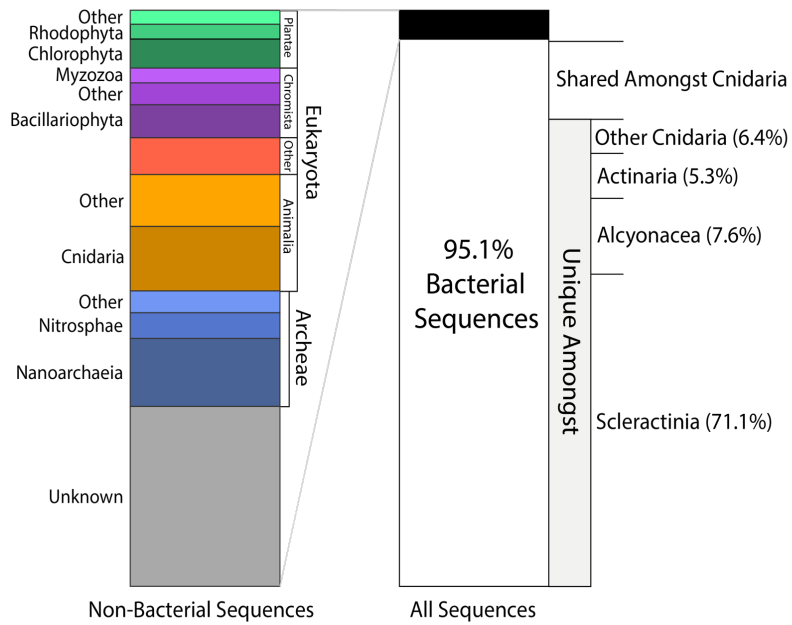
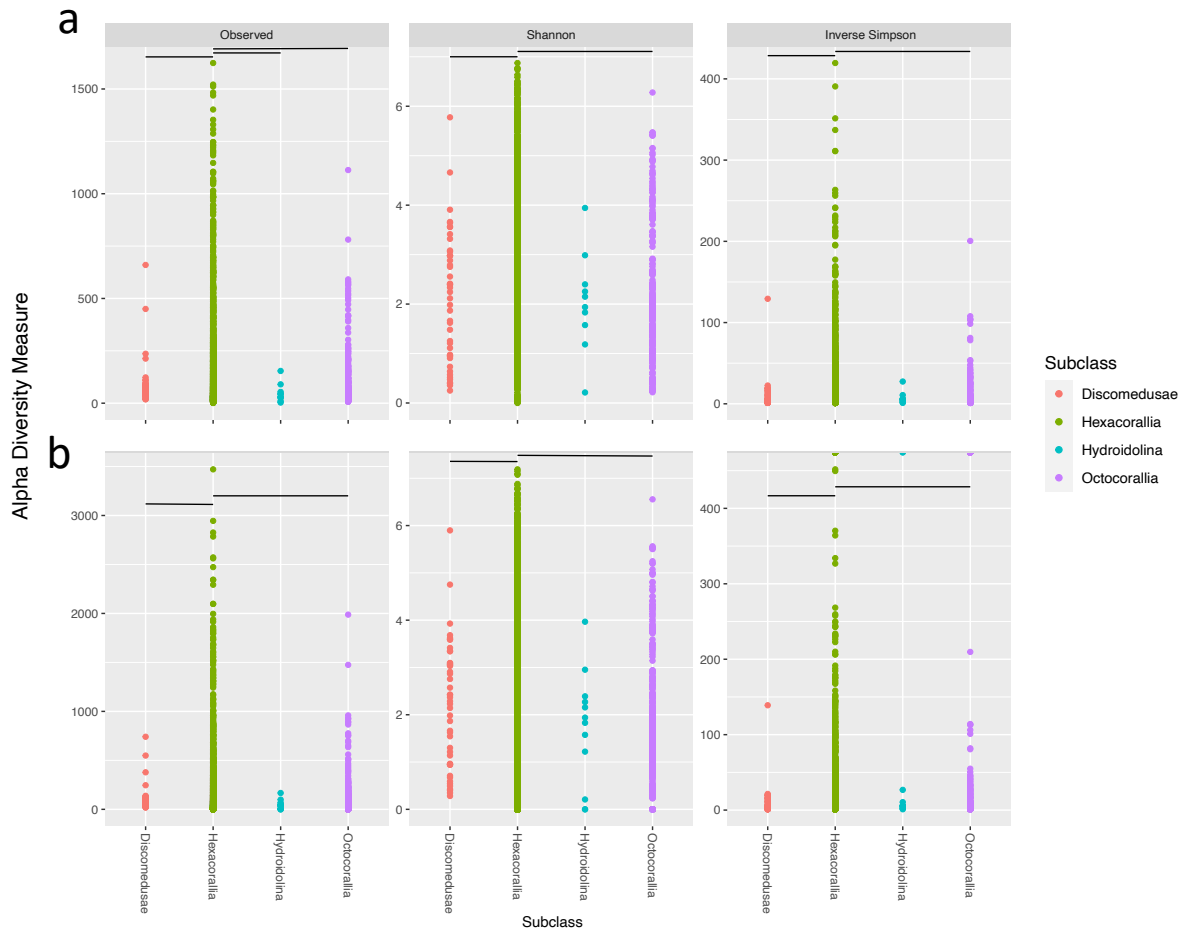
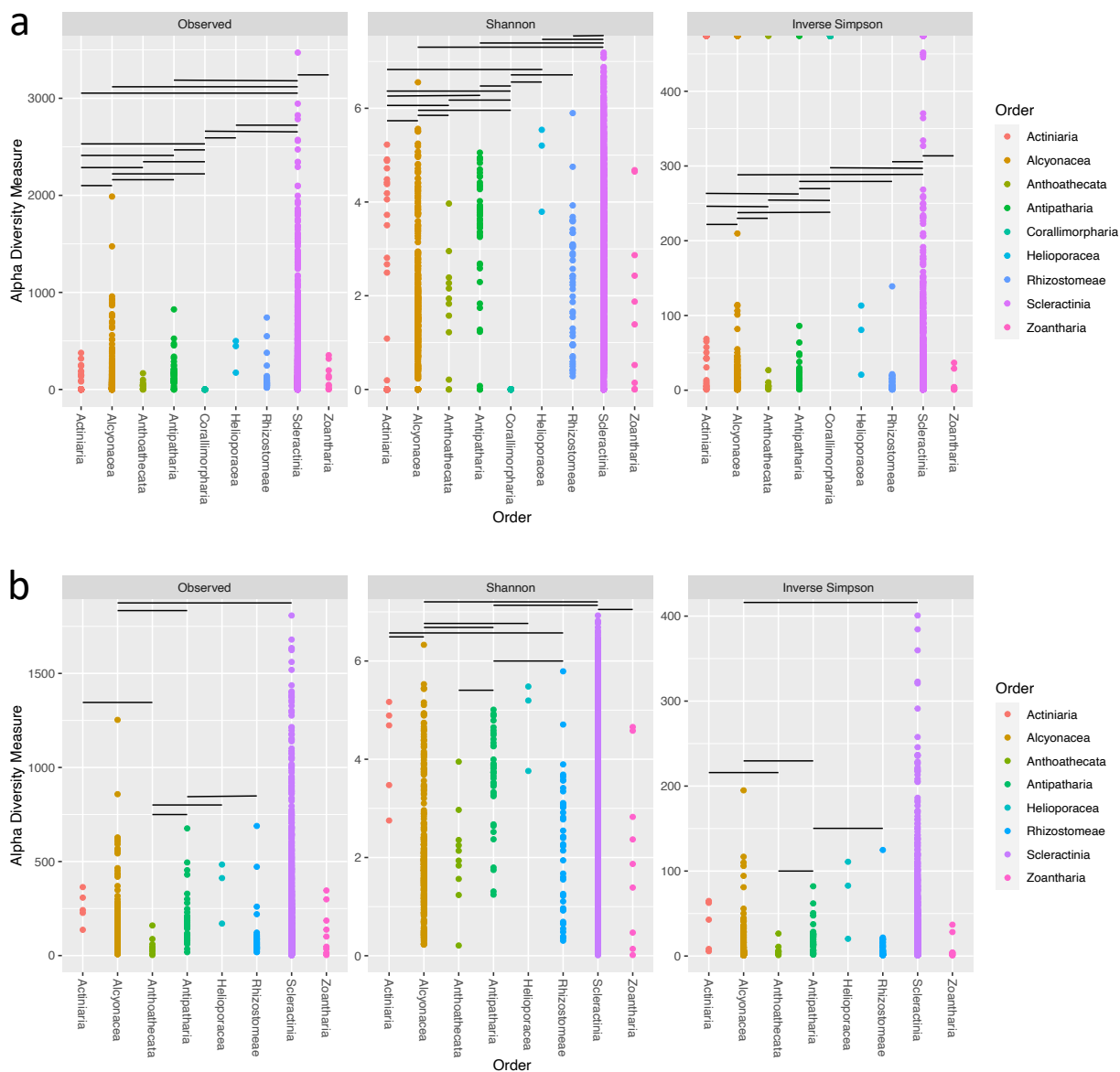




