**Summary and ANOVA results from distance based RDA using transformed and standardized species matrix from Arabuko Sokoke Forest**

> summary(db.rda)

Call:

capscale(formula = Stand\_spec ~ EdgeDist + LeafLayer + Basal + Debris + StemSmall + StemLarge + Hab, distance = "bray", add = TRUE)

Partitioning of Lingoes adjusted squared Bray distance:

Inertia Proportion

Total 42.297 1.0000

Constrained 7.947 0.1879

Unconstrained 34.350 0.8121

Eigenvalues, and their contribution to the Lingoes adjusted squared Bray distance

Importance of components:

CAP1 CAP2 CAP3 CAP4 CAP5 CAP6 CAP7 CAP8

Eigenvalue 2.48646 1.55707 1.00175 0.84626 0.60643 0.52899 0.50026 0.420188

Proportion Explained 0.05879 0.03681 0.02368 0.02001 0.01434 0.01251 0.01183 0.009934

Cumulative Proportion 0.05879 0.09560 0.11928 0.13929 0.15363 0.16613 0.17796 0.187894

MDS1 MDS2 MDS3 MDS4 MDS5 MDS6 MDS7 MDS8 MDS9

Eigenvalue 3.89195 3.29162 2.70900 2.51335 1.92724 1.57269 1.29398 1.21233 1.15202

Proportion Explained 0.09201 0.07782 0.06405 0.05942 0.04556 0.03718 0.03059 0.02866 0.02724

Cumulative Proportion 0.27991 0.35773 0.42178 0.48120 0.52676 0.56394 0.59453 0.62320 0.65043

MDS10 MDS11 MDS12 MDS13 MDS14 MDS15 MDS16 MDS17 MDS18

Eigenvalue 0.96189 0.83100 0.75661 0.72425 0.69149 0.64264 0.54702 0.50977 0.4651

Proportion Explained 0.02274 0.01965 0.01789 0.01712 0.01635 0.01519 0.01293 0.01205 0.0110

Cumulative Proportion 0.67317 0.69282 0.71071 0.72783 0.74418 0.75937 0.77231 0.78436 0.7954

MDS19 MDS20 MDS21 MDS22 MDS23 MDS24 MDS25 MDS26

Eigenvalue 0.4398 0.41664 0.390733 0.359915 0.356330 0.350184 0.342762 0.341856

Proportion Explained 0.0104 0.00985 0.009238 0.008509 0.008424 0.008279 0.008104 0.008082

Cumulative Proportion 0.8058 0.81560 0.824839 0.833349 0.841773 0.850052 0.858156 0.866238

MDS27 MDS28 MDS29 MDS30 MDS31 MDS32 MDS33 MDS34

Eigenvalue 0.341856 0.341856 0.341856 0.341856 0.341856 0.341856 0.326722 0.318887

Proportion Explained 0.008082 0.008082 0.008082 0.008082 0.008082 0.008082 0.007724 0.007539

Cumulative Proportion 0.874320 0.882402 0.890484 0.898567 0.906649 0.914731 0.922456 0.929995

MDS35 MDS36 MDS37 MDS38 MDS39 MDS40 MDS41 MDS42

Eigenvalue 0.295915 0.292086 0.283335 0.272357 0.259147 0.256976 0.235557 0.219662

Proportion Explained 0.006996 0.006906 0.006699 0.006439 0.006127 0.006075 0.005569 0.005193

Cumulative Proportion 0.936991 0.943896 0.950595 0.957034 0.963161 0.969236 0.974805 0.979999

MDS43 MDS44 MDS45 MDS46 MDS47 MDS48

Eigenvalue 0.207459 0.179308 0.159733 0.128084 0.106765 0.064655

Proportion Explained 0.004905 0.004239 0.003776 0.003028 0.002524 0.001529

Cumulative Proportion 0.984903 0.989143 0.992919 0.995947 0.998471 1.000000

Accumulated constrained eigenvalues

Importance of components:

