

# Environmental DNA identifies coastal plant community shift 1,000 years ago in Torrens Island, South Australia.

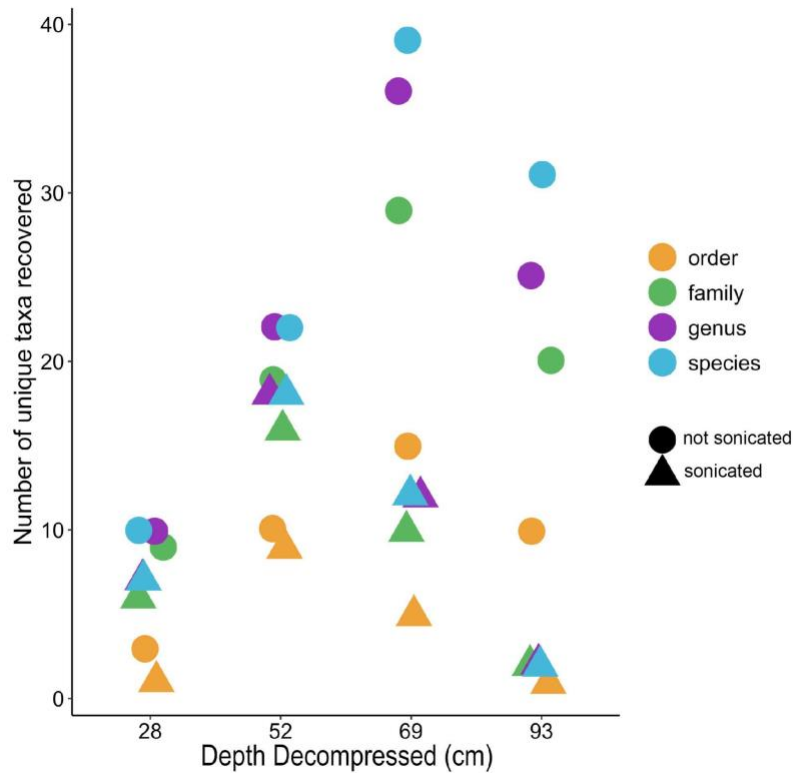
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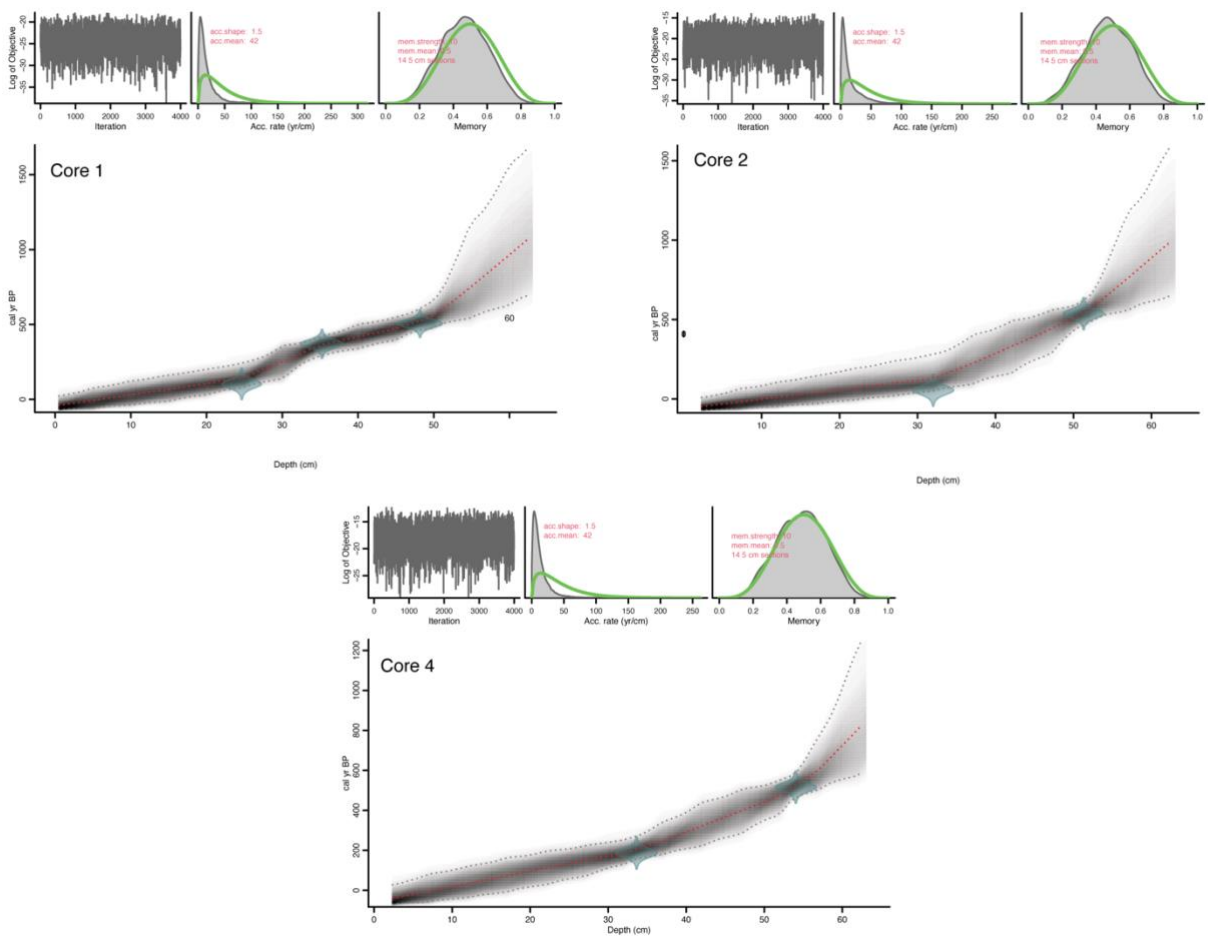
## Supplementary Material