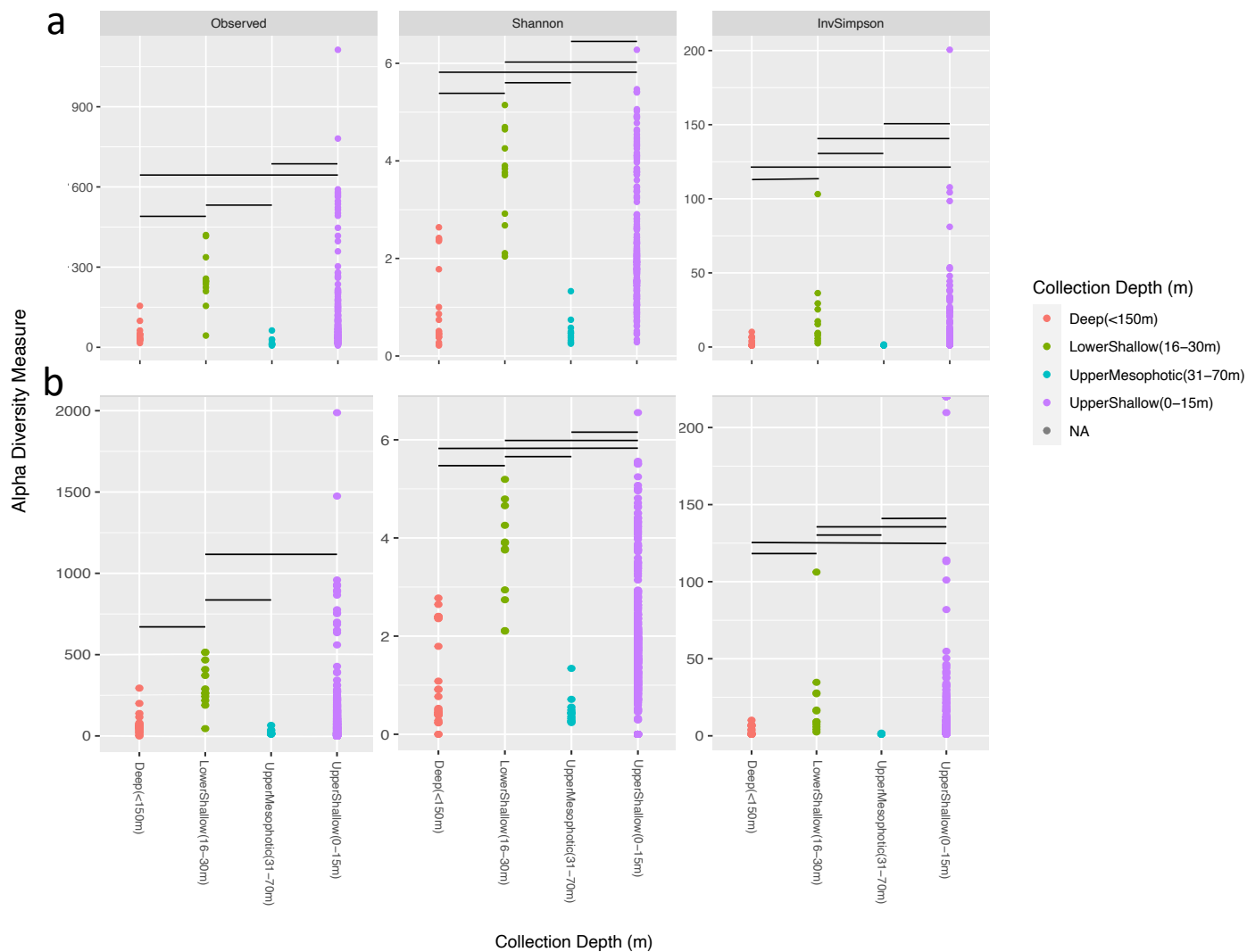
Supplementary Figure 1. The relative abundance of bacterial, archaeal, eukaryote, and unknown sequences identified across all cnidarian libraries in this dataset, as well as their presence within cnidarian orders.