CAP1 CAP2 CAP3 CAP4 CAP5 CAP6 CAP7 CAP8

Eigenvalue 2.4865 1.5571 1.0018 0.8463 0.60643 0.52899 0.50026 0.42019

Proportion Explained 0.3129 0.1959 0.1260 0.1065 0.07631 0.06656 0.06295 0.05287

Cumulative Proportion 0.3129 0.5088 0.6348 0.7413 0.81762 0.88418 0.94713 1.00000

Scaling 2 for species and site scores

\* Species are scaled proportional to eigenvalues

\* Sites are unscaled: weighted dispersion equal on all dimensions

\* General scaling constant of scores: 6.976302

Species scores

CAP1 CAP2 CAP3 CAP4 CAP5 CAP6

ARST 0.001745 -0.637069 -0.870966 0.41041 0.321152 0.026478

CHDI -0.244034 -0.158175 0.057307 -0.03830 0.021542 -0.020307

COTR 0.891046 0.452743 0.143194 -0.19991 0.261826 0.050005

DITY -0.343446 -0.089739 0.060685 -0.49130 -0.147045 -0.332417

GAPR -0.494605 -0.298956 -0.186837 -0.15338 0.033208 0.155977

HEBA -0.151666 -0.182693 0.106549 0.31688 0.085398 -0.022604

HEMA 0.183869 -0.073135 -0.085888 0.01830 -0.042874 0.010000

HEMI 0.191503 0.073878 0.009298 -0.04410 0.027580 0.046705

HEPL 0.447462 0.011101 0.001999 0.01811 -0.009615 0.003560

LALO -0.343446 -0.089739 0.060685 -0.49130 -0.147045 -0.332417

LYMO -0.177176 0.202341 0.017127 -0.01210 0.006770 -0.017113

MOAF 0.179937 -0.004983 -0.147356 -0.04822 0.386510 -0.105028

MOSU 0.356748 -0.637103 -0.378748 -0.02117 -0.145304 -0.260429

NAME -0.666273 0.502814 -0.145759 0.04343 -0.376632 -0.382244

NUBO -0.228654 0.210155 0.034923 -0.21016 -0.008076 0.007317

PSOR 0.459247 0.135692 0.202305 0.04712 0.097512 -0.120806

TRMA 0.387048 -0.004209 -0.053044 -0.02206 0.014014 0.044619

TRPL -0.354491 -0.199208 0.133964 0.08800 -0.026925 0.072704

TRVA -0.243663 -0.181072 -0.168817 -0.05119 -0.040544 0.292423

VAAL -0.015868 -0.413785 -0.176281 -0.30418 -0.383090 0.155650

Site scores (weighted sums of species scores)

