0.4-1.0)	0.0 (0.0-0.1)	1.0 (0.7-1.0)	0.3 (0.0-1.0)
Calidris ferruginea	0.1 (0.0-0.3)	0.6 (0.4-0.7)	0.8 (0.6-1.0)	0.0 (0.0-0.0)	0.0 (0.0-0.2)	0.7 (0.4-1.0)
Carcharhinus leucas	0.4 (0.2-0.7)	1.0 (0.7-1.0)	0.8 (0.5-1.0)	0.0 (0.0-0.3)	0.9 (0.6-1.0)	0.2 (0.0-0.7)
Carcharhinus limbatus	0.9 (0.8-1.0)	1.0 (0.9-1.0)	0.6 (0.1-1.0)	0.8 (0.6-1.0)	0.2 (0.0-0.9)	0.0 (0.0-0.0)
Charadrius hiaticula	0.1 (0.0-0.3)	0.8 (0.6-1.0)	1.0 (0.9-1.0)	0.0 (0.0-0.0)	0.0 (0.0-0.1)	0.9 (0.6-1.0)
Fontitrygon margarita	0.3 (0.2-0.5)	1.0 (0.9-1.0)	0.9 (0.7-1.0)	0.2 (0.0-0.4)	1.0 (0.9-1.0)	0.5 (0.2-0.9)
Fontitrygon margaritella	0.2 (0.2-0.4)	0.9 (0.7-1.0)	0.9 (0.8-1.0)	0.1 (0.0-0.2)	0.7 (0.5-0.9)	0.6 (0.3-0.9)
Fontitrygon ukpam	0.1 (0.0-0.3)	0.4 (0.0-0.9)	0.6 (0.0-1.0)	0.0 (0.0-0.1)	0.1 (0.0-0.6)	0.1 (0.0-0.9)
Ginglymostoma cirratum	0.8 (0.4-1.0)	0.9 (0.7-1.0)	0.6 (0.0-1.0)	0.6 (0.1-1.0)	0.2 (0.0-0.7)	0.0 (0.0-0.2)
Glaucostegus cemiculus	0.5 (0.4-0.6)	1.0 (0.9-1.0)	0.9 (0.6-1.0)	0.2 (0.1-0.4)	0.9 (0.8-1.0)	0.2 (0.0-0.7)
Gymnura sereti	0.4 (0.3-0.6)	0.9 (0.8-1.0)	0.8 (0.5-1.0)	0.2 (0.1-0.4)	0.9 (0.6-1.0)	0.2 (0.0-0.6)
Hypanus rudis	0.3 (0.2-0.5)	0.8 (0.5-1.0)	0.8 (0.5-1.0)	0.1 (0.0-0.3)	0.7 (0.1-1.0)	0.2 (0.0-0.7)
Limosa lapponica	0.1 (0.0-0.4)	0.8 (0.5-1.0)	0.9 (0.7-1.0)	0.0 (0.0-0.0)	0.2 (0.0-0.8)	0.8 (0.4-1.0)
Numenius phaeopus	0.1 (0.0-0.2)	0.4 (0.1-0.7)	0.2 (0.0-0.4)	0.0 (0.0-0.0)	0.1 (0.0-0.4)	0.0 (0.0-0.3)
Pluvialis squatarola	0.1 (0.0-0.4)	0.7 (0.5-0.9)	1.0 (0.8-1.0)	0.0 (0.0-0.0)	0.0 (0.0-0.3)	0.8 (0.4-1.0)
Rhinoptera marginata	0.3 (0.2-0.4)	1.0 (0.9-1.0)	0.9 (0.6-1.0)	0.0 (0.0-0.1)	0.8 (0.4-1.0)	0.3 (0.0-0.9)
Rhizoprionodon acutus	1.0 (0.8-1.0)	0.9 (0.8-1.0)	0.5 (0.0-1.0)	0.7 (0.4-1.0)	0.2 (0.0-0.9)	0.0 (0.0-0.0)
Sphyrna lewini	0.6 (0.5-0.8)	0.9 (0.7-1.0)	0.6 (0.2-1.0)	0.7 (0.5-0.9)	0.2 (0.0-0.7)	0.0 (0.0-0.1)
Tringa nebularia	0.3 (0.0-0.6)	0.9 (0.6-1.0)	0.8 (0.6-1.0)	0.0 (0.0-0.1)	0.2 (0.0-0.9)	0.3 (0.0-0.8)
Tringa totanus	0.1 (0.0-0.3)	0.8 (0.5-1.0)	0.9 (0.6-1.0)	0.0 (0.0-0.0)	0.2 (0.0-0.7)	0.7 (0.3-1.0)

Appendix 8.11 - Mixing model outcomes

We used the mixing models with Markov chain lengths of 3,000,000 iterations as final models (Appendix 8.5) with the trophic discrimination factors (TDFs) described by Kim *et al.* 2010 and Caut *et al.* 2009 (combined) for sharks and rays, and the TDFs for feathers of shorebirds described by Oortwijn *et al.* 2023. Sources (prey) were grouped *a posteriori* (e.g., Phillips *et al.* 2014) into main prey species groups (Appendix 8.3). For each of the mesopredator species in both study areas, we determined the posterior distribution of the proportion that a source contributes to the diet of that predator. The mean of these posterior distributions was reported in Figures 8.4. The following tables show the mean (black dot) and the 95%, 75% and 50% credible intervals (increasing bar size), respectively. The gray bar represents the scale from 0 to 1 (100% contribution), and the text indicates the mean with a 95% credible interval of the posterior distribution.

Based on these model posterior distributions, we also determined the specialization index (ε) for each predator, as described by Newsome *et al.* (2012). The table in this supplementary information shows the mean and 95% credible interval of the posterior distribution of the specialization index for each mesopredator in each study area (these are also included in Figure 8.4).