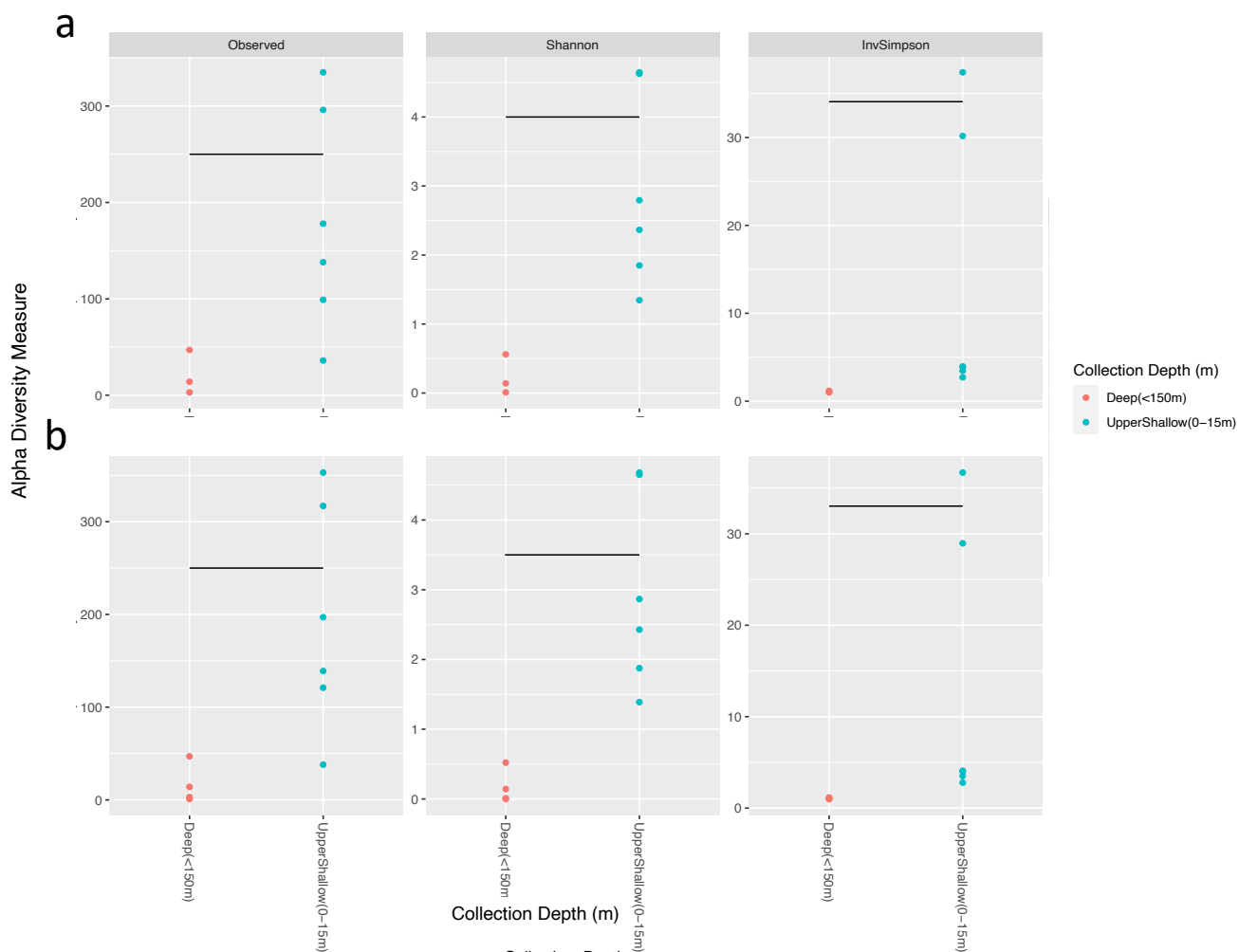
Supplementary Figure 2. Alpha diversity indices for cnidarian subclasses with (a) unrarefied, and (b) rarefied (minimum 5000 reads) Illumina Mi-Seq samples (V4 region library). Lines indicate significant differences between cnidarian subclasses after performing a Kruskal-Wallis test with Dunn post-doc ($p_{adj} < 0.02$).



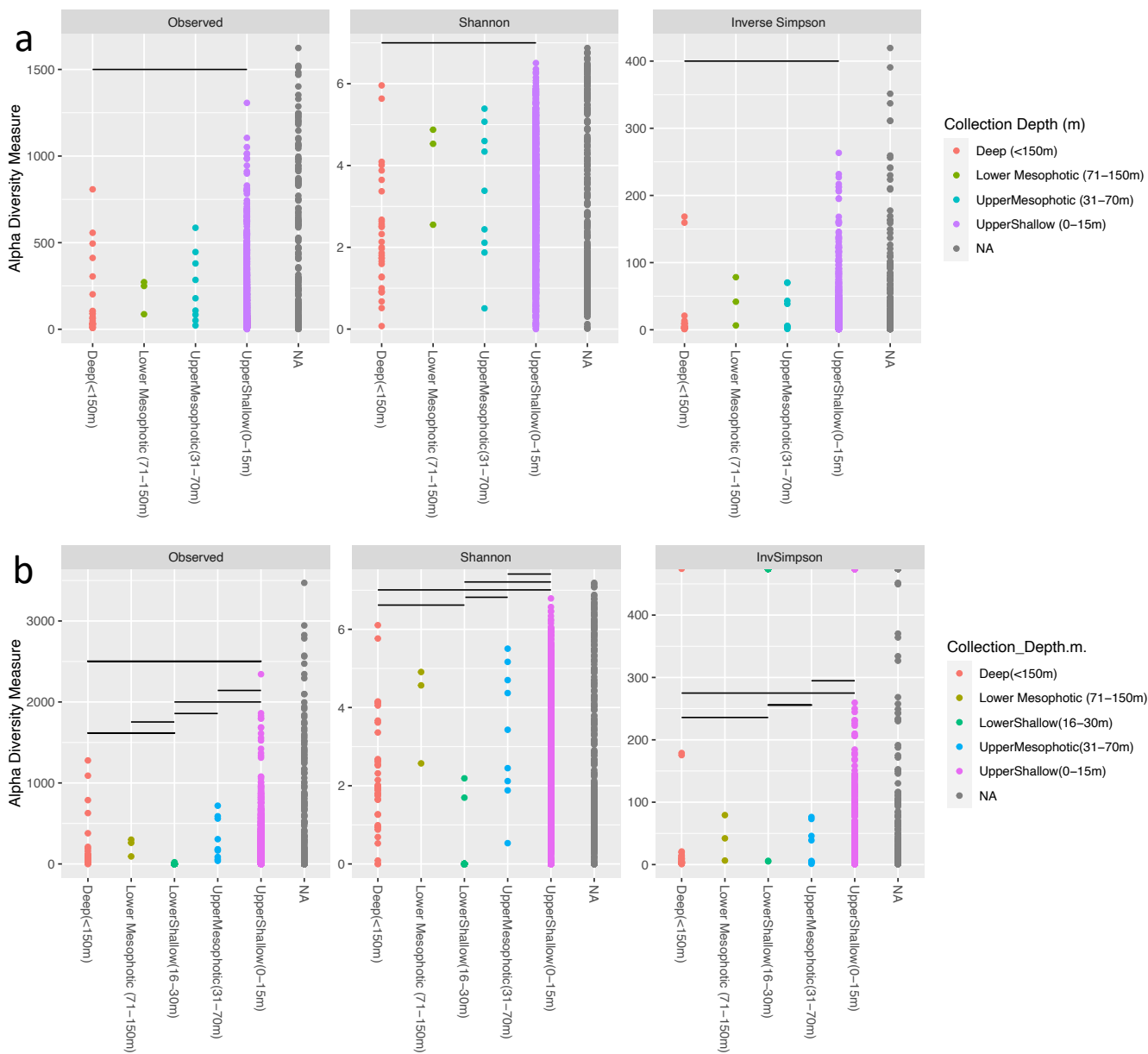
Supplementary Figure 3. Alpha diversity indices for cnidarian orders with (a) unrarefied, and (b) rarefied (minimum 5000 reads) Illumina Mi-Seq samples (V4 region library). Lines indicate significant differences between cnidarian orders after performing a Kruskal-Wallis test with Dunn post-doc ($p_{adj} < 0.02$).