CAP1 CAP2 CAP3 CAP4 CAP5 CAP6

1 -0.424189 -0.758645 0.13778 2.81649 1.39851 -0.34351

2 -0.642708 -0.433869 -1.66220 -0.84503 0.09717 2.30074

3 0.030184 -0.087145 0.30155 0.22839 -0.39857 2.69134

4 -0.048200 -0.618571 -1.95333 0.94163 -1.72196 0.78565

5 -1.213692 -1.639200 0.85135 -1.32520 1.29716 0.01679

6 1.862102 -0.122881 0.97773 -0.71486 -0.13786 0.46264

7 -0.435285 0.686986 -0.52913 -1.21689 0.96282 2.42688

8 -1.151083 -1.842070 0.60293 -1.79090 0.79190 -0.62070

9 -0.704433 -0.920843 -1.77077 -1.39086 0.72443 1.09359

10 -0.994809 -1.420562 1.68508 1.38121 -1.83612 1.80829

11 0.210498 -1.475573 1.68651 -1.46117 0.67338 -0.51925

12 -1.283819 -1.375451 1.76875 1.41810 -0.23998 1.26826

13 -1.376313 -1.820213 0.74021 -1.77799 1.21248 -1.04074

14 -1.669683 -2.197755 2.24019 0.25305 0.02864 0.64836

15 -1.801206 0.496105 0.57226 -1.16461 0.76495 -0.70319

16 -0.621205 0.485776 1.54370 -0.98643 0.76690 -1.10797

17 -0.216978 -0.811952 -1.37601 -1.51014 -2.71429 1.15871

18 0.354481 2.227906 0.82946 0.36025 -0.61594 0.12885

19 -1.294007 2.490117 0.20821 0.29761 0.13020 0.26690

20 -0.006961 -0.660084 -1.99733 0.92475 -2.27035 1.02377

21 -0.586834 -0.217708 -0.02443 1.09239 -0.82983 2.03066

22 -1.031757 -1.380943 1.31174 0.74585 -1.37872 1.96304

23 -1.395347 3.051569 -0.70668 0.44012 -0.50156 -0.23608

24 -0.751110 0.860138 -1.08312 0.05052 -2.36970 -3.46170

25 -0.785229 1.720576 -1.67353 1.75376 -2.03166 -0.14744

26 -1.400655 3.001163 -0.64646 0.93063 -0.55519 -0.25396

27 -1.013389 2.500902 -0.49950 -0.95403 0.74820 1.46674

28 -0.289946 0.234705 -1.08886 -0.34173 2.82992 -1.19834

29 -0.986337 -1.185583 1.62394 1.91717 -0.58751 1.44286

30 0.875686 -0.627225 0.50384 3.30339 1.17696 -1.43088

31 2.044236 -0.124927 1.49059 0.17118 -1.59090 -0.68461

32 2.143166 0.136095 0.40069 0.53544 -0.61527 0.36633

33 2.301338 0.187497 0.59617 -0.18964 0.74114 -0.10342

34 1.951508 0.100893 1.10992 -0.04052 0.39086 0.04648

35 1.639798 -0.197179 -1.04738 1.07946 -1.57773 0.64224

36 -1.109994 2.574812 -0.08856 0.42971 0.75693 -0.44380

37 0.362063 0.187040 -0.55045 -0.69309 1.46005 0.29173

38 1.249047 -0.378903 -0.76170 1.03965 -1.90083 0.38800

39 -0.544483 -0.854838 0.38107 -1.10835 1.13129 -0.11074

40 0.294672 1.350603 0.21567 -0.52994 0.69187 0.52919

41 1.430715 0.009317 -0.70854 -0.31168 0.45268 1.12871

42 -1.033166 -1.687612 0.66478 -2.09383 0.80753 -1.70435

43 -1.282428 2.460109 0.02431 0.21051 0.31233 -1.26694

44 0.092857 0.288380 -0.30133 -0.14748 0.76940 -0.61834

45 -1.275464 -1.859030 0.30509 -1.66160 1.49153 -2.10651

46 0.430243 -1.074772 -2.22934 0.05214 -1.23131 -2.12203

47 0.858109 -1.140500 1.22885 -1.45908 1.24008 -1.07669

48 1.203709 2.132940 0.19701 0.72708 -0.50938 0.06954

49 0.438531 -0.842856 -0.51232 -0.91532 0.12650 0.04184

50 2.264909 0.113207 1.05577 -0.21369 -0.14862 -0.96650

51 2.318089 0.137883 0.86082 -0.67269 0.39278 -0.44943

52 2.349020 0.141449 0.78121 -0.31678 -0.23764 0.11668

53 -0.206719 -1.105881 -4.04237 1.75870 2.41411 0.03153

54 1.200244 -0.421675 -1.80224 -0.08832 -1.07438 0.83367

55 0.340935 2.559478 1.09311 -0.06687 0.73922 -0.93505

56 -0.144289 -0.931700 -0.49870 3.58523 0.29847 -1.57408

57 -0.524422 0.080499 -0.43600 -2.45570 -0.74512 -2.24373

Site constraints (linear combinations of constraining variables)

