Salinization effects on macroinvertebrates

Contents

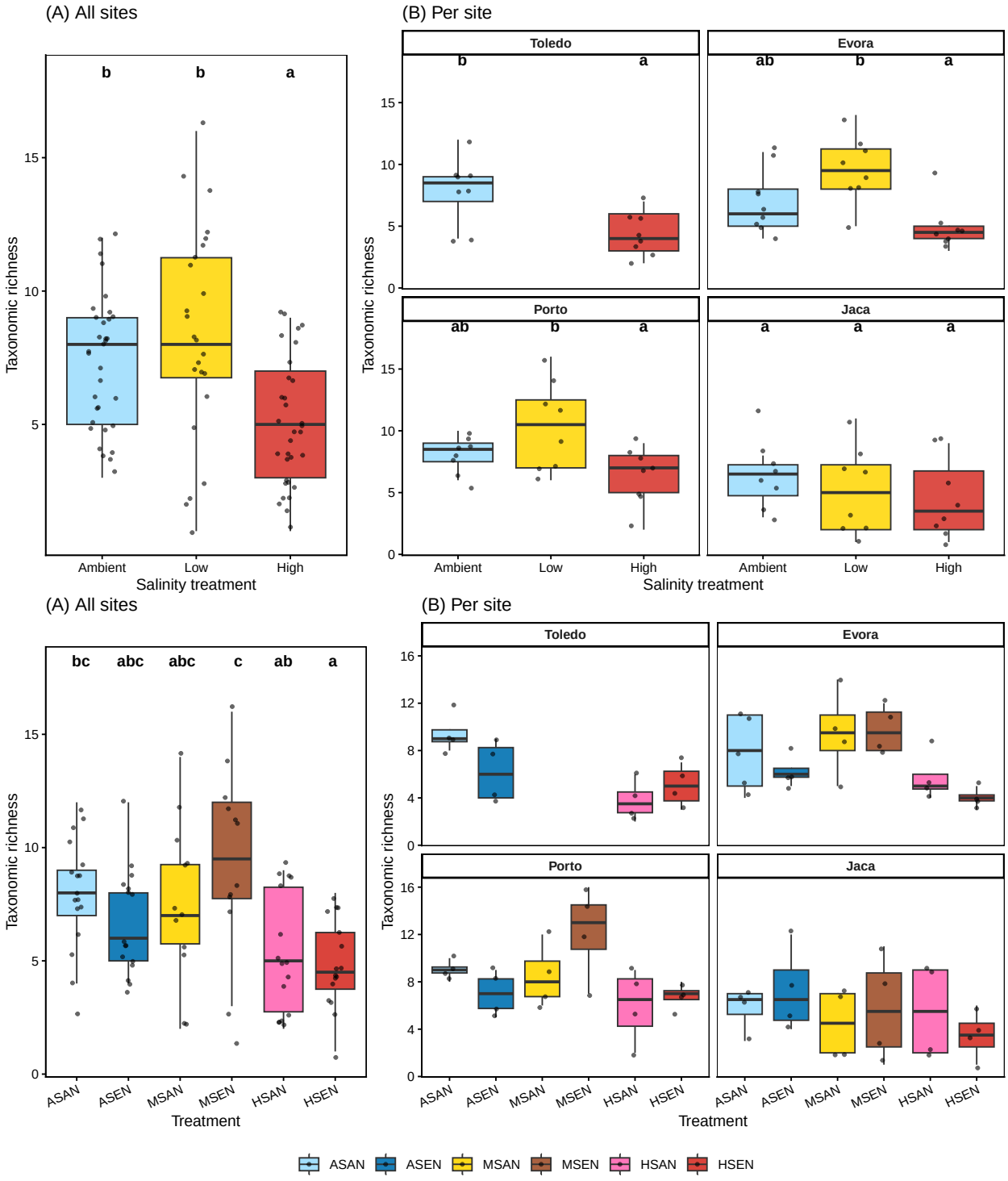
0.1 Data import and preparation

```
##  [1] "Ceratopogonidae" "Chironomidae"    "Culicidae_Culex" "Dolichopodidae"
##  [5] "Ephydridae"      "Limoniidae"      "Stratiomyidae"   "Syrphydae"
##  [9] "Psychodidae"     "Tabanidae"       "OLIGOCHAETA"
```

```
##  [1] "ACARI"                "Araneae"              "PSEUDOSCORPIONIDA"
##  [4] "chlorophyll_a"        "pH"                   "initial_conductivity"
##  [7] "conductivity"         "oxygen"               "nitrites"
## [10] "phosphates"
```

1 Diversity (univariate) and LMMs

1.0.1 Salinization as a whole



1.1 NMDS (no clustering) — all sites & by site

```
## Run 0 stress 0.2032125
## Run 1 stress 0.2070171
## Run 2 stress 0.2058759
## Run 3 stress 0.2095613
```

```
## Run 4 stress 0.2058099
## Run 5 stress 0.208983
## Run 6 stress 0.2120407
## Run 7 stress 0.2174831
## Run 8 stress 0.2114358
## Run 9 stress 0.20809
## Run 10 stress 0.2251869
## Run 11 stress 0.2038183
## Run 12 stress 0.2071446
## Run 13 stress 0.2076793
## Run 14 stress 0.2065389
## Run 15 stress 0.1993512
## ... New best solution
## ... Procrustes: rmse 0.06898059  max resid 0.4048666
## Run 16 stress 0.1997021
## ... Procrustes: rmse 0.03174057  max resid 0.2538447
## Run 17 stress 0.2075797
## Run 18 stress 0.2227706
## Run 19 stress 0.2130459
## Run 20 stress 0.2081249
## Run 21 stress 0.2047776
## Run 22 stress 0.2191023
## Run 23 stress 0.2086069
## Run 24 stress 0.2101949
## Run 25 stress 0.2043656
## Run 26 stress 0.2055447
## Run 27 stress 0.2058169
## Run 28 stress 0.1994345
## ... Procrustes: rmse 0.01645348  max resid 0.1168232
## Run 29 stress 0.2037033
## Run 30 stress 0.2079236
## Run 31 stress 0.2063069
## Run 32 stress 0.2080867
## Run 33 stress 0.2166306
## Run 34 stress 0.1998813
## Run 35 stress 0.2052998
## Run 36 stress 0.2093964
## Run 37 stress 0.2053472
## Run 38 stress 0.2182593
## Run 39 stress 0.20969
## Run 40 stress 0.2207468
## Run 41 stress 0.2209387
## Run 42 stress 0.2168868
## Run 43 stress 0.217187
## Run 44 stress 0.2207471
## Run 45 stress 0.205299
## Run 46 stress 0.1990353
## ... New best solution
## ... Procrustes: rmse 0.03142581  max resid 0.2542362
## Run 47 stress 0.2170034
## Run 48 stress 0.2245557
## Run 49 stress 0.2118807
## Run 50 stress 0.2250919
## Run 51 stress 0.2092053
```

```
## Run 52 stress 0.2158724
## Run 53 stress 0.213915
## Run 54 stress 0.2098323
## Run 55 stress 0.2066947
## Run 56 stress 0.2030948
## Run 57 stress 0.2146671
## Run 58 stress 0.1998117
## Run 59 stress 0.2040667
## Run 60 stress 0.2150957
## Run 61 stress 0.2087646
## Run 62 stress 0.2086739
## Run 63 stress 0.1999375
## Run 64 stress 0.2133314
## Run 65 stress 0.2114387
## Run 66 stress 0.2083216
## Run 67 stress 0.2084072
## Run 68 stress 