Banc d'Arguin

Species	Polychaetes	Bivalves	Gastropods	Crustaceans	Demersal teleosts	Benthopelagic teleosts	Cephalopods	Stingrays	Benthopelagic rays	Guitarfish	Sharks
Aetomylaeus bovinus	0.1 (0.0-0.3)	0.5 (0.4-0.7)	0.1 (0.0-0.4)	0.1 (0.0-0.2)	0.2 (0.0-0.3)						
Dasyatis marmorata	0.1 (0.0-0.3)	0.5 (0.3-0.7)	0.0 (0.0-0.1)	0.0 (0.0-0.1)	0.3 (0.2-0.4)						
Fontitrygon margarita	0.1 (0.0-0.4)	0.6 (0.4-0.7)	0.1 (0.0-0.2)	0.1 (0.0-0.2)	0.2 (0.1-0.3)						
Fontitrygon margaritella	0.2 (0.0-0.5)	0.4 (0.1-0.7)	0.1 (0.0-0.3)	0.1 (0.0-0.4)	0.2 (0.0-0.4)						
Ginglymostoma cirratum	0.1 (0.0-0.3)	0.1 (0.0-0.2)	0.1 (0.0-0.3)	0.1 (0.0-0.3)	0.2 (0.0-0.4)	0.2 (0.0-0.5)	0.1 (0.0-0.3)	0.2 (0.0-0.5)			
Glaucostegus cemiculus	0.1 (0.0-0.3)	0.3 (0.1-0.4)	0.1 (0.0-0.2)	0.1 (0.0-0.3)	0.1 (0.0-0.3)			0.4 (0.0-0.6)			
Gymnura altavela	0.1 (0.0-0.2)	0.2 (0.0-0.3)	0.1 (0.0-0.3)	0.0 (0.0-0.1)	0.2 (0.0-0.5)			0.4 (0.0-0.7)			
Leptocharias smithii	0.0 (0.0-0.1)	0.3 (0.1-0.4)	0.0 (0.0-0.2)	0.0 (0.0-0.1)	0.1 (0.0-0.3)	0.1 (0.0-0.3)	0.2 (0.0-0.5)	0.2 (0.0-0.5)			
Rhinobatos irvinei	0.1 (0.0-0.4)	0.4 (0.2-0.5)	0.1 (0.0-0.2)	0.1 (0.0-0.2)	0.1 (0.0-0.3)			0.2 (0.0-0.4)			
Rhinobatos rhinobatos	0.1 (0.0-0.3)	0.3 (0.0-0.4)	0.1 (0.0-0.2)	0.1 (0.0-0.3)	0.2 (0.0-0.4)			0.3 (0.0-0.6)			
Rhinoptera marginata	0.0 (0.0-0.2)	0.5 (0.4-0.6)	0.0 (0.0-0.2)	0.0 (0.0-0.1)	0.4 (0.3-0.5)						
Paragaleus pectoralis	0.1 (0.0-0.2)	0.1 (0.0-0.3)	0.1 (0.0-0.3)	0.1 (0.0-0.2)	0.1 (0.0-0.3)	0.1 (0.0-0.4)	0.2 (0.0-0.4)	0.2 (0.0-0.5)			
Rhizoprionodon acutus				0.1 (0.0-0.1)	0.1 (0.0-0.2)	0.1 (0.0-0.4)	0.3 (0.1-0.4)	0.2 (0.0-0.5)	0.1 (0.0-0.4)	0.1 (0.0-0.3)	0.1 (0.0-0.3)
Sphyrna lewini				0.0 (0.0-0.1)	0.2 (0.0-0.5)	0.1 (0.0-0.4)	0.3 (0.1-0.5)	0.1 (0.0-0.3)	0.1 (0.0-0.5)	0.1 (0.0-0.2)	0.1 (0.0-0.3)
Sphyrna zygaena				0.0 (0.0-0.1)	0.0 (0.0-0.1)	0.1 (0.0-0.3)	0.7 (0.2-0.9)	0.1 (0.0-0.2)	0.0 (0.0-0.1)	0.0 (0.0-0.1)	0.0 (0.0-0.1)
Calidris canutus	0.1 (0.0-0.3)	0.6 (0.4-0.9)	0.0 (0.0-0.1)	0.0 (0.0-0.1)	0.2 (0.0-0.4)						
Charadrius hiaticula	0.2 (0.0-0.7)	0.3 (0.0-0.6)	0.2 (0.0-0.5)	0.1 (0.0-0.4)	0.1 (0.0-0.3)						
Limosa lapponica	0.2 (0.0-0.6)	0.4 (0.1-0.7)	0.1 (0.0-0.2)	0.1 (0.0-0.3)	0.2 (0.0-0.5)						
Numenius phaeopus	0.2 (0.0-0.5)	0.3 (0.1-0.5)	0.1 (0.0-0.2)	0.1 (0.0-0.3)	0.3 (0.1-0.5)						
Pluvialis squatarola	0.3 (0.0-0.7)	0.3 (0.0-0.6)	0.2 (0.0-0.4)	0.1 (0.0-0.4)	0.1 (0.0-0.4)						
Haematopus ostralegus	0.1 (0.0-0.5)	0.4 (0.1-0.7)	0.1 (0.0-0.2)	0.1 (0.0-0.3)	0.3 (0.1-0.5)						