CAP1 CAP2 CAP3 CAP4 CAP5 CAP6

1 -0.970590 -0.287745 0.34433 0.73500 0.57815 1.099976

2 -0.419184 -0.440865 -0.77102 -0.23539 -0.21268 1.603418

3 -0.118092 -0.081642 0.69114 0.44553 0.09241 1.310415

4 -0.239746 -0.605195 -0.25606 -0.54477 0.01279 0.816723

5 -0.686245 -0.082242 0.68502 0.71683 0.55976 1.251878

6 0.267388 -0.509531 -0.28789 -1.01310 -0.09504 0.976684

7 -0.108407 0.235017 0.54288 -0.30603 0.85737 1.453577

8 -0.230864 -1.006262 -0.04292 -0.43601 -0.33654 0.265431

9 -1.282594 -1.014898 -0.93562 -1.17524 0.56109 0.107093

10 0.050340 -0.797690 1.03610 0.29871 -1.82470 0.427656

11 -0.397887 -0.324147 0.70613 0.20439 -0.30379 0.895895

12 -2.051747 -0.592221 1.28128 0.39004 1.00677 -0.407985

13 -1.869058 -0.906711 0.35935 -0.40404 0.40955 -0.384532

14 -1.676279 -0.868540 0.97355 0.57890 0.31475 -0.353408

15 -0.668274 0.008943 0.35977 -0.78613 -0.29872 1.260881

16 -0.578823 -0.293570 1.38840 -0.24587 -0.41000 0.321290

17 -0.027298 -1.007462 -0.80511 -1.39871 -2.00959 0.853459

18 -0.463246 -0.868282 0.52351 0.12553 -0.33190 0.238209

19 -0.591473 0.023703 0.99280 0.03352 -0.13305 1.095428

20 -0.398720 -0.649601 -0.08531 -0.20155 -0.76348 0.955304

21 -0.366701 -0.710397 -0.49820 0.76819 0.04506 1.284584

22 -0.218397 -0.617237 -0.05791 -1.27411 -1.01328 0.667111

23 -1.585908 2.909738 -1.01015 -0.21298 -0.61236 0.189607

24 -1.146217 1.224225 -0.66571 0.19971 -1.97571 -2.095925

25 -0.263782 1.316418 -0.88468 2.07241 -1.26915 -1.143264

26 -1.624509 2.680153 -0.83367 1.00127 -0.70749 0.161938

27 -0.725313 3.003813 -1.21510 -0.83942 -0.14520 0.255201

28 0.309553 -0.012132 -0.67301 -0.22171 2.02753 -0.575889

29 0.111959 0.272578 0.85694 1.62548 0.39028 -0.137814

30 0.857228 -0.634788 0.19956 2.56229 0.10121 -0.546929

31 1.592127 -0.518852 1.21494 1.18028 -2.67267 -0.798550

32 1.093813 0.174277 -0.06881 1.11606 -1.00546 0.631925

33 0.965736 0.432780 -0.30406 -0.36208 1.34197 -0.010825

34 0.917676 0.509698 0.09946 0.65621 0.84288 0.332732

35 0.402357 0.264941 -0.49842 0.46069 -0.20926 0.524500

36 0.746928 0.409469 0.12317 0.36052 0.97875 -0.004298

37 1.532903 1.102313 0.65400 -0.91924 1.37347 0.274190

38 0.690522 0.059236 0.18419 0.67066 -0.32771 -0.101881

39 0.313476 0.047872 0.31407 0.36239 0.16234 -0.471564

40 0.659947 0.970196 0.43814 -0.44357 0.34151 0.518185

41 1.139823 0.769606 0.03354 -0.25172 0.39773 0.614469

42 0.626795 -0.302750 0.13832 -1.18590 -0.30882 -1.411407

43 -0.507254 -0.112972 0.45389 -0.18210 0.19006 -1.278029

44 0.790061 0.330377 0.92397 0.21670 0.51152 -0.662407

45 -1.135542 -1.083511 -0.91568 -0.11593 0.90456 -2.033693

46 0.613728 -1.551185 -1.72982 -0.09735 -0.76223 -1.427985

47 1.108393 0.435946 0.00129 -0.38357 0.53363 0.008008

48 1.219363 0.087287 -0.30090 0.54878 -0.04865 0.228162

49 0.462471 -0.216927 -1.27350 -1.17541 -0.01754 -0.332667

50 0.874727 0.046913 1.28474 -0.54660 -0.20835 -1.396584

51 1.541746 0.413814 0.18803 -1.15319 0.83649 -0.469924