**Supplementary Table 1.** List of target chloroplast gene regions screened for as 'on target' in the bait set used to target capture eDNA.

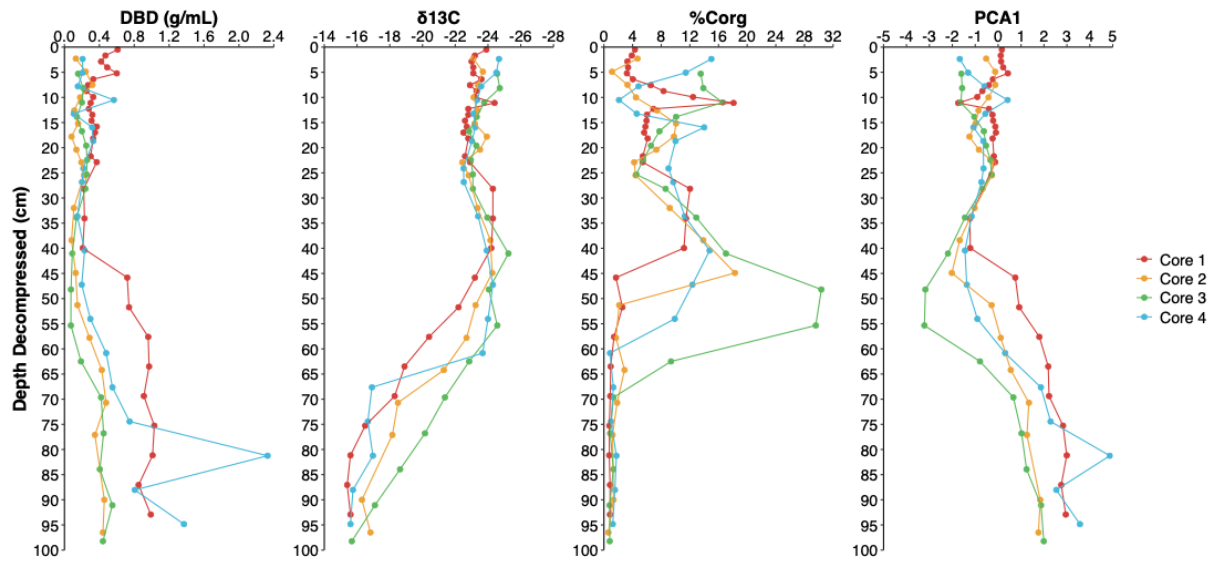
<b>Gene</b>	<b>Name</b>	<b>Target coordinates of <i>Avicennia marina</i> genome (Genbank: MN307164)</b>
psbA	photosystem II protein D1	479-1,537
matK	maturase K	2032-3621
psbK	photosystem II protein K	7389-7574
atpF	ATP synthase CF0 subunit I	11640-12894
atpH	ATP synthase CF0 subunit III	13262-13507
atpI	ATP synthase CF0 subunit IV	14508-15242
psbD	photosystem II protein D2	32868-33929
psbZ	photosystem II protein Z	35955-36143
rbcl	ribulose-1,5-bisphosphate carboxylase/oxygenase large subunit	55048-56508
atpB	ATP synthase CF1 beta subunit	52774-54270
accD	acetyl-CoA carboxylase carboxyltransferase beta subunit	57200-58681
petA	cytochrome f	62219-63181
psbE-psbF	photosystem II cytochrome b559 alpha subunit/photosystem II cytochrome b559 beta subunit	64710-64965
psbN-psbH	photosystem II protein N/photosystem II phosphoprotein	74136-74594
petD	cytochrome b6/f complex subunit IV	76279-77493
rpl14-rpl16	ribosomal protein L14/ribosomal protein L16	80938-82228
rpoC1	$\beta$ subunit of RNA polymerase	20713-23539
ndhK	NADH-plastoquinone oxidoreductase subunit K	49046-49723
ndhF	NADH-plastoquinone oxidoreductase subunit 5	124837-127068
ndhC	NADH-plastoquinone oxidoreductase subunit 3	49779-50141