Bijagós Archipelago

Species	Polychaetes	Bivalves	Gastropods	Crustaceans	Demersal teleosts	Benthopelagic teleosts	Cephalopods	Stingrays	Benthopelagic rays	Guitarfish	Sharks
Carcharhinus leucas				0.2 (0.0-0.5)	0.1 (0.0-0.4)	0.1 (0.0-0.3)	0.2 (0.0-0.5)	0.1 (0.0-0.3)	0.1 (0.0-0.3)	0.1 (0.0-0.3)	0.1 (0.0-0.2)
Carcharhinus limbatus				0.1 (0.0-0.2)	0.1 (0.0-0.2)	0.2 (0.0-0.5)	0.2 (0.0-0.4)	0.1 (0.0-0.2)	0.1 (0.0-0.3)	0.1 (0.0-0.2)	0.2 (0.0-0.4)
Fontitrygon margarita	0.1 (0.0-0.4)	0.2 (0.0-0.5)	0.1 (0.0-0.5)	0.1 (0.0-0.3)	0.4 (0.2-0.7)						
Fontitrygon margaritella	0.1 (0.0-0.4)	0.2 (0.0-0.4)	0.1 (0.0-0.4)	0.2 (0.0-0.5)	0.4 (0.1-0.6)						
Fontitrygon ukpam	0.2 (0.0-0.5)	0.2 (0.0-0.6)	0.2 (0.0-0.6)	0.3 (0.0-0.7)	0.1 (0.0-0.4)						
Ginglymostoma cirratum			0.1 (0.0-0.2)	0.1 (0.0-0.2)	0.2 (0.0-0.5)	0.4 (0.1-0.7)	0.1 (0.0-0.4)	0.2 (0.0-0.5)			
Glaucostegus cemiculus	0.2 (0.0-0.4)	0.2 (0.0-0.4)	0.1 (0.0-0.3)	0.1 (0.0-0.3)	0.2 (0.0-0.5)			0.2 (0.0-0.4)			
Gymnura sereti	0.2 (0.0-0.5)	0.2 (0.0-0.4)	0.1 (0.0-0.3)	0.2 (0.0-0.4)	0.3 (0.0-0.5)			0.2 (0.0-0.4)			
Rhinoptera marginata	0.2 (0.0-0.5)	0.4 (0.0-0.7)	0.1 (0.0-0.4)	0.2 (0.0-0.5)	0.1 (0.0-0.4)						
Rhizoprionodon acutus				0.1 (0.0-0.3)	0.1 (0.0-0.2)	0.3 (0.1-0.6)	0.2 (0.0-0.4)	0.1 (0.0-0.3)	0.1 (0.0-0.3)	0.1 (0.0-0.2)	0.1 (0.0-0.3)
Sphyrna lewini				0.1 (0.0-0.3)	0.1 (0.0-0.2)	0.2 (0.0-0.5)	0.2 (0.0-0.4)	0.1 (0.0-0.3)	0.1 (0.0-0.2)	0.1 (0.0-0.2)	0.2 (0.0-0.4)
Actitis hypoleucos	0.2 (0.0-0.6)	0.3 (0.0-0.6)	0.1 (0.0-0.4)	0.2 (0.0-0.6)	0.2 (0.0-0.5)						
Arenaria interpres	0.1 (0.0-0.4)	0.1 (0.0-0.4)	0.1 (0.0-0.3)	0.2 (0.0-0.5)	0.5 (0.1-0.7)						
Calidris alba	0.2 (0.0-0.5)	0.3 (0.0-0.6)	0.2 (0.0-0.5)	0.2 (0.0-0.6)	0.2 (0.0-0.5)						
Calidris canutus	0.1 (0.0-0.4)	0.3 (0.1-0.6)	0.1 (0.0-0.3)	0.4 (0.0-0.7)	0.2 (0.0-0.5)						
Calidris ferruginea	0.2 (0.0-0.5)	0.2 (0.0-0.6)	0.2 (0.0-0.5)	0.2 (0.0-0.5)	0.2 (0.0-0.6)						
Charadrius hiaticula	0.2 (0.0-0.6)	0.2 (0.0-0.5)	0.1 (0.0-0.4)	0.2 (0.0-0.5)	0.2 (0.0-0.5)						
Limosa lapponica	0.2 (0.0-0.6)	0.2 (0.0-0.6)	0.1 (0.0-0.4)	0.2 (0.0-0.5)	0.2 (0.0-0.5)						
Numenius phaeopus	0.1 (0.0-0.4)	0.4 (0.1-0.6)	0.2 (0.0-0.5)	0.2 (0.0-0.6)	0.1 (0.0-0.3)						
Pluvialis squatarola	0.2 (0.0-0.4)	0.4 (0.0-0.7)	0.2 (0.0-0.5)	0.2 (0.0-0.5)	0.2 (0.0-0.5)						
Tringa nebularia	0.2 (0.0-0.5)	0.1 (0.0-0.4)	0.1 (0.0-0.3)	0.2 (0.0-0.5)	0.4 (0.1-0.7)						
Tringa totanus	0.2 (0.0-0.6)	0.2 (0.0-0.6)	0.1 (0.0-0.4)	0.2 (0.0-0.6)	0.2 (0.0-0.4)						

Specialization indices (ε)

Species	Bijagós Archipelago	Banc d'Arguin
Actitis hypoleucos	0.4 (0.1-0.6)	
Aetomylaeus bovinus		0.5 (0.3-0.6)
Arenaria interpres	0.5 (0.2-0.7)	
Calidris alba	0.4 (0.2-0.6)	
Calidris canutus	0.4 (0.2-0.7)	0.6 (0.3-0.9)
Calidris ferruginea	0.4 (0.2-0.6)	
Carcharhinus leucas	0.3 (0.2-0.5)	
Carcharhinus limbatus	0.3 (0.2-0.5)	
Charadrius hiaticula	0.3 (0.1-0.6)	0.4 (0.2-0.6)
Dasyatis marmorata		0.5 (0.3-0.6)
Fontitrygon margarita	0.4 (0.2-0.6)	0.5 (0.3-0.7)
Fontitrygon margaritella	0.4 (0.2-0.6)	0.4 (0.2-0.7)
Fontitrygon ukpam	0.4 (0.2-0.7)	
Ginglymostoma cirratum	0.4 (0.2-0.6)	0.3 (0.2-0.5)
Glaucostegus cemiculus	0.3 (0.2-0.5)	0.4 (0.2-0.5)
Gymnura altavela		0.4 (0.2-0.7)
Gymnura sereti	0.3 (0.2-0.5)	
Haematopus ostralegus		0.4 (0.2-0.6)
Leptocharias smithii		0.4 (0.3-0.5)
Limosa lapponica	0.3 (0.1-0.6)	0.4 (0.2-0.7)
Numenius phaeopus	0.4 (0.2-0.6)	0.3 (0.2-0.5)
Paragaleus pectoralis		0.3 (0.2-0.5)
Pluvialis squatarola	0.4 (0.2-0.7)	0.3 (0.1-0.6)
Rhinobatos irvinei		0.4 (0.2-0.5)
Rhinobatos rhinobatos		0.4 (0.2-0.5)
Rhinoptera marginata	0.4 (0.2-0.6)	0.5 (0.4-0.6)
Rhizoprionodon acutus	0.4 (0.2-0.6)	0.3 (0.2-0.5)
Sphyrna lewini	0.3 (0.2-0.5)	0.4 (0.2-0.5)
Sphyrna zygaena		0.7 (0.3-0.9)
Tringa nebularia	0.4 (0.2-0.7)	
Tringa totanus	0.3 (0.1-0.6)	