0.2157883
## Run 69 stress 0.2215466
## Run 70 stress 0.2044162
## Run 71 stress 0.2080997
## Run 72 stress 0.2220724
## Run 73 stress 0.2050996
## Run 74 stress 0.2174675
## Run 75 stress 0.1993361
## ... Procrustes: rmse 0.03268669  max resid 0.2542712
## Run 76 stress 0.202147
## Run 77 stress 0.2171127
## Run 78 stress 0.2191615
## Run 79 stress 0.215268
## Run 80 stress 0.2056793
## Run 81 stress 0.2169769
## Run 82 stress 0.2090595
## Run 83 stress 0.2063067
## Run 84 stress 0.213629
## Run 85 stress 0.2022266
## Run 86 stress 0.2104672
## Run 87 stress 0.2118081
## Run 88 stress 0.2081171
## Run 89 stress 0.1990673
## ... Procrustes: rmse 0.02192242  max resid 0.1343486
## Run 90 stress 0.206507
## Run 91 stress 0.2114611
## Run 92 stress 0.2093606
## Run 93 stress 0.2181817
## Run 94 stress 0.2110018
## Run 95 stress 0.2152414
## Run 96 stress 0.2156041
## Run 97 stress 0.2013478
## Run 98 stress 0.2101411
## Run 99 stress 0.199702
## Run 100 stress 0.2077716
## Run 101 stress 0.2245162
## Run 102 stress 0.2250634
## Run 103 stress 0.2202369
```

```
## Run 104 stress 0.2026992
## Run 105 stress 0.2047736
## Run 106 stress 0.217262
## Run 107 stress 0.2082688
## Run 108 stress 0.2148742
## Run 109 stress 0.2000185
## Run 110 stress 0.2100959
## Run 111 stress 0.2095247
## Run 112 stress 0.2091911
## Run 113 stress 0.2021945
## Run 114 stress 0.2120416
## Run 115 stress 0.2025396
## Run 116 stress 0.2128999
## Run 117 stress 0.2088166
## Run 118 stress 0.2063458
## Run 119 stress 0.212016
## Run 120 stress 0.2154015
## Run 121 stress 0.2050045
## Run 122 stress 0.2062552
## Run 123 stress 0.2026024
## Run 124 stress 0.2136099
## Run 125 stress 0.2124959
## Run 126 stress 0.1988724
## ... New best solution
## ... Procrustes: rmse 0.0196181  max resid 0.1343908
## Run 127 stress 0.2093837
## Run 128 stress 0.2211445
## Run 129 stress 0.2213303
## Run 130 stress 0.1990863
## ... Procrustes: rmse 0.031716  max resid 0.2535142
## Run 131 stress 0.226756
## Run 132 stress 0.2160564
## Run 133 stress 0.2028498
## Run 134 stress 0.2133692
## Run 135 stress 0.2132553
## Run 136 stress 0.2178894
## Run 137 stress 0.2164356
## Run 138 stress 0.2249849
## Run 139 stress 0.2051868
## Run 140 stress 0.2096524
## Run 141 stress 0.2102635
## Run 142 stress 0.216509
## Run 143 stress 0.2192605
## Run 144 stress 0.2008705
## Run 145 stress 0.1999368
## Run 146 stress 0.2055735
## Run 147 stress 0.2089032
## Run 148 stress 0.2008235
## Run 149 stress 0.2072658
## Run 150 stress 0.2062193
## Run 151 stress 0.2029685
## Run 152 stress 0.2165357
## Run 153 stress 0.2227023
## Run 154 stress 0.2081096
```

```
