

## Appendix

**Table A1.** Complete taxon-specific *t* test results testing for temporal differences (1979–80 vs. 2004) in %cover-based depth distribution, by 0.25-m depth intervals, for total vegetation and the species in Figure 4. Data were pooled across sampling stations and arcsine transformed before analysis. For all *t* tests, d.f. =  $n_{1979-80} + n_{2004} - 2$ ; “—” = species absent in both sampling periods. Species abbreviations as genus initial plus first three letters of species name.

| Depth (m)          | Total vegetation | E.can         | M.alt        | P.ber        | N.fle       | C.glo        |
|--------------------|------------------|---------------|--------------|--------------|-------------|--------------|
| <b>0.50–0.74</b>   |                  |               |              |              |             |              |
| $n_{1979-80} = 14$ | $t = -2.470$     | $t = 0.177$   | $t = 0.119$  | —            | —           | $t = 0.262$  |
| $n_{2004} = 4$     | $P = 0.03$       | $P = 0.86$    | $P = 0.91$   |              |             | $P = 0.08$   |
| <b>0.75–0.99</b>   |                  |               |              |              |             |              |
| $n_{1979-80} = 40$ | $t = -3.837$     | $t = -1.859$  | $t = -2.945$ | $t = -0.562$ | $t = 0.566$ | $t = 0.545$  |
| $n_{2004} = 13$    | $P < 0.01$       | $P = 0.07$    | $P < 0.01$   | $P = 0.58$   | $P = 0.57$  | $P = 0.59$   |
| <b>1.00–1.24</b>   |                  |               |              |              |             |              |
| $n_{1979-80} = 65$ | $t = -17.105$    | $t = -4.531$  | $t = -8.587$ | $t = 0.654$  | $t = 0.877$ | $t = -3.831$ |
| $n_{2004} = 28$    | $P < 0.01$       | $P < 0.01$    | $P < 0.01$   | $P = 0.51$   | $P = 0.38$  | $P < 0.01$   |
| <b>1.25–1.49</b>   |                  |               |              |              |             |              |
| $n_{1979-80} = 11$ | $t = -6.066$     | $t = -1.230$  | $t = -5.058$ | —            | —           | $t = -0.326$ |
| $n_{2004} = 27$    | $P < 0.01$       | $P = 0.23$    | $P < 0.01$   |              |             | $P = 0.75$   |
| <b>1.50–1.74</b>   |                  |               |              |              |             |              |
| $n_{1979-80} = 17$ | $t = -5.032$     | $t = -2.272$  | $t = -4.986$ | $t = 0.519$  | $t = 1.194$ | $t = 1.896$  |
| $n_{2004} = 24$    | $P < 0.01$       | $P = 0.03$    | $P < 0.01$   | $P = 0.61$   | $P = 0.24$  | $P = 0.07$   |
| <b>1.75–1.99</b>   |                  |               |              |              |             |              |
| $n_{1979-80} = 33$ | $t = -6.869$     | $t = -6.375$  | $t = -5.175$ | $t = 0.422$  | $t = 0.962$ | $t = 2.003$  |
| $n_{2004} = 20$    | $P < 0.01$       | $P < 0.01$    | $P < 0.01$   | $P = 0.67$   | $P = 0.34$  | $P = 0.05$   |
| <b>2.00–2.24</b>   |                  |               |              |              |             |              |
| $n_{1979-80} = 42$ | $t = -8.530$     | $t = -8.373$  | $t = -5.543$ | $t = -1.043$ | $t = 1.451$ | $t = 2.984$  |
| $n_{2004} = 47$    | $P < 0.01$       | $P < 0.01$    | $P < 0.01$   | $P = 0.30$   | $P = 0.15$  | $P < 0.01$   |
| <b>2.25–2.49</b>   |                  |               |              |              |             |              |
| $n_{1979-80} = 16$ | $t = -5.555$     | $t = -9.817$  | $t = -0.973$ | $t = -0.505$ | $t = 2.203$ | $t = 3.874$  |
| $n_{2004} = 35$    | $P < 0.01$       | $P < 0.01$    | $P = 0.34$   | $P = 0.62$   | $P = 0.03$  | $P < 0.01$   |
