

SUPPLEMENTARY MATERIAL

Table S1. Abundance of fish species recorded in the Cabo Verde Archipelago and number of transects performed at each surveyed site. A total of ten species were shared between the shallow and upper zones: *Canthidermis sufflamen*, *Chaetodon robustus*, *Parapristipoma humile*, *Coris atlantica*, *Sparisoma choati*, *Sparisoma cretense*, *Mulloidichthys martinicus*, *Pseudupeneus prayensis*, *Chromis multilineata*, and *Aluterus scriptus*. Eight species were exclusive to the lower zone: *Sphoeroides marmoratus*, *Serranus atricauda*, *Anthias* spp., *Scorpaena maderensis*, *Muraena helena*, *Lappanella fasciata*, *Corniger spinosus*, and *Liopropoma emanueli*. Additionally, seven species were endemic to the archipelago: *Girella stuebeli*, *Gobius tetrophthalmus*, *Chromis lubbocki*, *Similiparma hermani*, *Diplodus fasciatus*, *Diplodus lineatus* and *Diplodus prayensis*.

Families and species	Sites (nr. of transects (40m ²))								
	Fogo (21)			Santiago (17)			Santo Antão (20)		
	Shallow (9)	Upper (6)	Lower (6)	Shallow (6)	Upper (4)	Lower (6)	Shallow (10)	Upper (8)	Lower (2)
Acanthuridae	8	2	2	2	14	4	53	23	
<i>Acanthurus monroviae</i>	8	2	2	2	14	4	53	23	
Aulostomidae	5	11		17	9	3	14	16	1
<i>Aulostomus strigosus</i>	5	11		17	9	3	14	16	1
Balistidae	5	1		1			10	4	
<i>Balistes punctatus</i>	5			1					
<i>Canthidermis sufflamen</i>		1					10	4	
Carangidae		6					2	8	
<i>Caranx crysos</i>							2		
<i>Caranx lugubris</i>								1	
<i>Seriola rivoliana</i>		6						7	
Chaetodontidae	4	1	7		4	27	1	4	3
<i>Chaetodon robustus</i>	4	1			2		1	4	
<i>Prognathodes marcellae</i>			7		2	27			3
Diodontidae				1					
<i>Diodon holocanthus</i>				1					
Girellidae							31		
<i>Girella stuebeli</i>							31		
Gobiidae	3						3		
<i>Gnatholepis thompsoni</i>	3						1		
<i>Gobius tetrophthalmus</i>							2		
Haemulidae		10			3		1	57	
<i>Parapristipoma humile</i>		10			3		1	57	
Holocentridae	25	15	5	16	12	9	39	61	1
<i>Corniger spinosus</i>						3			
<i>Myripristis jacobus</i>	22	14		13	10	6	39	41	
<i>Sargocentron hastatum</i>	3	1	5	3	2			20	1

Labridae	100	3	1	28	21	1	111	1	
<i>Bodianus speciosus</i>	10	1	1						
<i>Coris atlantica</i>	10			1	1				
<i>Lappanella fasciata</i>						1			
<i>Scarus hoefleri</i>	4						1		
<i>Sparisoma choati</i>	5			2	7		16		
<i>Sparisoma cretense</i>	4	2		22	13		8	1	
<i>Sparisoma frondosum</i>	1			1			2		
<i>Sparisoma spp.</i>	1						5		
<i>Thalassoma pavo</i>	65			2			79		
Lethrinidae	70								
<i>Lethrinus atlanticus</i>	70								
Lutjanidae	5	37				3	9	2	
<i>Apsilus fuscus</i>	5						6		
<i>Lutjanus fulgens</i>		37				3	1	2	
<i>Lutjanus goreensis</i>							2		
Monacanthidae		1					1		
<i>Aluterus scriptus</i>		1					1		
Mullidae	38	13		1	7		20	7	
<i>Mulloidichthys martinicus</i>	33	13		1	5		12	6	
<i>Pseudupeneus prayensis</i>	5				2		8	1	
Muraenidae	2						1		1
<i>Gymnothorax vicinus</i>	1								1
<i>Muraena helena</i>									
<i>Muraena melanotis</i>	1						1		
Pomacanthidae		3							
<i>Holacanthus africanus</i>		3							
Pomacentridae	588	807	73	220	69	250	1040	899	64
<i>Abudefduf hoefleri</i>	77								
<i>Abudefduf saxatilis</i>							2		
<i>Chromis lubbocki</i>	122	805	71		50	250	867	720	64
<i>Chromis multilineata</i>	310			190	19		159	175	
<i>Similiparma hermani</i>		2	2					4	
<i>Stegastes imbricatus</i>	79			30			12		
Scorpaenidae						1			
<i>Scorpaena maderensis</i>						1			
Serranidae	33	17	76	5	8	17	32	19	6
<i>Anthias spp.</i>			60			9			
<i>Cephalopholis taeniops</i>	32	16	11	5	8	1	29	14	1
<i>Liopropoma emanueli</i>			4			5			2
<i>Mycteroperca fusca</i>		1						1	1
<i>Rypticus saponaceus</i>	1						3	4	2
<i>Serranus atricauda</i>			1			2			
Sparidae		7	2	30			115	16	
<i>Diplodus fasciatus</i>		7	2				3	8	
<i>Diplodus lineatus</i>							15		
<i>Diplodus prayensis</i>								8	
<i>Spicara melanurus</i>				30			97		
Sphyraenidae		30							
<i>Sphyraena viridensis</i>		30							
Tetraodontidae	3	3	4	4	11	4	7	5	
<i>Canthigaster capistrata</i>	3	3	4	4	11	3	7	5	
<i>Sphoeroides marmoratus</i>						1			