## Run 155 stress 0.2062377
## Run 156 stress 0.2250229
## Run 157 stress 0.2011686
## Run 158 stress 0.2090543
## Run 159 stress 0.2052986
## Run 160 stress 0.2099006
## Run 161 stress 0.2139612
## Run 162 stress 0.2221391
## Run 163 stress 0.2052344
## Run 164 stress 0.2150318
## Run 165 stress 0.2253079
## Run 166 stress 0.2086395
## Run 167 stress 0.2267294
## Run 168 stress 0.2099266
## Run 169 stress 0.200095
## Run 170 stress 0.2169709
## Run 171 stress 0.2105431
## Run 172 stress 0.2097139
## Run 173 stress 0.2030601
## Run 174 stress 0.2146811
## Run 175 stress 0.2090719
## Run 176 stress 0.2139779
## Run 177 stress 0.1992255
## ... Procrustes: rmse 0.03043186  max resid 0.2545684
## Run 178 stress 0.2247533
## Run 179 stress 0.2220057
## Run 180 stress 0.2056953
## Run 181 stress 0.2068894
## Run 182 stress 0.2234957
## Run 183 stress 0.2064737
## Run 184 stress 0.2061141
## Run 185 stress 0.2190683
## Run 186 stress 0.2040092
## Run 187 stress 0.2181482
## Run 188 stress 0.2128747
## Run 189 stress 0.214798
## Run 190 stress 0.2215171
## Run 191 stress 0.2226947
## Run 192 stress 0.2114607
## Run 193 stress 0.2087309
## Run 194 stress 0.2168829
## Run 195 stress 0.2122845
## Run 196 stress 0.1998169
## Run 197 stress 0.2073952
## Run 198 stress 0.2098545
## Run 199 stress 0.2193323
## Run 200 stress 0.2114737
## Run 201 stress 0.2203046
## Run 202 stress 0.2014534
## Run 203 stress 0.2154552
## Run 204 stress 0.2133458
## Run 205 stress 0.2066016
## Run 206 stress 0.2108719
## Run 207 stress 0.210378
```

```
## Run 208 stress 0.1997786
## Run 209 stress 0.2000208
## Run 210 stress 0.2119869
## Run 211 stress 0.2244532
## Run 212 stress 0.2191928
## Run 213 stress 0.2048918
## Run 214 stress 0.2162755
## Run 215 stress 0.2153899
## Run 216 stress 0.2048905
## Run 217 stress 0.1997832
## Run 218 stress 0.2095572
## Run 219 stress 0.2081246
## Run 220 stress 0.2020697
## Run 221 stress 0.2126141
## Run 222 stress 0.2081079
## Run 223 stress 0.2113671
## Run 224 stress 0.2234049
## Run 225 stress 0.2211305
## Run 226 stress 0.2060183
## Run 227 stress 0.2131563
## Run 228 stress 0.1993504
## ... Procrustes: rmse 0.03079495  max resid 0.2546131
## Run 229 stress 0.2064055
## Run 230 stress 0.2069885
## Run 231 stress 0.21799
## Run 232 stress 0.2170751
## Run 233 stress 0.2064927
## Run 234 stress 0.2255356
## Run 235 stress 0.201693
## Run 236 stress 0.2193154
## Run 237 stress 0.1997473
## Run 238 stress 0.2034011
## Run 239 stress 0.2013978
## Run 240 stress 0.2002636
## Run 241 stress 0.2266383
## Run 242 stress 0.2139298
## Run 243 stress 0.2060882
## Run 244 stress 0.2161465
## Run 245 stress 0.2131301
## Run 246 stress 0.221922
## Run 247 stress 0.2052818
## Run 248 stress 0.2199292
## Run 249 stress 0.2208253
## Run 250 stress 0.2124707
## Run 251 stress 0.2140584
## Run 252 stress 0.2095876
## Run 253 stress 0.2101674
## Run 254 stress 0.2211103
## Run 255 stress 0.2079107
## Run 256 stress 0.2100527
## Run 257 stress 0.2048055
## Run 258 stress 0.2154355
## Run 259 stress 0.2146839
## Run 260 stress 0.2100348
```