| <b>2.50–2.74</b>   |                  |               |              |              |             |              |
| $n_{1979-80} = 16$ | $t = -7.439$     | $t = -9.041$  | $t = -2.232$ | $t = -0.516$ | $t = 2.659$ | $t = 4.454$  |
| $n_{2004} = 68$    | $P < 0.01$       | $P < 0.01$    | $P = 0.03$   | $P = 0.61$   | $P < 0.01$  | $P < 0.01$   |
| <b>2.75–2.99</b>   |                  |               |              |              |             |              |
| $n_{1979-80} = 33$ | $t = -6.253$     | $t = -8.628$  | $t = -3.117$ | $t = -1.526$ | $t = 1.965$ | $t = 1.682$  |
| $n_{2004} = 45$    | $P < 0.01$       | $P < 0.01$    | $P < 0.01$   | $P = 0.13$   | $P = 0.05$  | $P = 0.10$   |
| <b>3.00–3.24</b>   |                  |               |              |              |             |              |
| $n_{1979-80} = 72$ | $t = -8.703$     | $t = -19.093$ | $t = -3.465$ | $t = -3.864$ | $t = 5.517$ | $t = 2.697$  |
| $n_{2004} = 70$    | $P < 0.01$       | $P < 0.01$    | $P < 0.01$   | $P < 0.01$   | $P < 0.01$  | $P < 0.01$   |
| <b>3.25–3.49</b>   |                  |               |              |              |             |              |
| $n_{1979-80} = 40$ | $t = -9.824$     | $t = -13.828$ | $t = -1.492$ | $t = -3.219$ | $t = 3.967$ | $t = 1.556$  |
| $n_{2004} = 33$    | $P < 0.01$       | $P < 0.01$    | $P = 0.14$   | $P < 0.01$   | $P < 0.01$  | $P = 0.12$   |
| <b>3.50–3.74</b>   |                  |               |              |              |             |              |
| $n_{1979-80} = 28$ | $t = -7.304$     | $t = -14.081$ | $t = -1.422$ | $t = -2.790$ | $t = 5.312$ | —            |
| $n_{2004} = 44$    | $P < 0.01$       | $P < 0.01$    | $P = 16$     | $P < 0.01$   | $P < 0.01$  |              |
| <b>3.75–3.99</b>   |                  |               |              |              |             |              |
| $n_{1979-80} = 35$ | $t = -8.318$     | $t = -19.213$ | $t = -1.185$ | $t = -2.519$ | $t = 2.967$ | $t = 0.985$  |
| $n_{2004} = 34$    | $P < 0.01$       | $P < 0.01$    | $P = 0.24$   | $P = 0.01$   | $P < 0.01$  | $P = 0.33$   |
| <b>4.00–4.24</b>   |                  |               |              |              |             |              |
| $n_{1979-80} = 58$ | $t = -8.293$     | $t = -21.105$ | $t = -1.720$ | $t = -4.467$ | $t = 3.089$ | —            |
| $n_{2004} = 56$    | $P =$            | $P < 0.01$    | $P = 0.09$   | $P < 0.01$   | $P < 0.01$  |              |
| <b>4.25–4.49</b>   |                  |               |              |              |             |              |
| $n_{1979-80} = 9$  | $t = -3.910$     | $t = -4.968$  | $t = -1.340$ | $t = -1.055$ | $t = 2.697$ | —            |
| $n_{2004} = 26$    | $P < 0.01$       | $P < 0.01$    | $P = 0.19$   | $P = 0.30$   | $P = 0.01$  |              |
| <b>4.50–4.74</b>   |                  |               |              |              |             |              |
| $n_{1979-80} = 12$ | $t = -2.620$     | $t = -6.085$  | $t = -0.652$ | $t = 0.023$  | $t = 3.006$ | —            |
| $n_{2004} = 47$    | $P = 0.01$       | $P < 0.01$    | $P = 0.52$   | $P = 0.98$   | $P < 0.01$  |              |
| <b>4.75–4.99</b>   |                  |               |              |              |             |              |
| $n_{1979-80} = 8$  | $t = -1.911$     | $t = -4.739$  | —            | $t = 0.704$  | $t = 4.102$ | —            |
| $n_{2004} = 30$    | $P = 0.06$       | $P < 0.01$    |              | $P = 0.49$   | $P < 0.01$  |              |