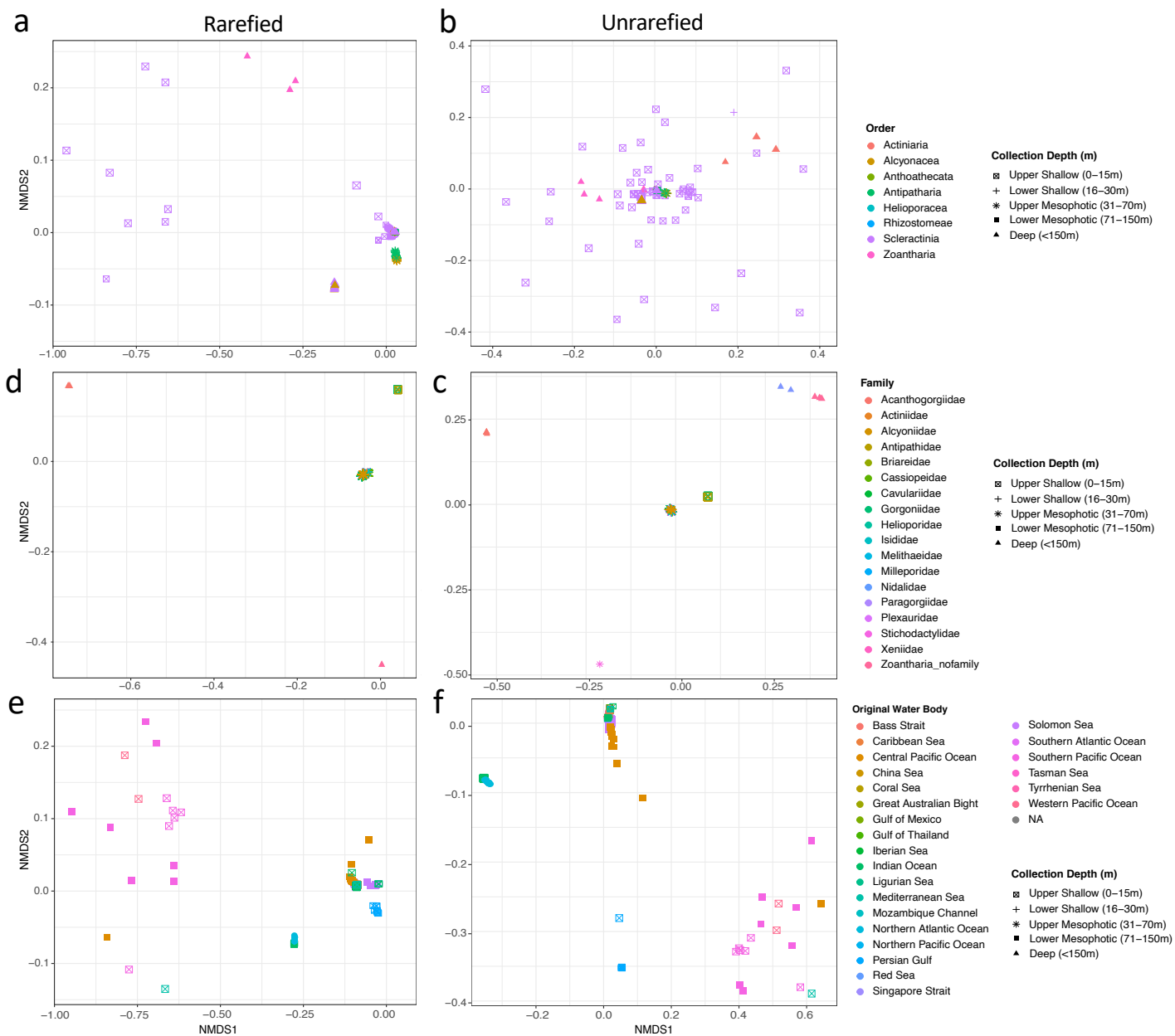
Supplementary Figure 4. Alpha diversity indices for alcyonacean samples collected across various depths with (a) unrarefied, and (b) rarefied (minimum 5000 reads) Illumina Mi-Seq samples (V4 region library). Lines indicate significant differences between depths after performing a Kruskal-Wallis test with Dunn post-doc ($p_{adj} < 0.02$).



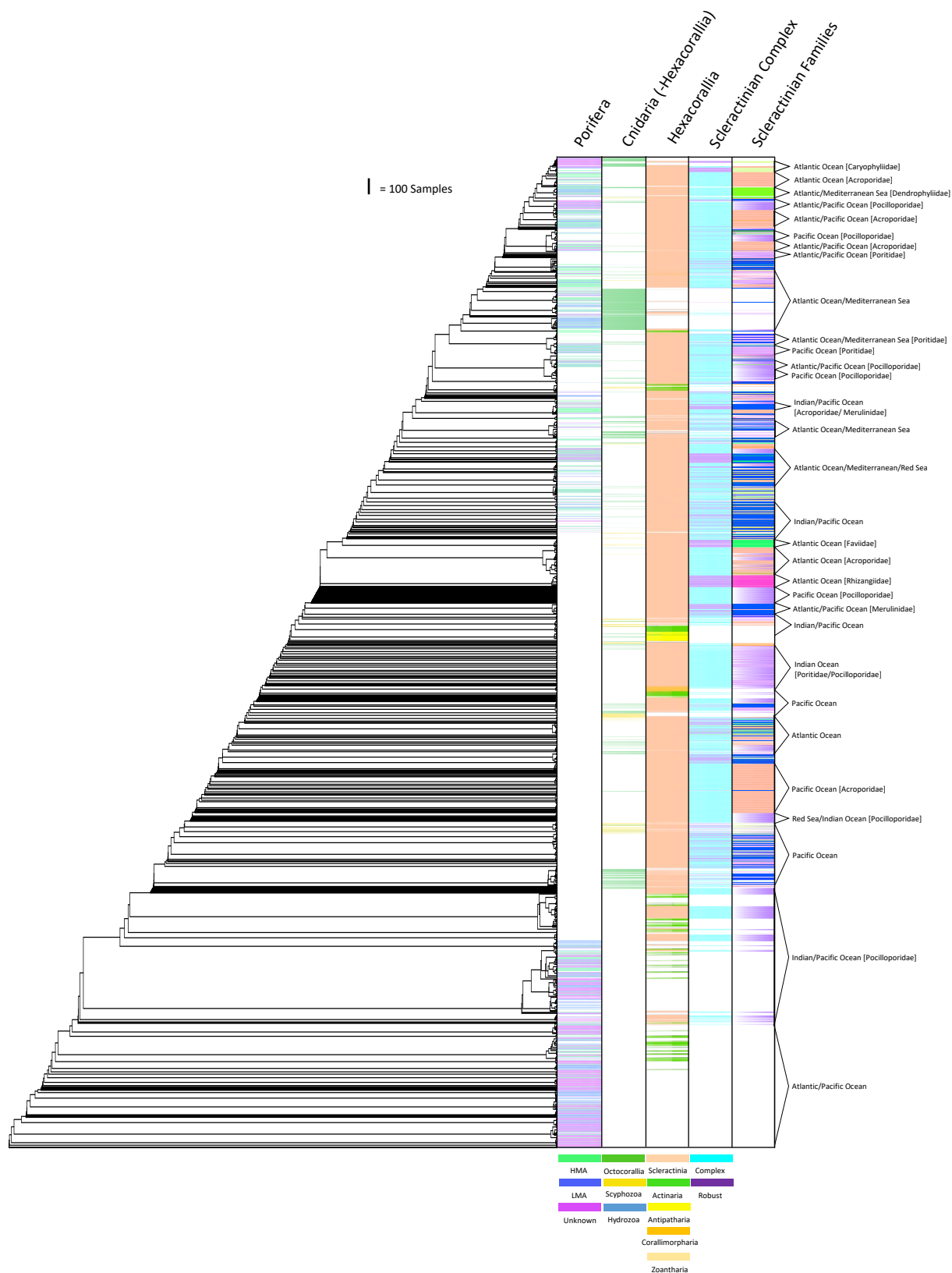
Supplementary Figure 4. Alpha diversity indices for zoantharian samples collected across various depths with (a) unrarefied, and (b) rarefied (minimum 5000 reads) Illumina Mi-Seq samples (V4region library). Lines indicate significant differences between depths after performing a Kruskal-Wallis test with Dunn post-doc ($p_{adj} < 0.02$).