```
## Run 261 stress 0.2151585
## Run 262 stress 0.2052386
## Run 263 stress 0.2131226
## Run 264 stress 0.2090205
## Run 265 stress 0.2026767
## Run 266 stress 0.2074939
## Run 267 stress 0.2175988
## Run 268 stress 0.2234497
## Run 269 stress 0.2233247
## Run 270 stress 0.2154804
## Run 271 stress 0.209695
## Run 272 stress 0.2006613
## Run 273 stress 0.2198249
## Run 274 stress 0.2043445
## Run 275 stress 0.1987231
## ... New best solution
## ... Procrustes: rmse 0.01296196  max resid 0.1186708
## Run 276 stress 0.2188018
## Run 277 stress 0.2045689
## Run 278 stress 0.22064
## Run 279 stress 0.2190056
## Run 280 stress 0.2001578
## Run 281 stress 0.2108921
## Run 282 stress 0.2128807
## Run 283 stress 0.1997776
## Run 284 stress 0.2098748
## Run 285 stress 0.2147336
## Run 286 stress 0.2039991
## Run 287 stress 0.218386
## Run 288 stress 0.2052604
## Run 289 stress 0.2098408
## Run 290 stress 0.2080363
## Run 291 stress 0.2115017
## Run 292 stress 0.2057052
## Run 293 stress 0.2102965
## Run 294 stress 0.2070913
## Run 295 stress 0.2201781
## Run 296 stress 0.2070137
## Run 297 stress 0.2214152
## Run 298 stress 0.2048409
## Run 299 stress 0.2083378
## Run 300 stress 0.2128818
## Run 301 stress 0.2086404
## Run 302 stress 0.2263015
## Run 303 stress 0.2031486
## Run 304 stress 0.2077997
## Run 305 stress 0.220743
## Run 306 stress 0.2065896
## Run 307 stress 0.2116223
## Run 308 stress 0.2261366
## Run 309 stress 0.211044
## Run 310 stress 0.2038111
## Run 311 stress 0.2219233
## Run 312 stress 0.2159579
```

```
## Run 313 stress 0.2166354
## Run 314 stress 0.2121483
## Run 315 stress 0.2163741
## Run 316 stress 0.2053543
## Run 317 stress 0.2163938
## Run 318 stress 0.2224012
## Run 319 stress 0.2074082
## Run 320 stress 0.2220539
## Run 321 stress 0.221523
## Run 322 stress 0.2187246
## Run 323 stress 0.2184163
## Run 324 stress 0.2111771
## Run 325 stress 0.2139493
## Run 326 stress 0.218928
## Run 327 stress 0.2177063
## Run 328 stress 0.2072637
## Run 329 stress 0.2132728
## Run 330 stress 0.2190632
## Run 331 stress 0.2164504
## Run 332 stress 0.2075446
## Run 333 stress 0.213842
## Run 334 stress 0.2153883
## Run 335 stress 0.2052611
## Run 336 stress 0.2110427
## Run 337 stress 0.2145447
## Run 338 stress 0.2279099
## Run 339 stress 0.2034053
## Run 340 stress 0.2169202
## Run 341 stress 0.2056492
## Run 342 stress 0.2258641
## Run 343 stress 0.217004
## Run 344 stress 0.1995514
## Run 345 stress 0.206901
## Run 346 stress 0.204478
## Run 347 stress 0.2054902
## Run 348 stress 0.2057653
## Run 349 stress 0.2104375
## Run 350 stress 0.2155108
## Run 351 stress 0.2092047
## Run 352 stress 0.2144655
## Run 353 stress 0.2165429
## Run 354 stress 0.2325719
## Run 355 stress 0.2000258
## Run 356 stress 0.214411
## Run 357 stress 0.1992213
## ... Procrustes: rmse 0.03094593  max resid 0.2561353
## Run 358 stress 0.2172735
## Run 359 stress 0.2098394
## Run 360 stress 0.2051608
## Run 361 stress 0.2121151
## Run 362 stress 0.2245519
## Run 363 stress 0.2068065
## Run 364 stress 0.2182118
## Run 365 stress 0.222107
```