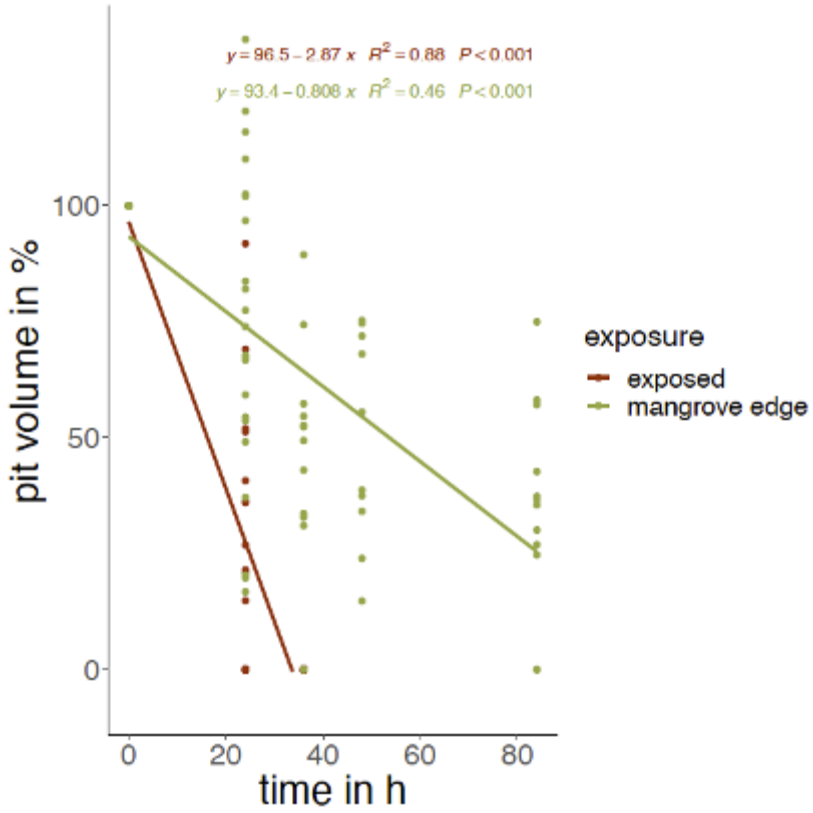
Appendix 9.1 Exclosure effects on environmental parameters

			meso-predator exclusion		effect of exclosure		no exclusion			post-hoc (excl, effect, control)
time	top cm	abiotic	mean	se	mean	se	mean	se	unit	
2019	top5	SD50	238.55	4.43	233.69	5.32	240.22	4.41	µm	a, a, a
2019	top5	SSILT	2.12	0.12	2.00	0.10	1.91	0.10	% <63 µm	a, a, a
2019	top5	LOI	0.76	0.04	0.95	0.04	1.08	0.30	%	a, a, a
2021	top1	SD50	217.87	1.93	223.12	4.40	231.93	4.69	µm	a, ab, b
2021	top1	SSILT	3.81	0.19	3.25	0.20	2.81	0.17	% <63 µm	a, b, b
2021	top1	LOI	1.01	0.02	0.95	0.03	0.90	0.03	%	a, ab, b
2021	top5	SD50	221.43	3.18	221.14	4.62	232.86	3.91	µm	a, a, a
2021	top5	SSILT	2.97	0.10	2.70	0.13	2.45	0.13	% <63 µm	a, ab, b
2021	top5	LOI	0.88	0.02	0.81	0.02	0.80	0.03	%	a, b, b
2021		ray pits	0.00	0.00	0.48	0.06	0.33	0.06	fraction of plots	a, b, b
2021		sedimentation	5.74	0.28	6.39	0.25	6.72	0.23	cm	a, ab, b
2021		erosion	4.72	0.32	6.35	0.35	6.75	0.26	cm	a, b, b
2021		net surface change	1.03	0.32	0.04	0.44	-0.02	0.38	cm	a, a, a

Appendix 9.2 The distribution of these pits related to the environmental predictors: distance to creek (Dst_crk), distance to mangroves (Dst_mng), distance to subtidal (Dst_sbt) and elevation (Elv) was best described according concentrated foraging patterns (negative binomial distribution) versus random distribution (normal distribution).

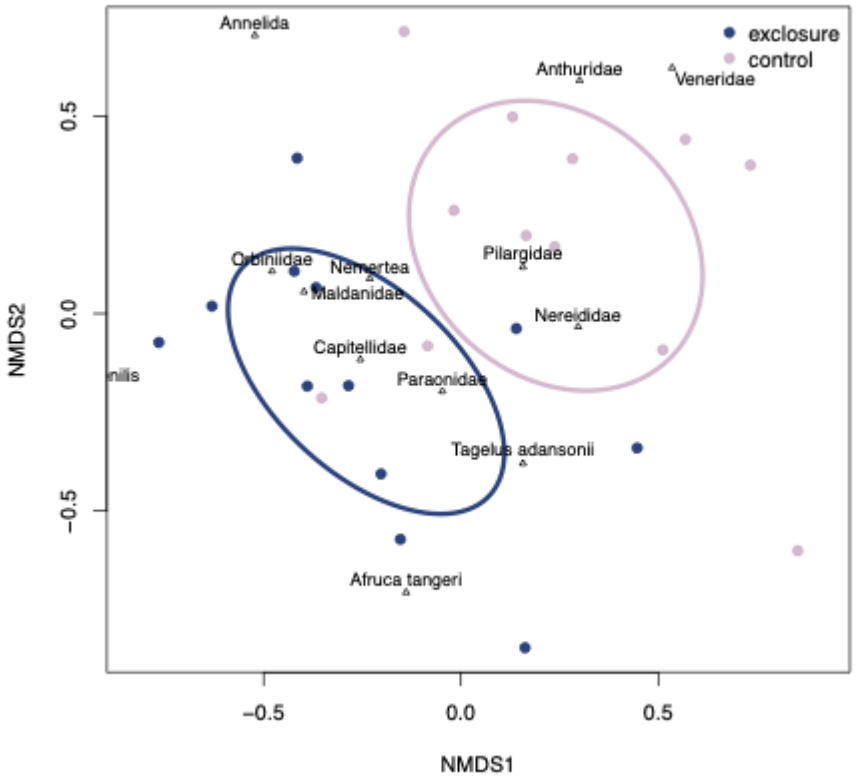
model	(Int)	Dst_crk	Dst_mng	Elv	class	df	logLik	AICc	delta	weight
negative binomial	18.82	-0.03842	-0.05459	0.2632	negbin	5	-106.478	224	0	1
lineair model	16.58	-0.03281	-0.05313	0.2229	glm	4	-123.533	255.7	31.75	0
poisson	-167.9	-0.4107	0.3311	-3.585	lm	5	-246.685	504.4	280.41	0