52 1.766723 0.430054 -0.04524 -0.27213 -0.28185 0.406070

53 0.003002 -1.551102 -3.97789 1.88724 1.68468 0.145187

54 1.100237 -0.430581 -1.42836 -1.13900 -0.66027 -0.258035

55 -0.561771 0.641941 1.29610 -0.93178 2.07208 -1.408068

56 -0.254257 -0.503782 0.99923 1.49654 0.58843 -1.640813

57 -0.590844 -0.218491 0.27716 -2.25918 -0.77136 -1.822710

Biplot scores for constraining variables

CAP1 CAP2 CAP3 CAP4 CAP5 CAP6

EdgeDist -0.14712 -0.186583 0.32984 0.29896 0.19481 -0.3972

LeafLayer 0.41629 0.290135 -0.17480 -0.46424 0.60167 -0.2402

Basal 0.36035 -0.244235 0.01295 0.43640 -0.35192 -0.4533

Debris 0.05114 -0.419248 -0.70654 0.49545 0.09779 -0.2322

StemSmall -0.31429 -0.130338 0.21670 -0.29032 0.19935 -0.6821

StemLarge 0.23505 -0.408639 -0.56667 -0.22316 -0.40048 -0.4341

HabCY -0.35878 0.747292 -0.30936 0.14906 -0.31611 -0.1767

HabM 0.69934 0.009971 -0.05837 0.05716 0.30439 -0.4984

Centroids for factor constraints

CAP1 CAP2 CAP3 CAP4 CAP5 CAP6

HabBR -0.5930 -0.518026 0.27928 -0.16929 -0.1498 0.7154

HabCY -1.0691 2.226870 -0.92186 0.44420 -0.9420 -0.5265

HabM 0.6131 0.008741 -0.05116 0.05011 0.2668 -0.4369

Permutation test for capscale under reduced model

Permutation: free

Number of permutations: 999

Model: capscale(formula = Stand\_spec ~ EdgeDist + LeafLayer + Basal + Debris + StemSmall + StemLarge + Hab, distance = "bray", add = TRUE)

Df SumOfSqs F Pr(>F)

**Model 8 7.947 1.3882 0.001 \*\*\***

Residual 48 34.350

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Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> anova(db.rda, by="axis", step=1000)

Permutation test for capscale under reduced model

Forward tests for axes

Permutation: free

Number of permutations: 999

Model: capscale(formula = Stand\_spec ~ EdgeDist + LeafLayer + Basal + Debris + StemSmall + StemLarge + Hab, distance = "bray", add = TRUE)

Df SumOfSqs F Pr(>F)

**CAP1 1 2.486 3.4745 0.002 \*\***

CAP2 1 1.557 2.1758 0.148

CAP3 1 1.002 1.3998 0.874

CAP4 1 0.846 1.1825 0.967

CAP5 1 0.606 0.8474 1.000

CAP6 1 0.529 0.7392 1.000

CAP7 1 0.500 0.6990 0.998

CAP8 1 0.420 0.5872 0.990

Residual 48 34.350

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Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> anova(db.rda, by="margin", step=1000)

Permutation test for capscale under reduced model

Marginal effects of terms

Permutation: free

Number of permutations: 999

Model: capscale(formula = Stand\_spec ~ EdgeDist + LeafLayer + Basal + Debris + StemSmall + StemLarge + Hab, distance = "bray", add = TRUE)

Df SumOfSqs F Pr(>F)

EdgeDist 1 0.699 0.9761 0.473

LeafLayer 1 0.731 1.0220 0.416

**Basal 1 1.011 1.4131 0.060 .**

**Debris 1 0.970 1.3550 0.076 .**

**StemSmall 1 1.084 1.5153 0.038 \***

StemLarge 1 0.739 1.0322 0.410

**Hab 2 2.444 1.7079 0.003 \*\***

Residual 48 34.350

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Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1