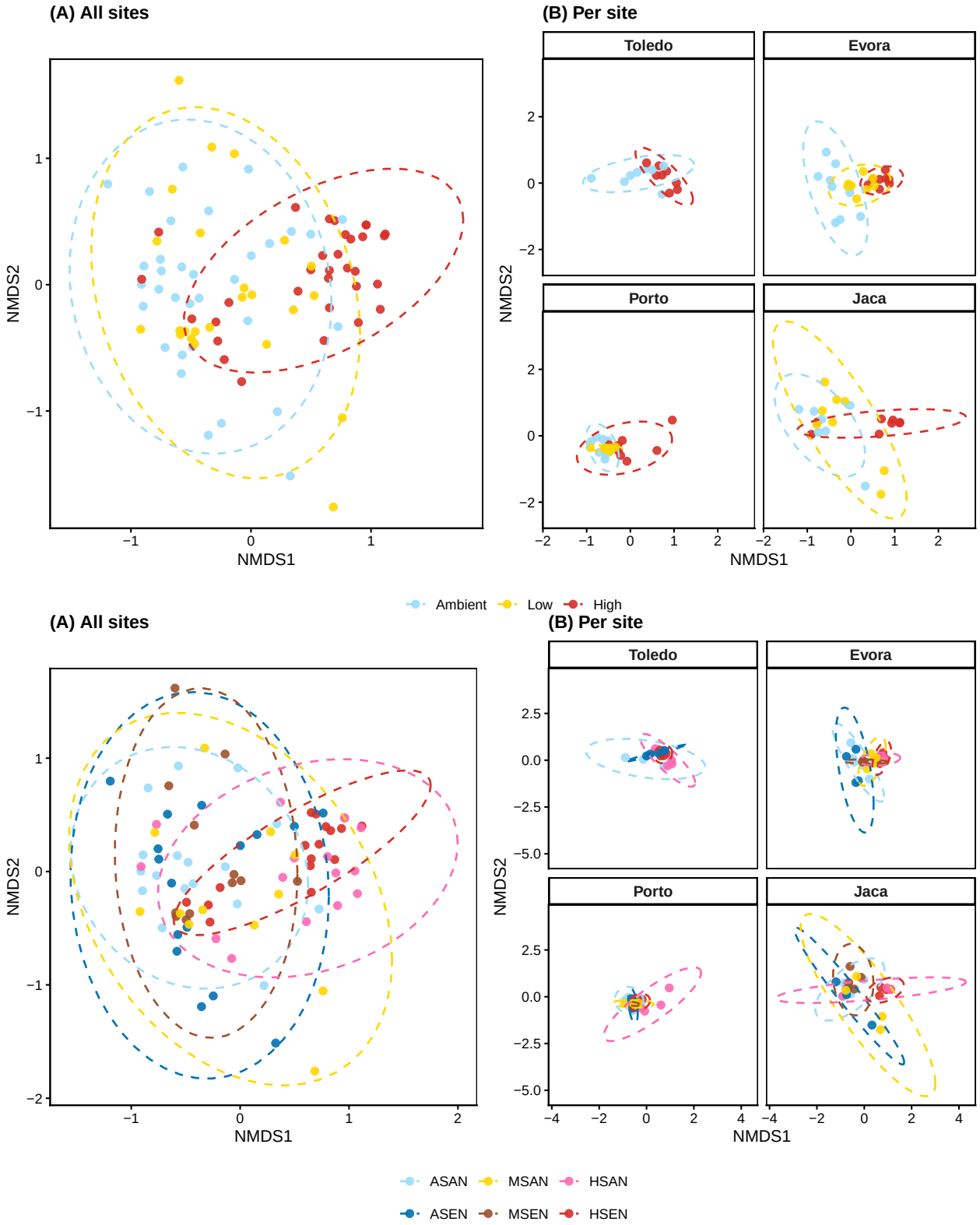
```
## Run 366 stress 0.2185559
## Run 367 stress 0.2043205
## Run 368 stress 0.2218102
## Run 369 stress 0.2138699
## Run 370 stress 0.2112402
## Run 371 stress 0.1999307
## Run 372 stress 0.2052209
## Run 373 stress 0.2013409
## Run 374 stress 0.2085389
## Run 375 stress 0.2021782
## Run 376 stress 0.2077633
## Run 377 stress 0.222303
## Run 378 stress 0.2098326
## Run 379 stress 0.2175214
## Run 380 stress 0.1995191
## Run 381 stress 0.2231786
## Run 382 stress 0.2198712
## Run 383 stress 0.2122737
## Run 384 stress 0.2138742
## Run 385 stress 0.2053767
## Run 386 stress 0.2140052
## Run 387 stress 0.2203465
## Run 388 stress 0.2167423
## Run 389 stress 0.2272182
## Run 390 stress 0.2058673
## Run 391 stress 0.2063122
## Run 392 stress 0.2022952
## Run 393 stress 0.2111201
## Run 394 stress 0.2101539
## Run 395 stress 0.20118
## Run 396 stress 0.2054719
## Run 397 stress 0.2086446
## Run 398 stress 0.2243682
## Run 399 stress 0.2083429
## Run 400 stress 0.2120033
## Run 401 stress 0.2033845
## Run 402 stress 0.2157228
## Run 403 stress 0.2150834
## Run 404 stress 0.2185948
## Run 405 stress 0.2206701
## Run 406 stress 0.2149795
## Run 407 stress 0.2079053
## Run 408 stress 0.2195016
## Run 409 stress 0.2092807
## Run 410 stress 0.2142298
## Run 411 stress 0.2156029
## Run 412 stress 0.2096006
## Run 413 stress 0.2262997
## Run 414 stress 0.2040243
## Run 415 stress 0.1990257
## ... Procrustes: rmse 0.03661832  max resid 0.2537904
## Run 416 stress 0.198875
## ... Procrustes: rmse 0.01295352  max resid 0.1185889
## Run 417 stress 0.2077722
```

```
## Run 418 stress 0.2126489
## Run 419 stress 0.2089317
## Run 420 stress 0.210576
## Run 421 stress 0.2154926
## Run 422 stress 0.2089228
## Run 423 stress 0.2132006
## Run 424 stress 0.2085426
## Run 425 stress 0.2244023
## Run 426 stress 0.2029663
## Run 427 stress 0.1997863
## Run 428 stress 0.2080483
## Run 429 stress 0.2018616
## Run 430 stress 0.2079141
## Run 431 stress 0.208311
## Run 432 stress 0.1990381
## ... Procrustes: rmse 0.03220946  max resid 0.2547817
## Run 433 stress 0.2209225
## Run 434 stress 0.2158349
## Run 435 stress 0.2186439
## Run 436 stress 0.2059015
## Run 437 stress 0.2075124
## Run 438 stress 0.1984638
## ... New best solution
## ... Procrustes: rmse 0.03834157  max resid 0.251878
## Run 439 stress 0.2009687
## Run 440 stress 0.2064747
## Run 441 stress 0.2101937
## Run 442 stress 0.2131103
## Run 443 stress 0.2080237
## Run 444 stress 0.2039021
## Run 445 stress 0.2183863
## Run 