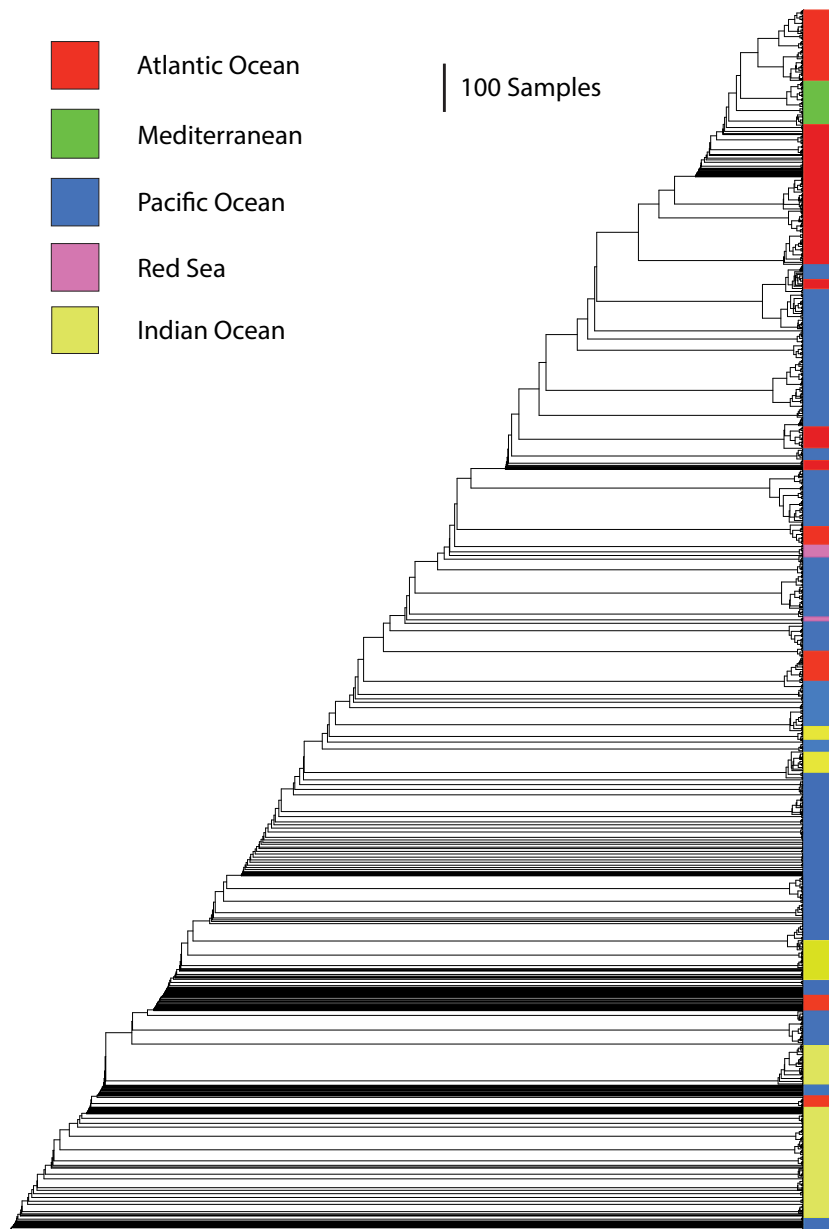
Supplementary Figure 5. Alpha diversity indices for scleractinian samples collected across various depths with (a) unrarefied, and (b) rarefied (minimum 5000 reads) Illumina Mi-Seq samples (V4 region library). Lines indicate significant differences between depths after performing a Kruskal-Wallis test with Dunn post-doc ($p_{adj} < 0.02$).



Supplementary Figure 7. Bacterial beta diversity (Illumina Mi-Seq V4 region library), shown as non-metric multidimensional scaling ordination based on Bray-Curtis dissimilarity between (a,b) cnidarian orders, (c,d) non-scleractinian cnidarian families, (e,f) Scleractinia. Sequences were rarefied (a,c,e), and unrarefied (b,d,f).



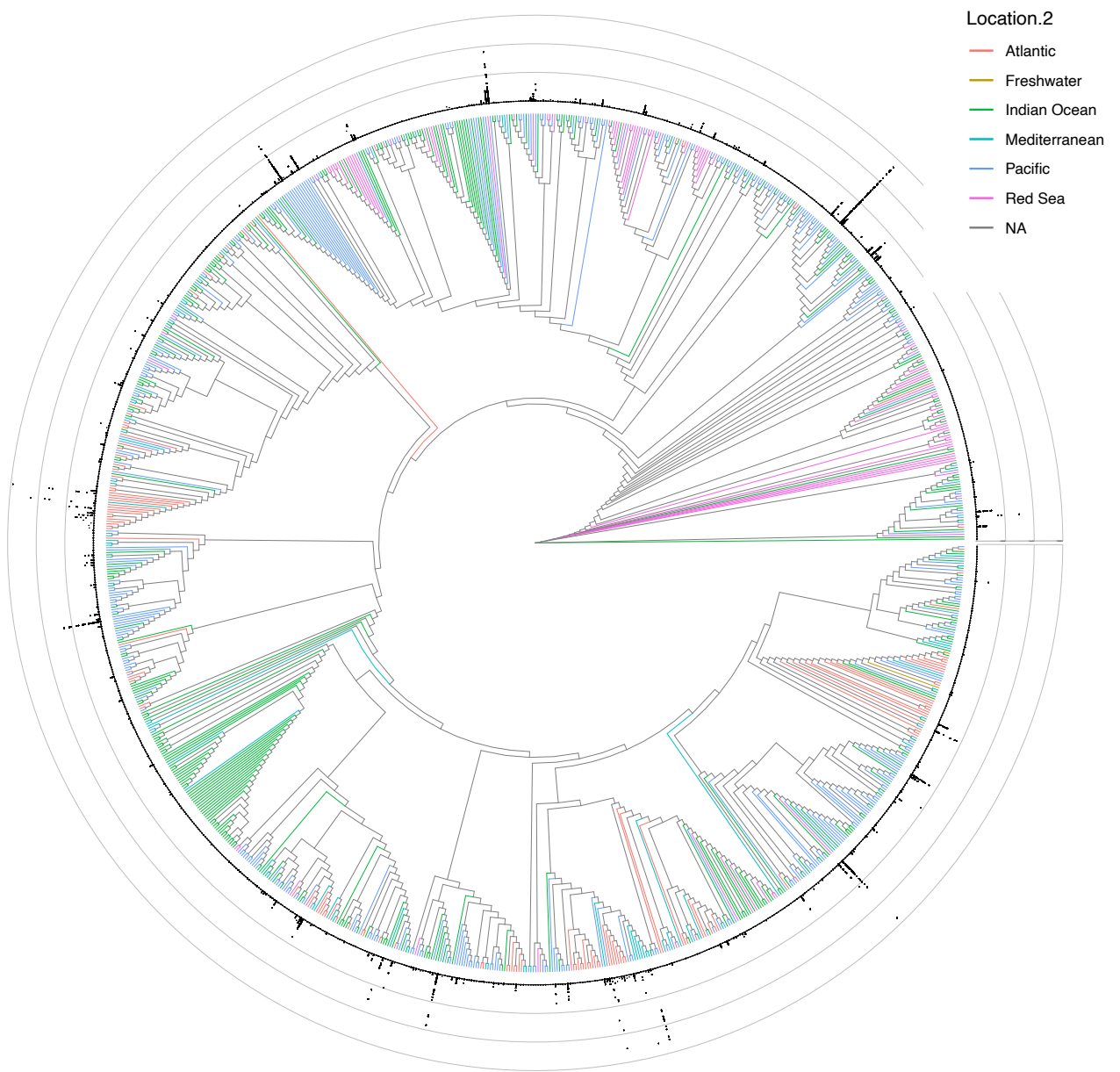
Supplementary Figure 8. Hierarchical clustering of the Bray-Curtis dissimilarity for cnidarian and porifera 16S rRNA gene samples (V4_p library). The first column represents Porifera, the second non-hexacorallian cnidarians, the third hexacorallia samples, the fourth scleractinian complexes, and the fifth scleractinian families. Labels represent at least 75% of samples from that location/family. Dendrogram is rooted for visual purposes only.