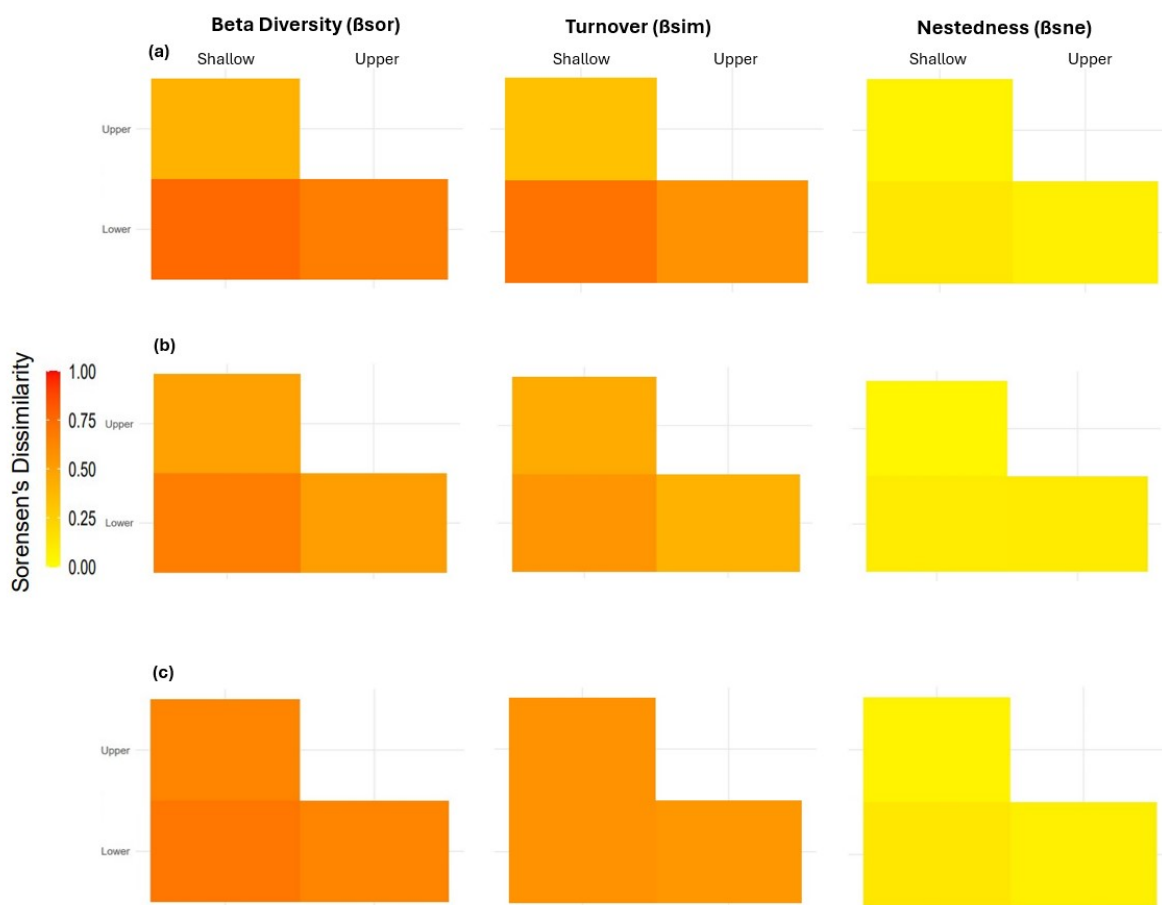


Figure S1. Heat map showing beta diversity and its components (turnover and nestedness) of fish assemblages across the depth zones of each surveyed island: (a) Santiago, (b) Santo Antão, and (c) Fogo. The analysis reveals that turnover is the predominant component of beta diversity across all islands.