446 stress 0.2158585
## Run 447 stress 0.2033374
## Run 448 stress 0.2099305
## Run 449 stress 0.2026309
## Run 450 stress 0.2000199
## Run 451 stress 0.2096909
## Run 452 stress 0.2008363
## Run 453 stress 0.2235517
## Run 454 stress 0.2223385
## Run 455 stress 0.2052861
## Run 456 stress 0.2188985
## Run 457 stress 0.2076825
## Run 458 stress 0.2154413
## Run 459 stress 0.2145122
## Run 460 stress 0.2166693
## Run 461 stress 0.210442
## Run 462 stress 0.2149432
## Run 463 stress 0.2089975
## Run 464 stress 0.2208732
## Run 465 stress 0.209981
## Run 466 stress 0.2163683
## Run 467 stress 0.2175245
## Run 468 stress 0.2220262
```

```
## Run 469 stress 0.2179588
## Run 470 stress 0.208337
## Run 471 stress 0.2132078
## Run 472 stress 0.2218146
## Run 473 stress 0.2182722
## Run 474 stress 0.2014377
## Run 475 stress 0.2151182
## Run 476 stress 0.2056678
## Run 477 stress 0.2009992
## Run 478 stress 0.2126239
## Run 479 stress 0.2121579
## Run 480 stress 0.2096217
## Run 481 stress 0.2173456
## Run 482 stress 0.2195132
## Run 483 stress 0.2226942
## Run 484 stress 0.2055273
## Run 485 stress 0.2144957
## Run 486 stress 0.2209557
## Run 487 stress 0.2138687
## Run 488 stress 0.2009661
## Run 489 stress 0.2083872
## Run 490 stress 0.2065461
## Run 491 stress 0.2122396
## Run 492 stress 0.2182713
## Run 493 stress 0.2101287
## Run 494 stress 0.2172519
## Run 495 stress 0.2149575
## Run 496 stress 0.199479
## Run 497 stress 0.1986138
## ... Procrustes: rmse 0.03392962  max resid 0.2539462
## Run 498 stress 0.2067706
## Run 499 stress 0.2074635
## Run 500 stress 0.2003366
## Run 501 stress 0.2204341
## Run 502 stress 0.2109074
## Run 503 stress 0.2036899
## Run 504 stress 0.211825
## Run 505 stress 0.2065746
## Run 506 stress 0.2112287
## Run 507 stress 0.1997721
## Run 508 stress 0.203891
## Run 509 stress 0.2054993
## Run 510 stress 0.2023042
## Run 511 stress 0.2111771
## Run 512 stress 0.210146
## Run 513 stress 0.2219914
## Run 514 stress 0.2069887
## Run 515 stress 0.2101428
## Run 516 stress 0.2263735
## Run 517 stress 0.2174209
## Run 518 stress 0.2145382
## Run 519 stress 0.2250278
## Run 520 stress 0.203137
## Run 521 stress 0.213543
```

```
## Run 522 stress 0.2211428
## Run 523 stress 0.2149893
## Run 524 stress 0.2194763
## Run 525 stress 0.2217658
## Run 526 stress 0.2199662
## Run 527 stress 0.20002
## Run 528 stress 0.2219869
## Run 529 stress 0.2153237
## Run 530 stress 0.214402
## Run 531 stress 0.2160341
## Run 532 stress 0.215209
## Run 533 stress 0.2036887
## Run 534 stress 0.1994075
## Run 535 stress 0.2111775
## Run 536 stress 0.2229911
## Run 537 stress 0.2174811
## Run 538 stress 0.2016311
## Run 539 stress 0.21464
## Run 540 stress 0.2147194
## Run 541 stress 0.2159327
## Run 542 stress 0.2068259
## Run 543 stress 0.2124555
## Run 544 stress 0.2103128
## Run 545 