Appendix 9.3



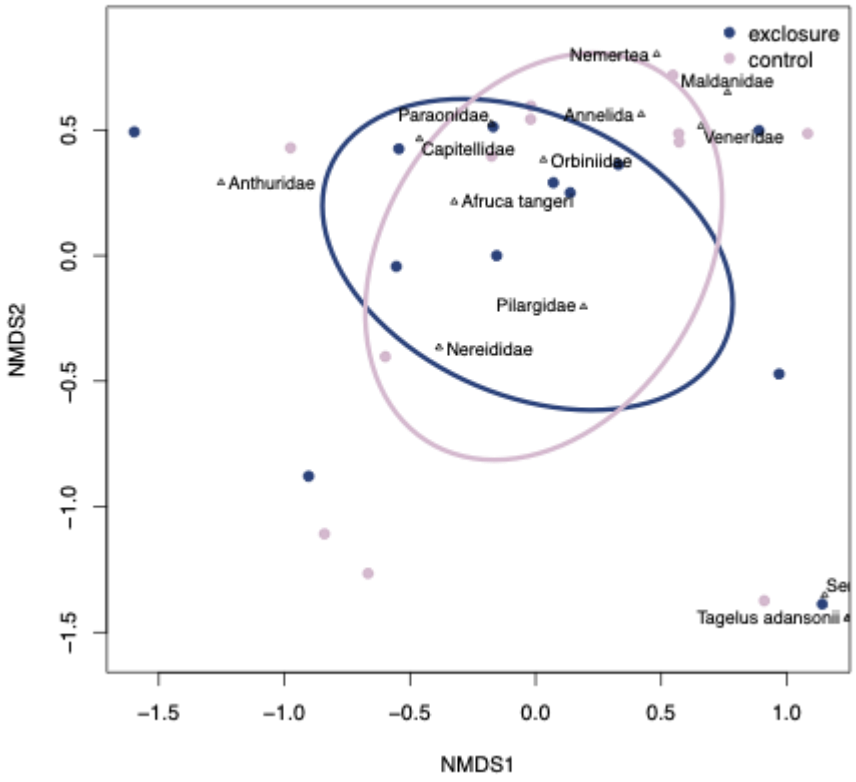
Measurement of ray pit longevity (i.e., volume decay) at exposed and more sheltered by the tidal flat (mangrove edge) locations reveal a shorter longevity of the ray pits at exposed sites. The locations were chosen based on a comparable elevation, on average +8.9 cm at the mangrove edge compared to exposed location.

Appendix 9.4



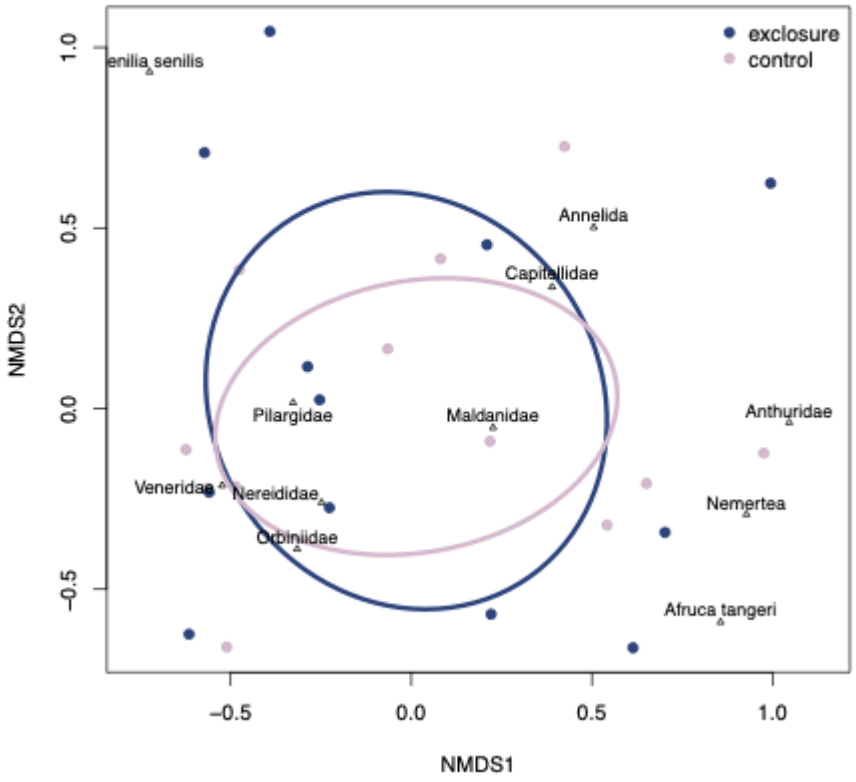
Macrozoobenthos Non-Metric Multidimensional Scaling (nMDS) on species abundance February 2021 with Bray-Curtis dissimilarity indices. $F = 3.515$ $p < 0.01$.

Appendix 9.5



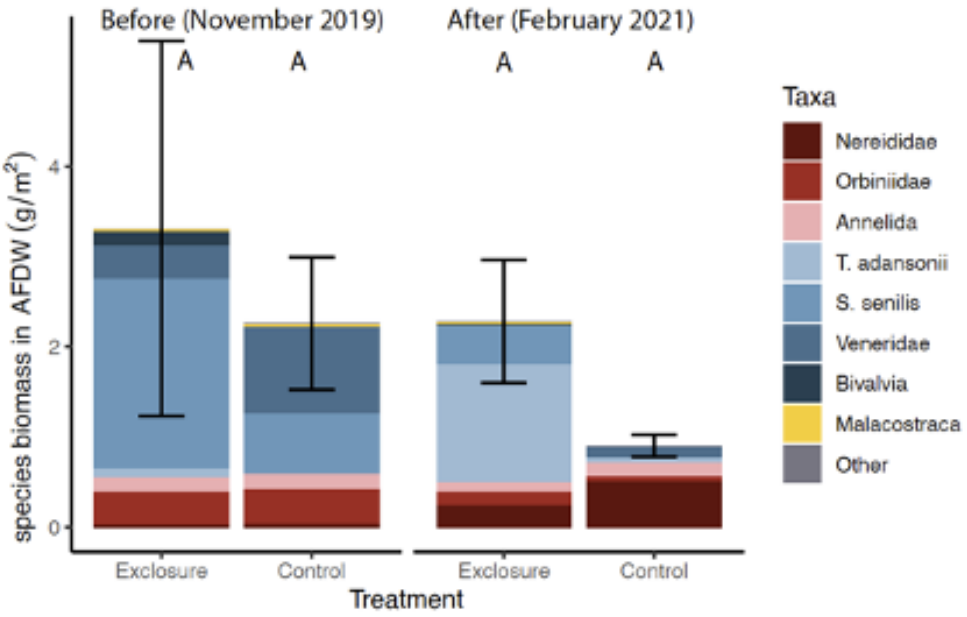
Macrozoobenthos Non-Metric Multidimensional Scaling (nMDS) on species biomass November 2019 with Bray-Curtis dissimilarity indices. $F = 0.755$ $p = 0.672$.