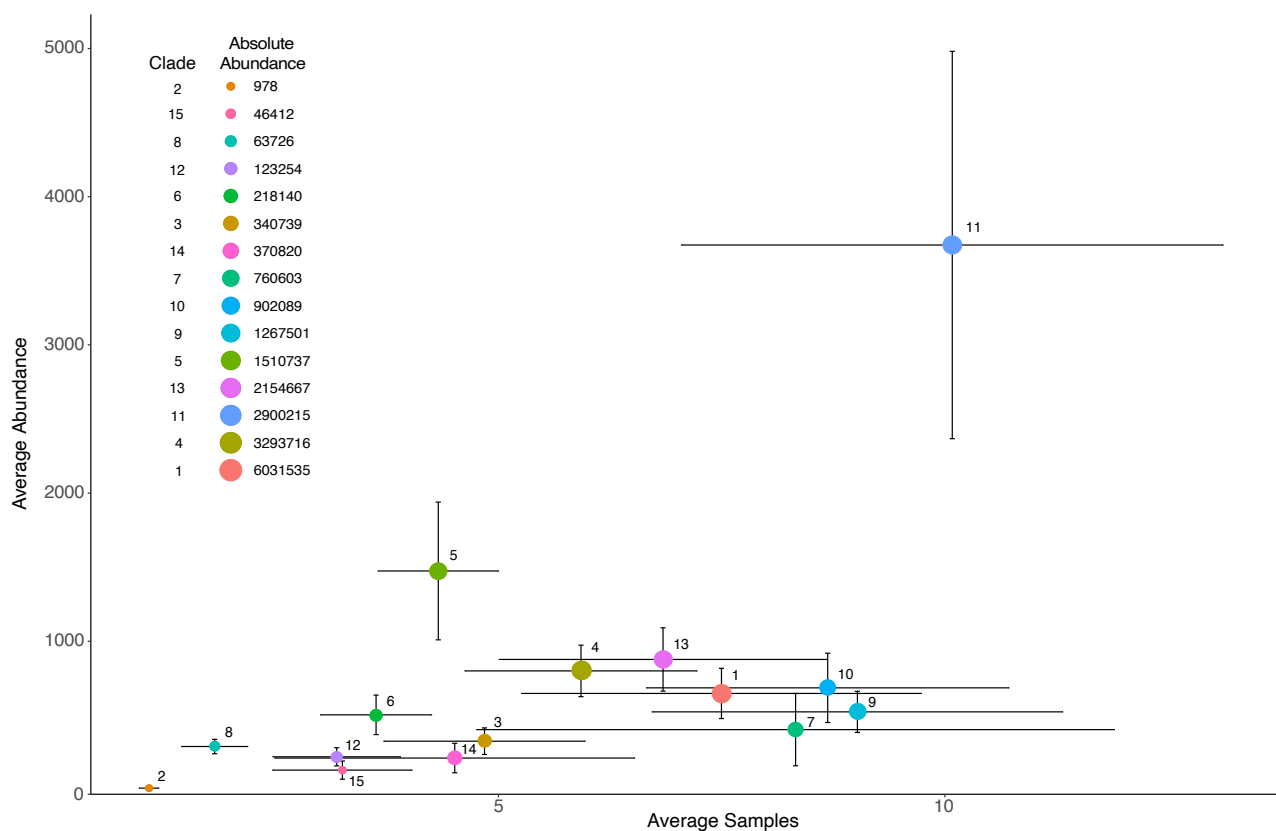
Supplementary Figure 9. Hierarchical clustering of the Bray-Curtis dissimilarity for 16S rRNA samples for 2012 'healthy' scleractinian colonies (Illumina Mi-Seq V4 library). Colored bars group samples with a minimum of 75% of samples from each ocean body. Dendrogram is rooted solely for visual purposes only.



Supplementary Figure 10. Maximum likelihood phylogeny based on the 16S rRNA sequences of *Endozoicomonas* ASVs identified within host families (Illumina Mi-Seq V4 region library). Branch length represents nucleotide variation.



Supplementary Figure 11. ASVs identified within and shared between cnidarian orders (V4 library), with branch lengths colored by water body. Absolute abundance of *Endozoicomonas* ASVs identified per sample, and the number of samples they were identified in are represented by small red circles on the outside of the tree. Branch lengths are standardized for visual purposes only.



Supplementary Figure 12. Average sequence read counts, and the average number of cnidarian samples that each of the major *Endozoicomonas* ASV clades were identified in (Illumina Mi-Seq V4 library). Error bars represent standard error. Absolute abundance of ASVs within each clade is represented by the diameter of the circle.

Supplementary Table 1. Metadata for the 16,012 microbial samples included in this dataset. Metadata was collated from the originally published studies, available supplementary information, and from online databases.