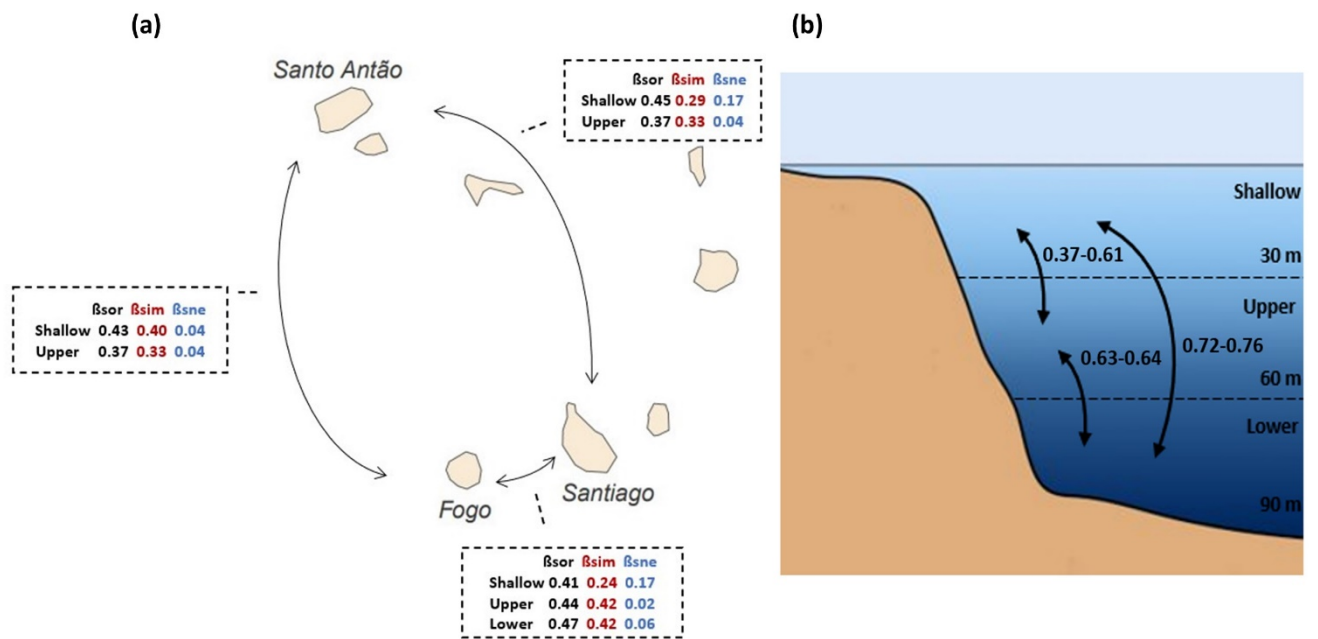


Figure S2. Taxonomic beta diversity calculated for an expanded MSA (160m²), excluding lower Santo Antão. **(a)** Sorensen's pairwise dissimilarity (β_{sor}) and its components turnover (β_{sim}) and nestedness (β_{sne}) between the surveyed islands and their depth zones. **(b)** Sorensen's pairwise dissimilarity between the shallow reef fish communities and mesophotic depth zones of each island.