stress 0.2027498
## Run 546 stress 0.2185689
## Run 547 stress 0.205818
## Run 548 stress 0.2008707
## Run 549 stress 0.2116809
## Run 550 stress 0.2176378
## Run 551 stress 0.2166952
## Run 552 stress 0.2139273
## Run 553 stress 0.2178437
## Run 554 stress 0.2224369
## Run 555 stress 0.2315916
## Run 556 stress 0.2240698
## Run 557 stress 0.2022495
## Run 558 stress 0.2138104
## Run 559 stress 0.2208733
## Run 560 stress 0.1995203
## Run 561 stress 0.2068007
## Run 562 stress 0.2120247
## Run 563 stress 0.2236789
## Run 564 stress 0.2136623
## Run 565 stress 0.2119043
## Run 566 stress 0.2000941
## Run 567 stress 0.2134122
## Run 568 stress 0.2201239
## Run 569 stress 0.2221506
## Run 570 stress 0.2057259
## Run 571 stress 0.2136798
## Run 572 stress 0.224598
## Run 573 stress 0.2240594
## Run 574 stress 0.2181398
## Run 575 stress 0.2011485
```

```
## Run 576 stress 0.198614
## ... Procrustes: rmse 0.03393347  max resid 0.2539362
## Run 577 stress 0.2079247
## Run 578 stress 0.2025577
## Run 579 stress 0.2200966
## Run 580 stress 0.2121472
## Run 581 stress 0.2050715
## Run 582 stress 0.2009678
## Run 583 stress 0.2060081
## Run 584 stress 0.207547
## Run 585 stress 0.199519
## Run 586 stress 0.2137294
## Run 587 stress 0.2156382
## Run 588 stress 0.2085677
## Run 589 stress 0.215782
## Run 590 stress 0.2162133
## Run 591 stress 0.222273
## Run 592 stress 0.2179866
## Run 593 stress 0.2185015
## Run 594 stress 0.2045459
## Run 595 stress 0.208196
## Run 596 stress 0.2189309
## Run 597 stress 0.2129548
## Run 598 stress 0.2166083
## Run 599 stress 0.1984603
## ... New best solution
## ... Procrustes: rmse 0.03251499  max resid 0.254003
## Run 600 stress 0.2019399
## Run 601 stress 0.2057474
## Run 602 stress 0.2155682
## Run 603 stress 0.2114655
## Run 604 stress 0.1984556
## ... New best solution
## ... Procrustes: rmse 0.001220453  max resid 0.009472447
## ... Similar to previous best
## *** Best solution repeated 1 times
```

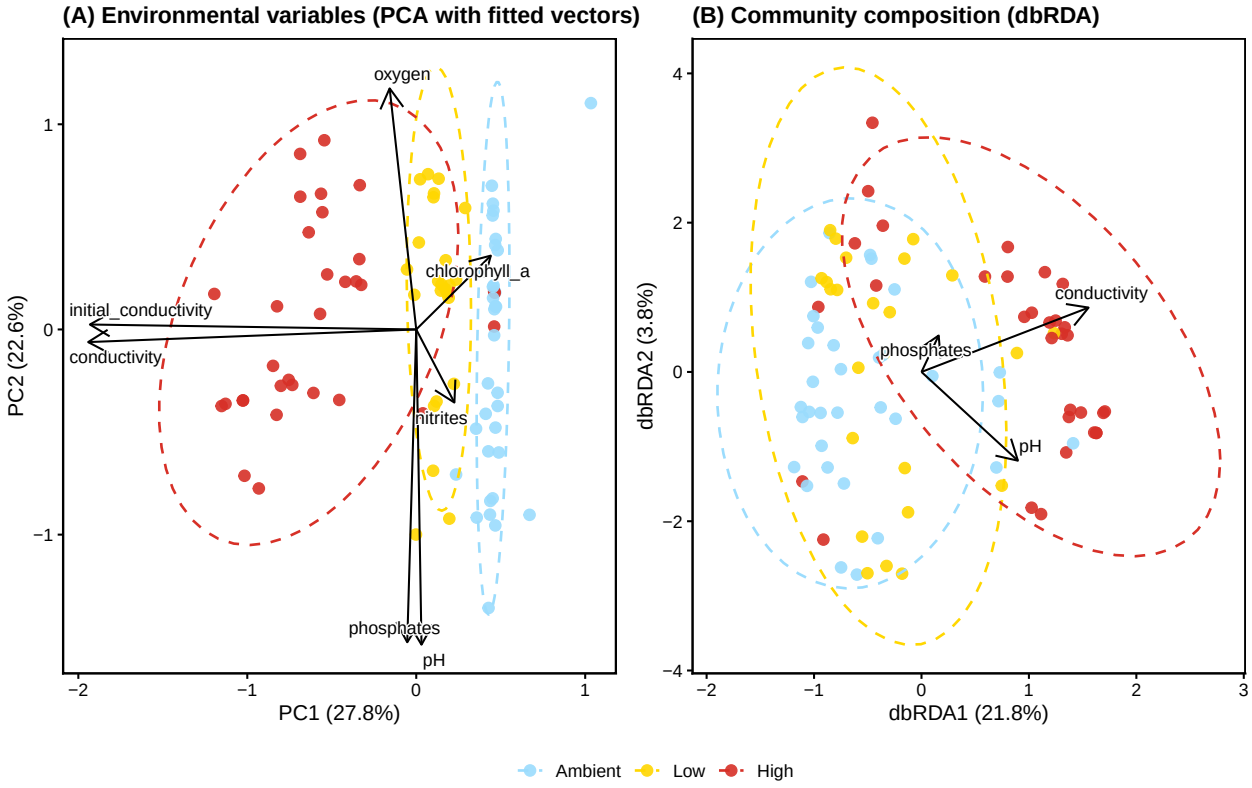


1.2 Multivariate dispersion & PERMANOVA

```
##
## Start: comm_hel ~ 1
```

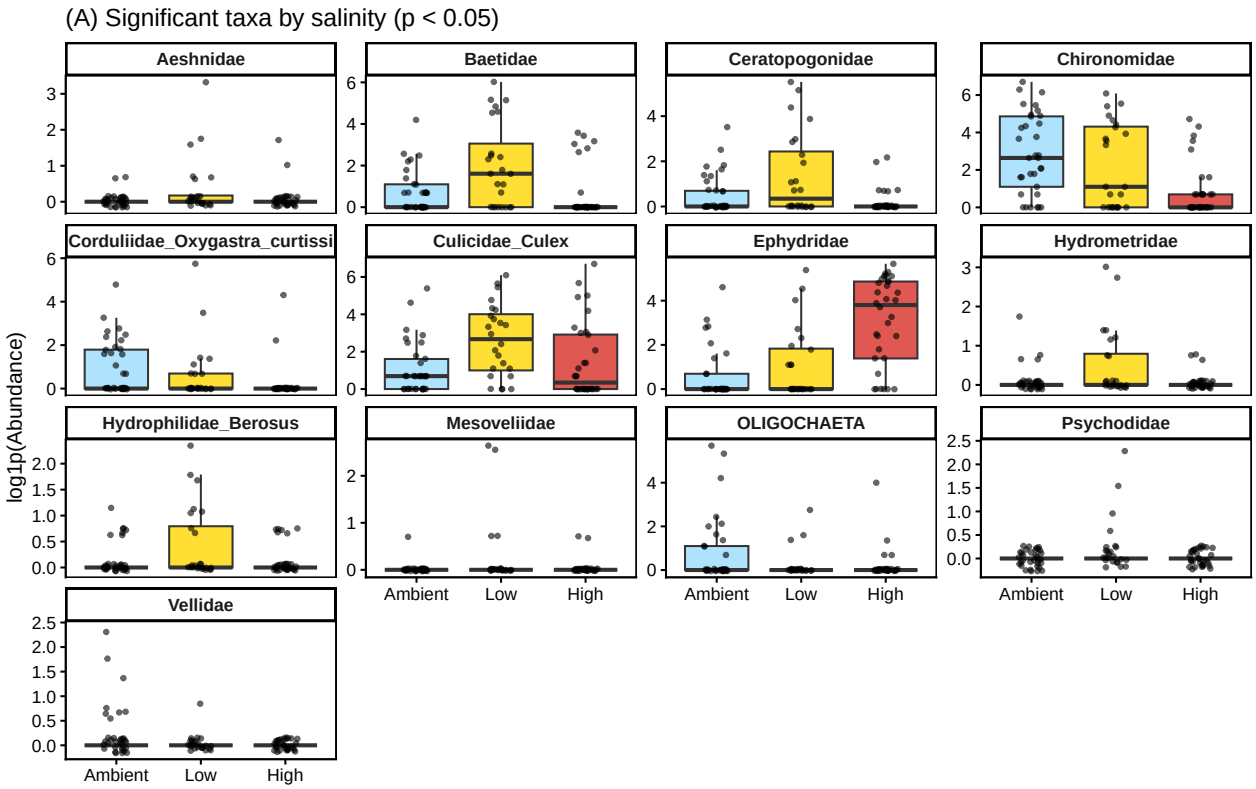
```
##
##                         Df    AIC       F Pr(>F)
## + conductivity           1 277.55 18.0807  0.001 ***
## + initial_conductivity   1 279.43 15.8870  0.001 ***
## + pH                     1 287.35  7.1257  0.001 ***
## + phosphates             1 292.63  1.6987  0.120
## + oxygen                 1 293.62  0.7253  0.630
## + chlorophyll_a          1 293.52  0.8153  0.670
## + nitrites               1 293.79  0.5522  0.933
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Step: comm_hel ~ conductivity