Appendix 9.6



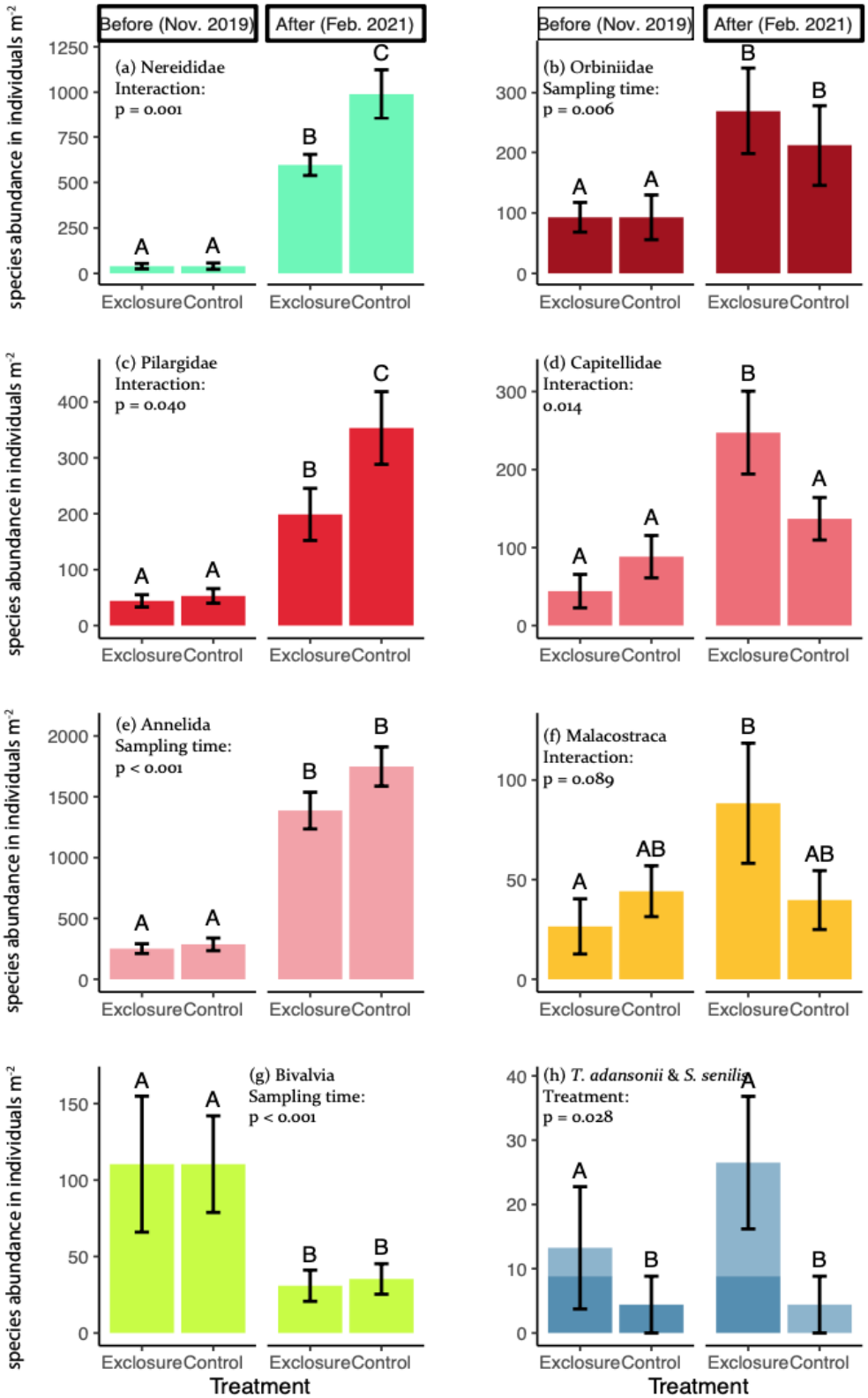
Macrozoobenthos Non-Metric Multidimensional Scaling (nMDS) on species abundance November 2019 with Bray-Curtis dissimilarity indices. $F = 0.535$ $p = 0.814$.

Appendix 9.7



Exclosure effects on total species biomass in ash free dry weight (AFDW gm^2). Data is shown in mean stacked per taxa ± sum SE of all taxa.

Appendix 9.8



Exclosure effects on species abundance. Data is shown in mean ± SE.

Appendix 10.1

Interview about objectives and general process of VCA

1. **Introduction**
   a. Introduction of the current study and need for efficiency and standardization among assessments.
   b. General introduction of researcher, their work and current value chain assessment.

2. **Assessment objectives**
   a. What was/is the general objective or objectives of your shark value chain assessment?
   b. What was the primary thinking behind the collection of information (e.g. stock, fisher or manager focused)?

3. **Details on the fishery.**
   a. Can you describe the fishery and value chain that was studied? Please describe in terms of problems addressed, governance regime, fishery logistics, fishing community, species fished, markets, community livelihoods and food security.

4. **Implications of assessment**
   a. What were the implications of your assessment results for adaptive management? Please describe in terms of which environmental, economic and socio-cultural results were most informative and relevant to managers.
   b. Can you describe for each of these results how you reached these? Describe the process from planning, data-management to communication.