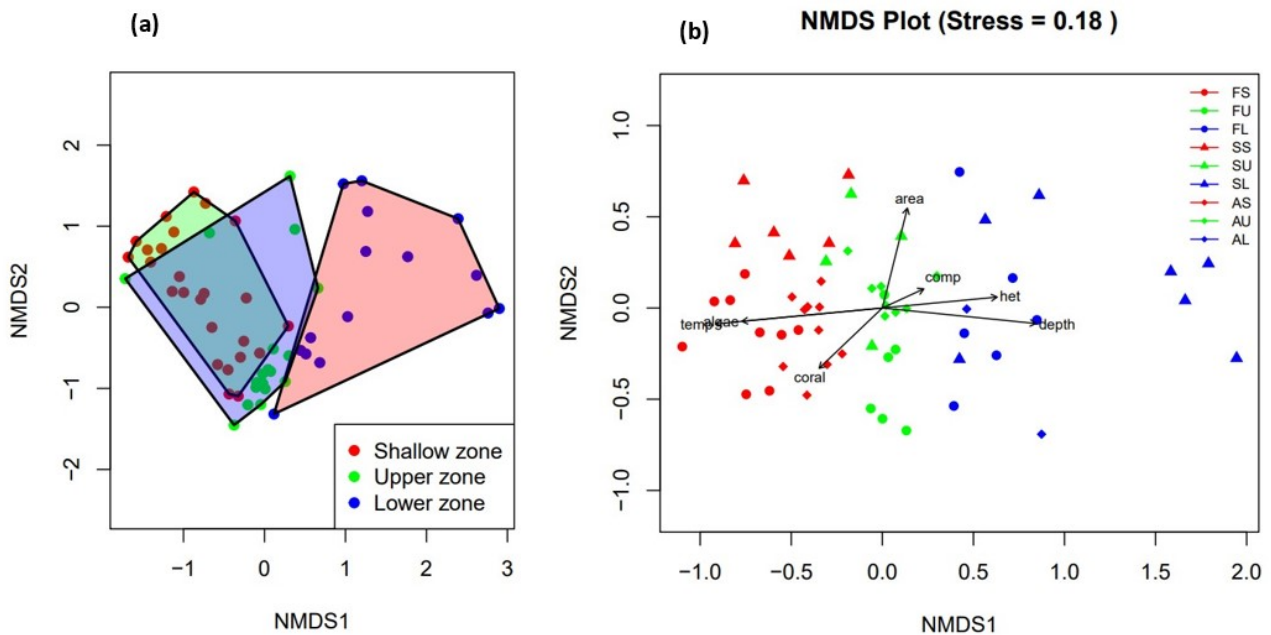


Figure S3. Non-metric Multidimensional Scaling (nMDS) analysis ($k=2$) visualizing the variation in fish assemblages across (a) the depth zones within the Cabo Verde archipelago and (b) different islands and depth zones, using the Bray-Curtis dissimilarity index. (b) Environmental variables, including benthic coverage, temperature, depth, island area, and habitat complexity, were assessed for their influence on beta diversity through the envfit function (arrows). The length and direction of the arrows represent the strength and direction of the relationship between each environmental variable and the assemblage composition.

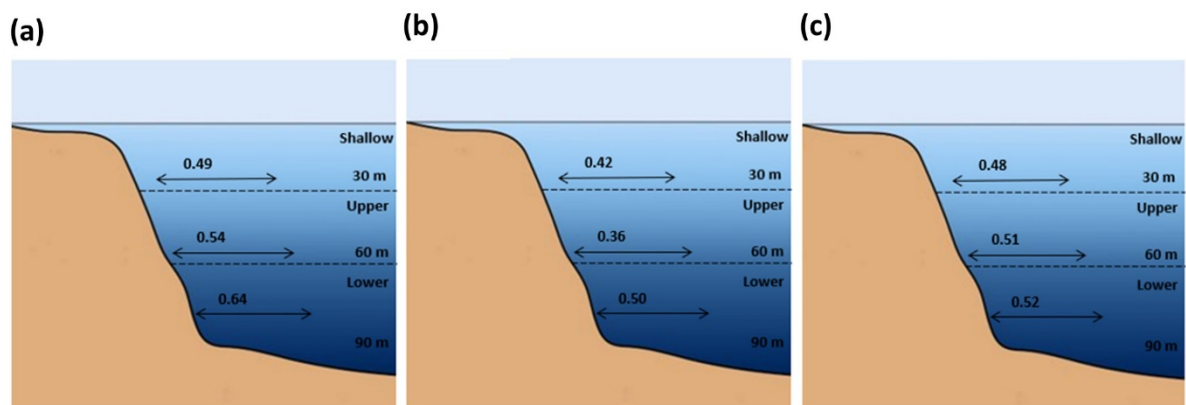


Figure S4. Intra beta diversity using Sorensen's pairwise dissimilarity within each depth zone of each surveyed islands: (a) Santiago, (b) Santo Antão, (c) Fogo.