Supplementary Table 2. Analysis of the effect of different variables on the structure (Bray-Curtis) and diversity (Observed, Shannon, Inverse-Simpson) on rarified (5000 reads) samples (V4 library). These include the analysis of all cnidarian samples simultaneously (all), all non-scleractinian cnidarians (non-scleractinia), and solely scleractinians (Scleractinia). Emboldened p-values represent those significant after adjusting for false discovery rate

		Bray-Curtis			ASVs Observed			Shannon			Inverse Simpson		
	df	R ²	F	p	R ²	t	p	R ²	t	p	R ²	t	p
Cnidaria (all)													
Class	2	0.005	7.7	<0.001	0.001	5.5	<0.001	0.001	11.7	<0.001	0.001	6.1	<0.001
Order	5	0.02	11.04	<0.001	0.05	1.2	0.3	0.08	3.7	<0.001	0.04	1.14	0.3
Family	31	0.08	8.8	<0.001	0.2	2.9	0.004	0.002	0.4	0.7	0.1	2.06	0.04
Genus	51	0.08	4.9	<0.001	0.2	2.7	0.008	0.2	6.5	<0.001	0.1	2.5	0.001
Tissue Type	6	0.01	7.3	<0.001	0.01	0.9	0.4	0.02	2.05	0.04	0.01	0.5	0.6
Lifestage	6	0.02	11.3	<0.001	0.005	5.6	<0.001	0.03	12.8	<0.001	0.005	6.1	<0.001
Collection Depth	4	0.01	8.5	<0.001	0.07	0.8	0.4	0.1	2.9	0.007	0.05	1.6	0.1
Collection Month	11	0.05	4.6	<0.001	0.06	4.5	<0.001	0.09	10.11	<0.001	0.05	4.7	<0.001
Symbiodiniaceae?	3	0.002	2.07	0.004	0.04	1.9	0.05	0.1	4.4	<0.001	0.04	1.2	0.2
WaterBody	24	0.05	6.4	<0.001	0.4	1.2	0.2	0.25	2.8	<0.001	0.2	1.8	0.08
Extraction Kit	6	0.02	8.3	<0.001	0.02	1.3	0.2	0.1	2.7	0.008	0.09	1.2	0.2
Cnidaria (Non_scleractinia)													
Class	2	0.03	11.7	<0.001	0.02	5.7	<0.001	0.02	7.4	<0.001	0.02	4.5	<0.001
Order	4	0.04	8.2	<0.001	0.04	1.7	0.09	0.2	2.9	0.004	0.09	2.4	0.02
Family	12	0.2	14.2	<0.001	0.05	1.2	0.7	0.3	1.5	0.1	0.04	1.8	0.5
Genus	11	0.2	13.4	<0.001	0.05	1.5	0.6	0.3	1.4	0.2	0.03	4.7	0.6
Tissue Type	5	0.02	3.3	<0.001	0.003	1	0.3	0.005	2.1	0.04	0.01	1.8	0.5
Lifestage	1	0.005	4.3	<0.001	0.2	5.9	<0.001	0.001	8.3	<0.001	0.004	5.1	<0.001
Collection Depth	2	0.008	3.7	<0.001	0.04	2.1	0.04	0.2	5.09	<0.001	0.1	4.7	<0.001
Collection Month	8	0.02	4.3	<0.001	0.1	0.8	0.4	0.09	2.4	0.008	0.1	0.6	0
Symbiodiniaceae?	2	0.01	3.4	<0.001	0.004	3.6	0.002	0.001	5.07	<0.001	0.008	2.6	0.5
WaterBody	8	0.03	3.7	<0.001	0.2	1.9	0.1	0.3	4.2	0.007	0.2	5.2	<0.001
Extraction Kit	7	0.009	3.5	<0.001	0.07	1.1	0.9	0.1	1.1	0.7	0.02	1.3	0.9
Cnidaria (Scleractinia)													
Family	19	0.06	7.2	<0.001	0.07	4.8	<0.001	0.1	9.9	<0.001	0.08	3.9	<0.001
Genus	40	0.05	3.4	<0.001	0.1	2.5	0.01	0.2	6.7	<0.001	0.1	2.4	0.02
Tissue Type	3	0.01	11.5	<0.001	0.008	3.8	<0.001	0.02	9.3	<0.001	0.009	3.9	<0.001
Lifestage	6	0.03	10.8	<0.001	0.006	4.9	<0.001	0.04	10.5	<0.001	0.007	5.2	<0.001
Collection Depth	4	0.01	7.5	<0.001	0.08	1.2	0.2	0.1	0.7	0.5	0.04	2.3	0.02
Collection Month	11	0.03	7.5	<0.001	0.04	4.2	<0.001	0.07	8.9	<0.001	0.05	3.9	<0.001
Symbiodiniaceae?	3	0.002	1.9	<0.001	0.03	1.9	0.05	0.04	4.1	<0.001	0.02	1.2	0.2
WaterBody	19	0.05	6.9	<0.001	0.43	6.7	<0.001	0.3	5.8	<0.001	0.2	4.9	<0.001
Extraction Kit	5	0.02	8.9	<0.001	0.1	1.6	0.1	0.2	3.6	0.001	0.1	1.3	0.2

Supplementary Table 3. Analysis of the effect of different variables on the structure (Bray-Curtis) and diversity (Observed, Shannon, Inverse-Simpson) on unrarified samples (V4 library). These include the analysis of all cnidarian samples simultaneously (all), all non-scleractinian cnidarians (non-scleractinia), and solely scleractinians (Scleractinia). Emboldened p-values represent those significant after adjusting for false discovery rate