5. **Planning your assessment**
   a. What do you think was the effort most well-spent during the planning of your assessment?
   b. Would you improve these efforts next time? If yes, how?
   c. What do you think was the effort that was least well-spent during the planning of your assessment?
   d. Would you leave this out next time, or adjust these efforts next time? How would you adjust these efforts?

6. **Delivering your assessment**
   a. What do you think was the effort most well-spent during the delivery of your assessment?
   b. Would you improve these efforts next time? If yes, how?
   c. What do you think was the effort that was least well-spent during the delivery of your assessment?
   d. Would you leave this out next time, or adjust these efforts next time? How would you adjust these efforts?

7. **Communicating your assessment (results)**
   a. Which communication efforts did you already undertake or are you planning to do in the (near) future?
   b. What do you think was the effort most well-spent during the visualization of your assessment from a change management point of view?
   c. Would you improve these efforts next time? If yes, how?
   d. What do you think was the effort that was least well-spent during the visualization of your assessment from a change management point of view?

e. Would you leave this out next time, or adjust these efforts next time? How would you adjust these efforts?

8. Results with highest potential

a. What was for you the result from your assessment with the highest potential for a change in management towards your objectives?
b. Can you explain for each result why these are important for adaptive management?

Review of the value chain assessment (FAO Guidance steps).

Assessment Information

1. Name
2. Institute
3. Country of assessment

4. Please provide a list of names (and coordinates) of ports and landing sites which your assessment covers and was carried out. Use Google Maps for coordinates. Example: Porto Bandim, Bissau (11.840506, -15.588619). You can also provide the link to a publication which describes these.
5. Would you consider your assessment to be primarily focused on the stock, fisher or manager?
    - Stock (focused on trends, population status, landings)
    - Fisher (focused on livelihoods, economics, trade equality)
    - Manager (focused on trade routes, fisheries management and regulations, compliance)

Reviewing the process of your Value Chain Assessment

6. Which step of the VCA process did you underestimate the most (in terms of effort and resources)? Rank the steps from 1 (= most underestimated) to 5 (= least underestimated).

	1	2	3	4	5
Establishing a Monitoring, Evaluation and Assessment Process					
Designing the survey					
Deploying the survey					
Management and use of data					
Communication and Adaptive Management					

7. Specifically, which tasks did you underestimate the most (in terms of effort and resources)? Rank the tasks from 1 (= most underestimated) to 12 (= least underestimated).

	1	2	3	4	5	6	7	8	9	10	11	12
Identifying and documenting value(s) and desired target(s).												
Searching out available information.												
Considering key stakeholders and key stakeholder groups.												

Preliminary value chain mapping and selection												
Determine what will be measured.												
Decide on the form of the survey.												
Logistical planning of survey deployment.												
Survey deployment.												
Formatting and consolidating data.												
Data processing and analysis.												
Identifying an adaptive management framework.												
Monitoring adaptive management.												

8. Can you please motivate your ranking in the two previous questions (what did you most underestimate in your VCA)?
9. Which step of the VCA process delivered the most (in terms of outcomes/outputs)? Rank the steps from 1 (= delivered the most) to 5 (= delivered the least).

	1	2	3	4	5
Establishing a Monitoring, Evaluation and Assessment Process					
Designing the survey					
Deploying the survey					
Management and use of data					
Communication and Adaptive Management					

10. Specifically, which task delivered the most ((in terms of outcomes/outputs))? Rank the tasks from 1 (= delivered the most) to 12 (= delivered the least).

	1	2	3	4	5	6	7	8	9	10	11	12
Identifying and documenting value(s) and desired target(s).												
Searching out available information.												
Considering key stakeholders and key stakeholder groups.												
Preliminary value chain mapping and selection												
Determine what will be measured.												
Decide on the form of the survey.												
Logistical planning of survey deployment.												
Survey deployment.												
Formatting and consolidating data.												
Data processing and analysis.												
Identifying an adaptive management framework.												
Monitoring adaptive management.												

11. Can you please motivate your ranking in the previous two questions (what delivered the most in your VCA)?

12. What key information did you miss in terms of socio-cultural, environmental or economic aspects of your VCA?

Reviewing the process of your Value Chain Assessment

13. What is your knowledge of stock assessments? Mark from 1 (not knowledgeable) to 5 (very knowledgeable).
14. What is the added value of a Value Chain Assessment in comparison to a stock assessment for adaptive management?

Appendix G.1

Species richness in intertidal areas

I compared the species richness for both shorebirds and elasmobranchs (i.e., sharks and rays) for the largest 100 intertidal areas in the world. I determined the largest intertidal areas based on the data from Murray *et al.* 2019. I then overlapped each area with the distribution maps (based on IUCN and BirdLife maps) of all shorebird, shark and ray species to create a species for each area. I manually excluded species for which intertidal habitat use was impossible and unlikely (e.g., shorebirds associated with desserts or pelagic and deep-water shark and ray species). I determined the proportion of species in each IUCN Red List category and the species richness of shorebirds and elasmobranchs for each tidal area. I then used a Poisson generalized linear model to determine if areas with high elasmobranch species richness also have a high richness in shorebirds. Lastly, I determined if the occurrence of shorebird and ray families are correlated and, thus, which families are associated with one another.

Burrowing depths

I used the Ocean Biodiversity Information System (OBIS, 2023) dataset (accessed through the R-package 'robis') to create a list of endobenthic families for each of the 100 largest intertidal areas in the world (based on Murray *et al.* 2019). I then matched each of these families with the burrowing depth ranges described in the trait database of Clare *et al.* (2022) with additional records from Kristensen and Kostka (2005). This resulted in 584 unique families being recorded in all of these largest intertidal areas, of which 43% (n = 250) were matched with a presence for each of the sediment layers. For the predators I performed a small literature study (i.e., combining search terms 'burrowing depth', 'excavation depth' with 'ray', and 'probing depth' with 'shorebird' or 'wader')

to describe the maximum reported probing or burrowing depth for shorebirds and rays respectively (Table 1). As this is a preliminary analysis, likely, not all reported probing and burrowing depths of shorebirds and rays in intertidal habitats around the world are included.

Table 1. Overview of studies describing the probing (shorebirds) and burrowing (rays) depths.