##
##                Df    AIC      F Pr(>F)
## - conductivity  1 292.36 18.081  0.001 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##                         Df    AIC      F Pr(>F)
## + pH                     1 271.53 8.1081  0.001 ***
## + phosphates             1 277.65 1.8599  0.079 .
## + oxygen                 1 278.62 0.9000  0.472
## + nitrites               1 278.74 0.7823  0.720
## + chlorophyll_a          1 278.77 0.7519  0.743
## + initial_conductivity   1 279.17 0.3680  0.914
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Step: comm_hel ~ conductivity + pH
##
##                Df    AIC       F Pr(>F)
## - pH            1 277.55  8.1081  0.001 ***
## - conductivity  1 287.35 19.0612  0.001 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##                         Df    AIC      F Pr(>F)
## + phosphates             1 270.12 3.3243  0.006 **
## + initial_conductivity   1 272.36 1.1274  0.324
## + oxygen                 1 272.42 1.0726  0.359
## + chlorophyll_a          1 272.70 0.7982  0.677
## + nitrites               1 272.82 0.6799  0.797
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Step: comm_hel ~ conductivity + pH + phosphates
##
##                Df    AIC       F Pr(>F)
## - phosphates    1 271.53  3.3243  0.010 **
## - pH            1 277.65  9.6055  0.001 ***
## - conductivity  1 286.76 19.8103  0.001 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##
##                          Df    AIC      F Pr(>F)
## + initial_conductivity    1 271.30 0.7771  0.601
## + nitrites                1 271.24 0.8293  0.631
## + chlorophyll_a           1 271.25 0.8231  0.678
## + oxygen                  1 271.40 0.6802  0.697
```

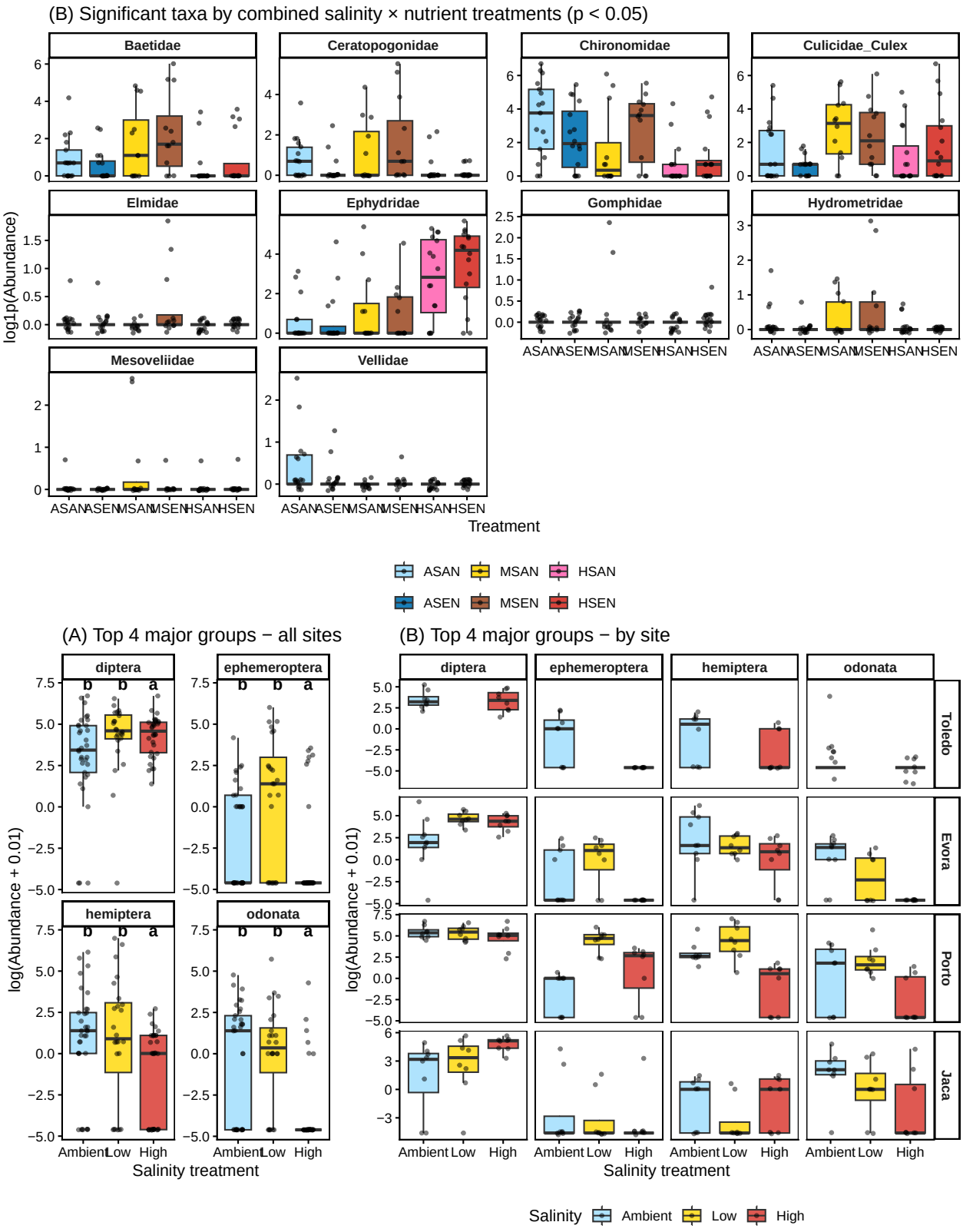


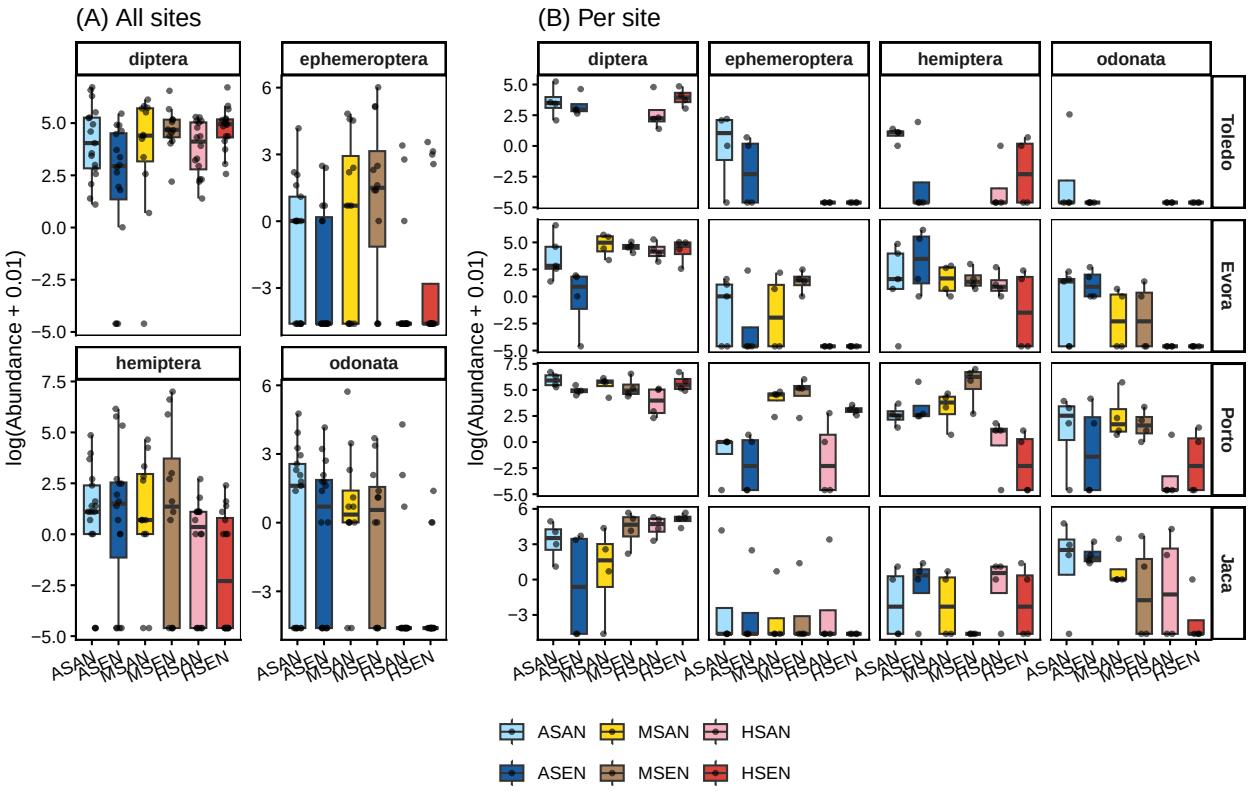
1.3 Indicator taxa (ANOVA-based significant taxa)

```
##  [1] "Ceratopogonidae"              "Chironomidae"
##  [3] "Culicidae_Culex"              "Ephydridae"
##  [5] "Psychodidae"                  "OLIGOCHAETA"
##  [7] "Hydrophilidae_Berosus"        "Hydrometridae"
##  [9] "Mesoveliidae"                 "Vellidae"
## [11] "Aeshnidae"                    "Corduliidae_Oxygastra_curtissi"
## [13] "Baetidae"
```




```
##  [1] "Ceratopogonidae" "Chironomidae"    "Culicidae_Culex" "Ephydridae"
##  [5] "Elmidae"         "Hydrometridae"   "Mesoveliidae"    "Vellidae"
##  [9] "Gomphidae"       "Baetidae"
```


(B) Significant taxa by combined salinity × nutrient treatments (p < 0.05)
Baetidae
Ceratopogonidae
Chironomidae
Culicidae_Culex
Elmidae
Ephydridae
Gomphidae
Hydrometridae
Mesoveliidae
Vellidae
log1p(Abundance)
ASAN ASEN MSAN MSEN HSAN HSEN
Treatment
ASAN MSAN HSAN
ASEN MSEN HSEN
(A) Top 4 major groups − all sites
diptera
ephemeroptera
hemiptera
odonata
b b a
log(Abundance + 0.01)
Ambient Low High
Salinity treatment
(B) Top 4 major groups − by site
Toledo
Evora
Porto
Jaca
Salinity Ambient Low High


(A) All sites
(B) Per site
diptera
ephemeroptera
hemiptera
odonata
Toledo
Evora
Porto
Jaca
log(Abundance + 0.01)
ASAN
ASEN
MSAN
MSEN
HSAN
HSEN