		Bray-Curtis			ASVs Observed			Shannon			Inverse Simpson		
	df	R ²	F	p	R ²	t	p	R ²	t	p	R ²	t	p
Cnidaria (all)													
Class	2	0.007	9.6	<0.001	0.003	6.8	<0.001	0.004	14.9	<0.001	0.002	6.6	<0.001
Order	5	0.02	11.6	<0.001	0.07	1.3	0.19	0.1	3.9	<0.001	0.04	1.4	0.2
Family	28	0.1	10.9	<0.001	0.2	2.8	0.004	0.03	0.9	0.4	0.2	1.9	0.05
Genus	44	0.08	5.7	<0.001	0.02	3.4	<0.001	0.3	7.2	<0.001	0.2	2.7	0.006
Tissue Type	6	0.02	8.5	<0.001	0.02	1.2	0.02	0.01	2.5	0.01	0.012	0.5	5.9
Lifestage	4	0.02	12.2	<0.001	0.004	6.8	<0.001	0.01	15.2	<0.001	0.003	6.4	<0.001
Collection Depth	4	0.02	11.8	<0.001	0.1	4.5	<0.001	0.2	3.2	0.002	0.06	1.7	0.09
Collection Month	11	0.04	10.8	<0.001	0.06	5.3	<0.001	0.1	11.3	<0.001	0.05	4.7	<0.001
Symbiodiniaceae?	2	0.002	2.6	0.004	0.08	2.4	0.02	0.2	4.5	<0.001	0.05	1.2	0.2
WaterBody	21	0.06	8.9	<0.001	0.03	1.6	0.1	0.3	2.9	0.008	0.2	1.7	0.09
Extraction Kit	6	0.02	8.2	<0.001	0.017	1.7	0.1	0.1	3.9	<0.001	0.07	1.2	0.2
Cnidaria (Non_scleractinia)													
Class	2	0.04	15.4	<0.001	0.03	6.1	<0.001	0.02	7.9	<0.001	0.02	4.5	<0.001
Order	4	0.05	9.4	<0.001	0.1	2.3	0.02	0.2	2.9	0.004	0.1	3.6	<0.001
Family	11	0.2	16.2	<0.001	0.4	0.5	0.6	0.3	1.6	0.1	0.4	0.9	0.4
Genus	11	0.2	12.9	<0.001	0.5	0.5	0.6	0.3	1.4	0.2	0.3	0.5	0.6
Tissue Type	5	0.03	4.2	<0.001	0.01	1.1	0.3	0.01	2.3	0.02	0.02	0.8	0.4
Lifestage	1	0.007	5.5	<0.001	0.004	6.5	<0.001	0.001	8.9	<0.001	0.001	5.1	<0.001
Collection Depth	2	0.01	4.5	<0.001	0.07	3.3	0.003	0.1	5.3	<0.001	0.06	4.6	<0.001
Collection Month	8	0.03	4.1	<0.001	0.13	0.8	0.4	0.09	2.3	0.02	0.1	0.4	0.7
Symbiodiniaceae?	2	0.02	3.8	<0.001	0.001	3.9	0.001	0.007	5.3	<0.001	0.08	2.5	0.02
WaterBody	7	0.04	4.2	<0.001	0.2	3.2	<0.001	0.3	4.9	0.002	0.2	4.8	<0.001
Extraction Kit	6	0.008	4.1	<0.001	0.05	1.5	0.2	0.1	2.5	0.05	0.02	0.9	0.4
Cnidaria (Scleractinia)													
Family	17	0.08	10.05	<0.001	0.12	5.3	<0.001	0.2	12.1	<0.001	0.09	3.9	<0.001
Genus	33	0.06	4.3	<0.001	0.2	3.4	<0.001	0.2	7.4	<0.001	0.1	2.5	0.01
Tissue Type	3	0.02	13.3	<0.001	0.01	4.5	<0.001	0.01	11.6	<0.001	0.008	3.9	<0.001
Lifestage	4	0.02	11.6	<0.001	0.004	5.8	<0.001	0.02	12.9	<0.001	0.003	5.5	<0.001
Collection Depth	2	0.02	19.2	<0.001	0.12	1.5	0.12	0.2	0.4	0.7	0.04	2.1	0.04
Collection Month		0.04	8.8	<0.001	0.05	4.6	<0.001	0.07	10.7	<0.001	0.04	4.4	<0.001
Symbiodiniaceae?	2	0.002	2.4	<0.001	0.04	2.4	0.02	0.08	4.4	<0.001	0.02	1.1	0.2
WaterBody	18	0.08	9.03	<0.001	0.4	5.6	<0.001	0.3	6.5	<0.001	0.2	4.4	<0.001
Extraction Kit	5	0.02	8.9	<0.001	0.02	1.7	0.1	0.2	4.1	<0.001	0.1	1.3	0.2

Supplementary Table 4. Analysis of the Bray-Curtis dispersion (distance from centroid) for all cnidarian orders (V4 library). These include the analysis of all rarefied data (minimum 5000 reads), and unrarefied data.

Cnidaria (rarefied)								
	Actiniaria	Alcyonacea	Anthoathecata	Antipatharia	Helioporacea	Rhizostomeae	Scleractinia	Zoantharia
Actiniaria		2.00E-03	9.98E-01	9.99E-04	5.05E-01	1.70E-02	9.99E-04	0.4675
Alcyonacea	3.03E-06		9.99E-04	1.70E-02	5.00E-03	2.00E-03	9.99E-04	0.016
Anthoathecata	9.96E-01	8.94E-07		9.99E-04	4.27E-01	1.30E-02	9.99E-04	0.4366
Antipatharia	2.83E-04	2.07E-02	1.08E-04		4.00E-03	1.39E-01	9.99E-04	0.015
Helioporacea	4.72E-01	8.09E-06	4.32E-01	4.74E-06		2.10E-02	9.99E-04	0.1139
Rhizostomeae	1.41E-02	1.56E-04	9.19E-03	1.32E-01	1.74E-03		9.99E-04	0.2208
Scleractinia	4.69E-165	6.29E-43	6.55E-183	6.26E-143	2.16E-169	8.98E-167		0.001
Zoantharia	4.01E-01	2.56E-03	3.66E-01	8.48E-03	1.22E-01	2.32E-01	1.49E-121	
Cnidaria (unrarefied)								
Actiniaria		9.99E-04	4.28E-01	2.70E-02	1.06E-01	1.20E-01	9.99E-04	0.8042
Alcyonacea	1.40E-10		9.99E-04	9.99E-04	9.99E-04	9.99E-04	9.99E-04	0.001
Anthoathecata	3.77E-01	3.55E-15		2.00E-03	2.23E-01	5.00E-03	9.99E-04	0.1698
Antipatharia	2.13E-02	1.05E-05	1.88E-05		2.00E-03	3.10E-01	9.99E-04	0.032
Helioporacea	1.16E-01	6.19E-15	2.61E-01	1.35E-06		5.00E-03	9.99E-04	0.05
Rhizostomeae	1.17E-01	1.04E-08	2.20E-03	3.01E-01	2.19E-04		9.99E-04	0.2498
Scleractinia	5.28E-162	2.49E-82	2.99E-271	3.15E-199	1.84E-249	5.51E-201		0.001
Zoantharia	7.76E-01	4.41E-06	1.85E-01	3.07E-02	5.46E-02	2.72E-01	7.74E-151	

Supplementary Table 5. Analysis of the Bray-Curtis dispersion (distance from centroid) for all scleractinian orders (V4 library). These include the analysis of all rarefied data (minimum 5000 reads), and unrarefied data.

Cnidaria_nonscleractinia (rarefied)							
	Actiniaria	Alcyonacea	Anthoathecata	Antipatharia	Helioporacea	Rhizostomeae	Zoantharia
Actiniaria		9.99E-04	3.99E-01	2.40E-02	1.19E-01	1.42E-01	0.7712
Alcyonacea	1.38E-10		9.99E-04	9.99E-04	9.99E-04	9.99E-04	0.001
Anthoathecata	3.78E-01	3.72E-15		9.99E-04	2.80E-01	5.00E-03	0.1798
Antipatharia	2.13E-02	1.04E-05	1.98E-05		9.99E-04	3.10E-01	0.032
Helioporacea	1.16E-01	6.04E-15	2.62E-01	1.35E-06		9.99E-04	0.0519
Rhizostomeae	1.17E-01	1.06E-08	2.33E-03	3.02E-01	2.29E-04		0.2677
Zoantharia	7.76E-01	4.38E-06	1.87E-01	3.08E-02	5.46E-02	2.74E-01	
Cnidaria_nonscleractinia (unrarefied)							
Actiniaria		9.99E-04	9.72E-01	9.99E-04	5.20E-01	1.60E-02	0.3766
Alcyonacea	2.62E-06		9.99E-04	3.50E-02	9.99E-04	9.99E-04	0.003
Anthoathecata	9.61E-01	1.37E-06		9.99E-04	4.69E-01	1.90E-02	0.3916
Antipatharia	2.42E-04	2.28E-02	1.61E-04		9.99E-04	1.34E-01	0.009
Helioporacea	4.87E-01	9.52E-06	4.37E-01	5.11E-06		6.99E-03	0.1199
Rhizostomeae	1.37E-02	1.56E-04	1.21E-02	1.25E-01	2.03E-03		0.2218
Zoantharia	3.96E-01	2.51E-03	3.95E-01	7.81E-03	1.27E-01	2.34E-01	