Group	**Species**	**Abb.**	**Area**	**Max depth (mm)**	**Reference**
Short-billed Shorebirds	*Calidris canutus*	*Cal can*	Wadden Sea, NLD	40	Zwarts & Blomert 1992
Short-billed Shorebirds	*Calidris canutus*	*Cal can*	Banc d'Arguin, MAU	40	van Gils et al. 2016
Short-billed Shorebirds	*Calidris canutus*	*Cal can*	Bragantinian Peninsula, BRA	38	Kober et al. 2009
Long-billed Shorebirds	*Haematopus ostralegus*	*Hae ost*	Eastern Europe	91	Sarychev & Mischenko 2014
Long-billed Shorebirds	*Haematopus ostralegus*	*Hae ost*	Wadden Sea, NLD	70	Wanink & Zwarts 1985
Short-billed Shorebirds	*Calidris tenuirostris*	*Cal ten*	Roebuck Bay, AUS	45	Tulp & Goeij 1994
Long-billed Shorebirds	*Recurvirostra avosetta*	*Rec avo*	Haringvliet, NLD	58	Dirksen et aL. 1992
Short-billed Shorebirds	*Calidris alpina*	*Cal alp*	Sivash, Ukraine	30	Verkuil et al. 1993
Short-billed Shorebirds	*Calidris alpina*	*Cal alp*	NLD	30	Van der Voet 1967
Long-billed Shorebirds	*Limosa limosa*	*Lim lim*	Haringvliet, NLD	97	Dirksen et aL. 1992
Long-billed Shorebirds	*Limosa lapponica*	*Lim lap*	Haringvliet, NLD	85	Dirksen et aL. 1992
Long-billed Shorebirds	*Numenius arquata*	*Num arq*	Wadden Sea, NLD	125	Zwarts & Esselink 1989
Short-billed Shorebirds	*Calidris alba*	*Cal alb*	Wadden Sea, NLD	27	Gerritsen & Meiboom 1986
Short-billed Shorebirds	*Calidris alba*	*Cal alb*	Bragantinian Peninsula, BRA	25	Kober et al. 2009
Short-billed Shorebirds	*Calidris alba*	*Cal alb*	Bodega Bay, USA	25	Myers et al. 1980
Short-billed Shorebirds	*Pluvialis squatarola*	*Plu squ*	Bay of Heist, BE	30	Tassie et al. 2011
Short-billed Shorebirds	*Pluvialis squatarola*	*Plu squ*	Bragantinian Peninsula, BRA	35	Kober et al. 2009
Short-billed Shorebirds	*Calidris ferruginea*	*Cal fer*	Sivash, Ukraine	38	Verkuil et al. 1993
Short-billed Shorebirds	*Calidris falcinellus*	*Cal fal*	Sivash, Ukraine	30	Verkuil et al. 1993
Short-billed Shorebirds	*Tringa totanus*	*Tri tot*	Ythan Estuary, UK	41	Goss-Custard 1969
Short-billed Shorebirds	*Charadrius semipalmatus*	*Cha sem*	Bragantinian Peninsula, BRA	11	Kober et al. 2009
Short-billed Shorebirds	*Arenaria interpres*	*Are int*	Bragantinian Peninsula, BRA	27	Kober et al. 2009
Short-billed Shorebirds	*Calidris pusilla*	*Cal pus*	Bragantinian Peninsula, BRA	18	Kober et al. 2009

Long-billed Shorebirds	*Limnodromus griseus*	*Lim gri*	Bragantinian Peninsula, BRA	62	Kober et al. 2009
Long-billed Shorebirds	*Tringa semipalmata*	*Tri sem*	Bragantinian Peninsula, BRA	59	Kober et al. 2009
Long-billed Shorebirds	*Limosa fedoa*	*Lim fed*	Bragantinian Peninsula, BRA	126	Kober et al. 2009
Long-billed Shorebirds	*Numenius phaeopus*	*Num pha*	Bragantinian Peninsula, BRA	104	Kober et al. 2009
Eagle and Cownose Rays	*Myliobatis tenuicaudatus*	*Myl ten*	Manukau Harbour, NWZ	150	Thrush et al. 1991
Eagle and Cownose Rays	*Myliobatis tenuicaudatus*	*Myl ten*	Manukau Harbour, NWZ	200	Hines et al. 1997
Stingrays	*Pastinachus ater*	*Pas ate*	Ningaloo Reef, AUS	56	O'Shea et al. 2012
Stingrays	*Himantura spp.*	*Him spp*	Ningaloo Reef, AUS	56	O'Shea et al. 2012
Stingrays	*Taeniura lymma*	*Tae lym*	Ningaloo Reef, AUS	56	O'Shea et al. 2012
Stingrays	*Urogymnus asperrimus*	*Uro asp*	Ningaloo Reef, AUS	56	O'Shea et al. 2012
Stingrays	*Himantura australis*	*Him aus*	Lucinda, AUS	41	Crook et al. 2021
Stingrays	*Pastinachus ater*	*Pas ate*	Lucinda, AUS	41	Crook et al. 2021
Stingrays	*Hemitrygon akajei*	*Hem aka*	Ariake Sound, JAP	204	Takeuchi & Tamaki 2014
Eagle and Cownose Rays	*Rhinoptera bonasus*	*Rhi bon*	Chesapeake Bay, USA	100	Glaspie & Seitz 2017
Eagle and Cownose Rays	*Myliobatis californica*	*Myl cal*	La Choya, MEX	66	Lynn-Myrick & Flessa 1996
Stingrays	*Urobatis halleri*	*Uro hal*	La Choya, MEX	66	Lynn-Myrick & Flessa 1996
Stingrays	*Hypanus americanus*	*Hyp ame*	Debidue Flat, USA	50	Grant 1983
Stingrays	*Hypanus sabina*	*Hyp sab*	Debidue Flat, USA	50	Grant 1983
Stingrays	*Hypanus americanus*	*Hyp ame*	St. Joseph Bay, USA	200	Valentine et al. 1994
Stingrays	*Hypanus sabina*	*Hyp sab*	St. George Sound, USA	150	Reidenauer & Thistle 1981
Stingrays	*Fontitrygon margaritella*	*Fon mar*	Bijagos Archipelago, GB	170	Nauta et al. 2023
Eagle and Cownose Rays	*Rhinoptera bonasus*	*Rhi bon*	Chesapeake Bay, USA	400	Smith & Merriner 1985