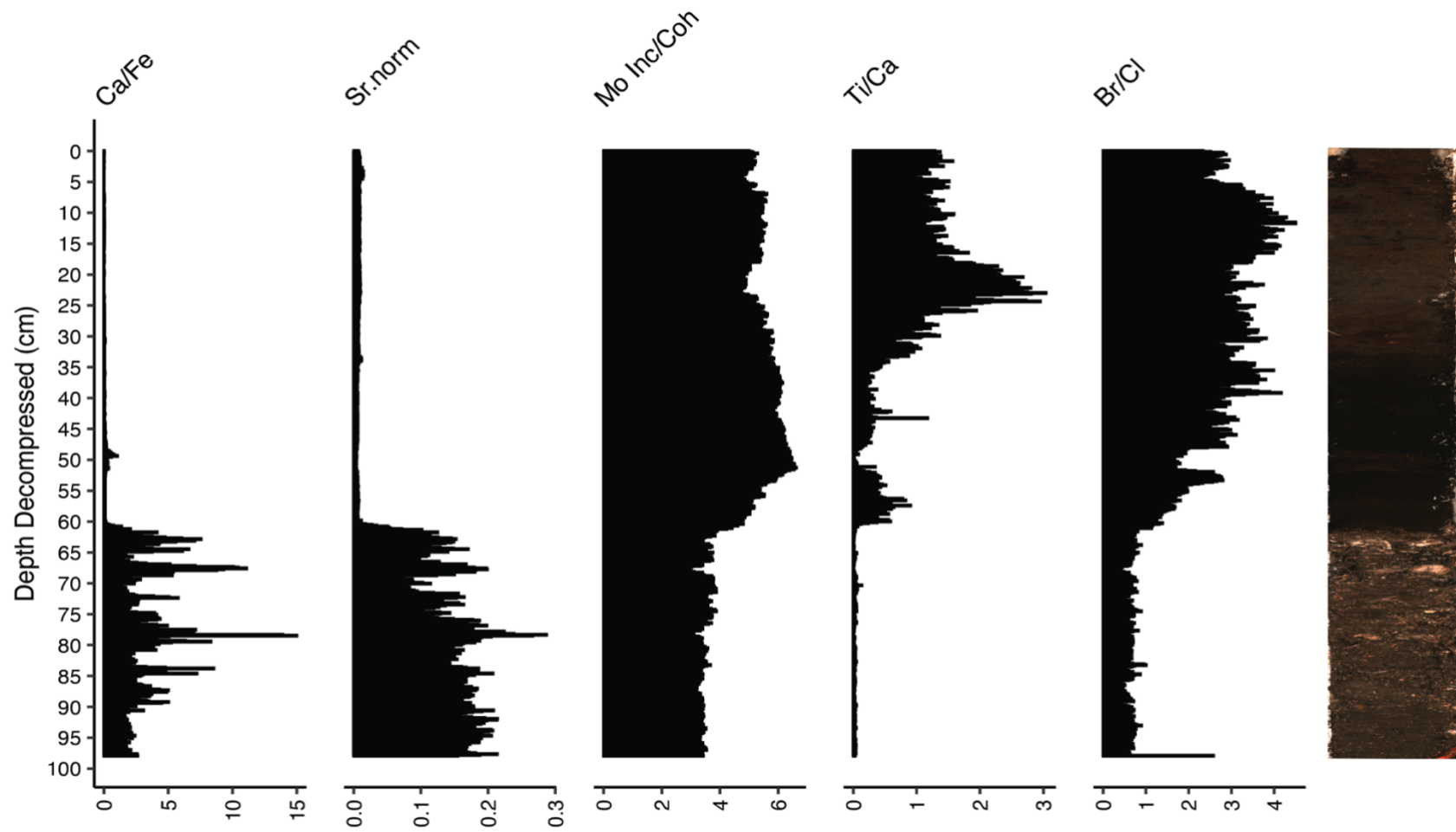
**Supplementary Figure 1.** Results of the sonication trial on Core 1 to determine whether extracted sediment DNA required sonication prior to library preparation and targeted capture. Colours indicate the taxonomic resolution achieved by the sample and shapes indicate whether the sample had been sonicated or not. The number of unique taxa recovered (prior to filtering) is on the y-axis and depth decompressed (cm) is on the x-axis. The more degraded DNA in deeper sections (i.e., at 69 and 93 cm) of the core was more impacted by sonication where the number of unique taxa was substantially lower than non-sonicated samples. Although shallower sections of the core were not as impacted by sonication, the DNA recovered was not sonicated in any soil sample in this study.



**Supplementary Figure 2.** Age-depth model outputs for cores 1, 2 and 4. Models were run using the ‘rbacon’ package in R and specifying the end depth at 63 cm (as indicated by changepoint analyses using principal component 1 scores of %C<sub>org</sub>, δ<sup>13</sup>C and dry bulk density) as this was deemed to be the start of the hiatus. The lack of pre-hiatus radiocarbon data for core 3 meant a model could not be run.



**Supplementary Figure 3.** Results of Dry Bulk Density in g/mL (DBD), stable organic carbon isotope composition ( $\delta^{13}\text{C}$ ) and % organic carbon content (%Corg) conducted on all four soil cores and plotted against decompressed depth. The far-right plot shows the results of the Principal Components Analysis on these variables across all four cores, where PC1 explained 74% of the variance. The PC1 scores obtained for each core are plotted separately. Colours indicate cores.



**Supplementary Figure 4.** X-ray Fluorescence (XRF) results for the soil core designated Core 3. Element ratios represented here are Calcium/Iron (Ca/Fe), Strontium (Sr) (normalised to Molybdenum incoherent + coherent scattering), Molybdenum Compton (incoherent) and Rayleigh (coherent) scattering (Moly ratio), Titanium/Calcium (Ti/Ca) and Bromine/Chlorine (Br/Cl). A high-resolution photograph of Core 3 is provided (far right), taken at 200  $\mu\text{m}$  resolution.

**Supplementary Table 2.** Output of radiocarbon ( $^{14}\text{C}$ ) dating results for each soil core. Radiocarbon ages are calibrated against the Southern Hemisphere calibration curve SHCal20. Where marine influence is identified, a mixed SHCal20/Marine20 calibration is used. Marine calibrations included a local marine reservoir correction  $\Delta R$  using <https://delta-r-calc.jcu.io/>. Calibrations were done using OxCal 4.4.4 using a P-Sequence deposition model. Calibrated ages provide both unmodelled and modelled age ranges and median values and refer to Cal BP where before present is 1950.

Core ID	Decompressed Depth (cm)	$\delta^{13}\text{C}$ (‰)	Percent Modern Carbon (pMC, $1\sigma$ )	Conventional Radiocarbon age (yr BP, $1\sigma$ )	% Marine	Unmodelled Calibrated age range (cal yr BP, 68.3%)	Unmodelled Calibrated Age range (cal yr BP, 95.4%)	Modelled Calibrated age range (cal yr BP, 68.3%)	Modelled Calibrated Age range (cal yr BP, 95.4%)	Median Modelled Calibrated Age (cal yr BP)
Core 1	24.64	-22.9	98.24 $\pm$ 0.32	143 $\pm$ 26	-	252 - ...	259 - ...	255 - 9	261 - 3	103
Core 1	35.24	-24.3	95.29 $\pm$ 0.28	388 $\pm$ 24	-	487 - 328	492 - 322	455 - 325	486 - 320	371
Core 1	48.19	-23.2	94.06 $\pm$ 0.27	492 $\pm$ 23	-	515 - 495	531 - 490	516 - 496	531 - 490	506
Core 1	63.50	-18.9	72.82 $\pm$ 0.21	2548 $\pm$ 23	50%	2461 - 2341	2667 - 2301	2446 - 2338	2608 - 2181	2391
Core 1	91.76	-15.6	68.53 $\pm$ 0.33	3036 $\pm$ 39	65%	3024 - 2846	3111 - 2796	3054 - 2868	3145 - 2781	2958
Core 2	32	-23.0	98.61 $\pm$ 0.26	110 $\pm$ 25	-	240 - 25	252 - ...	136 - 22	243 - 3	55
Core 2	51.3	-24.2	93.18 $\pm$ 0.29	570 $\pm$ 25	-	548 - 522	621 - 507	550 - 522	622 - 508	537
Core 2	77.1	-17.3	71.33 $\pm$ 0.22	2,715 $\pm$ 25	50%	2725 - 2543	2751 - 2486	2724 - 2540	2748 - 2471	2624
Core 2	96.5	-13.3	62.30 $\pm$ 0.21	3,800 $\pm$ 30	75%	3959 - 3763	4065 - 3680	3908 - 3722	4049 - 3630	3908
Core 3	33.89	-25.1	98.24 $\pm$ 0.24	145 $\pm$ 20	-	252 - ...	256 - ...	252 - 3	256 - 3	94
Core 3	98.24	-15.4	67.43 $\pm$ 0.20	3,165 $\pm$ 25	65%	3184 - 3010	3311 - 2935	3205 - 3026	3319 - 2941	3109
Core 4	33.64	-23.2	97.28 $\pm$ 0.25	220 $\pm$ 20	-	280 - 150	286 - 143	214 - 148	286 - 142	187
Core 4	54.04	-24.1	93.71 $\pm$ 0.24	520 $\pm$ 20	-	523 - 504	535 - 498	524 - 505	535 - 499	516
Core 4	94.84	-14.7	60.57 $\pm$ 0.20	4,030 $\pm$ 30	70%	4287 - 4089	4380 - 3995	4280 - 4086	4379 - 3985	4179

**Supplementary Table 3.** Principal Component Analysis results for Dry Bulk Density in g/mL (DBD), stable organic carbon isotope composition ( $\delta^{13}\text{C}$ ) and % organic carbon content (%C<sub>org</sub>) and elements Calcium/Iron (Ca/Fe), Strontium (Sr) (normalised to Molybdenum incoherent + coherent scattering), Molybdenum Compton (incoherent) and Rayleigh (coherent) scattering (Moly ratio), Titanium/Calcium (Ti/Ca) and Bromine/Chlorine (Br/Cl) (XRF). The variables included in the analysis are on the left and the R, R<sup>2</sup> and percent contributions to Principal Component 1 are recorded.

Variables	R	R <sup>2</sup>	Contribution to PC1
DBD, $\delta^{13}\text{C}$ and %C <sub>org</sub>			
DBD	0.86	0.74	33.41
$\delta^{13}\text{C}$	0.90	0.81	36.50
%C <sub>org</sub>	-0.82	0.67	30.09
XRF			
Ca/Fe	0.86	0.74	19.43
Sr.norm	0.96	0.92	24.01
Mo Inc/Coh	-0.90	0.83	21.38
Ti/Ca	-0.70	0.49	12.68
Br/Cl	-0.93	0.86	22.49