**Table A1.** (Contd)

| Depth (m)          | Total vegetation | E.can        | M.alt        | P.ber        | N.fle       | C.glo |
|--------------------|------------------|--------------|--------------|--------------|-------------|-------|
| <b>5.00–5.24</b>   |                  |              |              |              |             |       |
| $n_{1979-80} = 34$ | $t = -0.091$     | $t = -7.896$ | —            | $t = -1.112$ | $t = 2.711$ | —     |
| $n_{2004} = 37$    | $P = 0.93$       | $P < 0.01$   |              | $P = 0.27$   | $P < 0.01$  |       |
| <b>5.25–5.49</b>   |                  |              |              |              |             |       |
| $n_{1979-80} = 13$ | $t = -1.093$     | $t = -4.014$ | $t = -0.764$ | $t = -1.414$ | $t = 1.315$ | —     |
| $n_{2004} = 22$    | $P = 0.28$       | $P < 0.01$   | $P = 0.45$   | $P = 0.17$   | $P = 0.020$ |       |
| <b>5.50–5.74</b>   |                  |              |              |              |             |       |
| $n_{1979-80} = 14$ | $t = -5.446$     | $t = -2.496$ | $t = -0.611$ | $t = 1.830$  | $t = 3.530$ | —     |
| $n_{2004} = 37$    | $P < 0.01$       | $P = 0.02$   | $P = 0.54$   | $P = 0.07$   | $P < 0.01$  |       |
| <b>5.75–5.99</b>   |                  |              |              |              |             |       |
| $n_{1979-80} = 5$  | $t = -2.313$     | $t = -1.331$ | —            | $t = -0.351$ | $t = 4.282$ | —     |
| $n_{2004} = 23$    | $P = 0.03$       | $P = 0.19$   |              | $P = 0.73$   | $P < 0.01$  |       |
| <b>6.00–6.24</b>   |                  |              |              |              |             |       |
| $n_{1979-80} = 5$  | $t = -2.236$     | $t = -4.276$ | —            | $t = 1.700$  | $t = 2.012$ | —     |
| $n_{2004} = 13$    | $P = 0.04$       | $P < 0.01$   |              | $P = 0.11$   | $P = 0.06$  |       |
| <b>6.25–6.49</b>   |                  |              |              |              |             |       |
| $n_{1979-80} = 3$  | $t = -3.911$     | $t = -0.945$ | —            | —            | —           | —     |
| $n_{2004} = 6$     | $P < 0.01$       | $P = 0.38$   |              |              |             |       |

**Table A2.** Complete taxon-specific  $t$  test results testing for temporal differences (1979–80 *vs.* 2004) in %cover-based depth distribution, by 0.25-m depth intervals, for the taxa in Figure 5. Data were pooled across sampling stations and arcsine transformed before analysis. For all  $t$  tests, d.f. =  $n_{1979-80} + n_{2004} - 2$ ; “—” = species absent in both sampling periods. Species abbreviations as genus initial plus first three letters of species name.

| Depth (m)          | C.her        | P.pus       | P.per       | P.cri       | N.opa        | filam. algae |
|--------------------|--------------|-------------|-------------|-------------|--------------|--------------|
| <b>0.50–0.74</b>   |              |             |             |             |              |              |
| $n_{1979-80} = 14$ | —            | —           | —           | —           | $t = 1.055$  | —            |
| $n_{2004} = 4$     |              |             |             |             | $P = 0.31$   |              |
| <b>0.75–0.99</b>   |              |             |             |             |              |              |
| $n_{1979-80} = 40$ | $t = 0.795$  | —           | —           | —           | $t = 1.050$  | $t = -0.159$ |
| $n_{2004} = 13$    | $P = 0.43$   |             |             |             | $P = 0.30$   | $P = 0.87$   |
| <b>1.00–1.24</b>   |              |             |             |             |              |              |
| $n_{1979-80} = 65$ | $t = 1.411$  | $t = 1.114$ | $t = 0.654$ | —           | $t = 1.177$  | $t = -1.600$ |
| $n_{2004} = 28$    | $P = 0.16$   | $P = 0.27$  | $P = 0.51$  |             | $P = 0.24$   | $P = 0.11$   |
| <b>1.25–1.49</b>   |              |             |             |             |              |              |
| $n_{1979-80} = 11$ | $t = 2.295$  | $t = 2.256$ | $t = 2.058$ | —           | $t = 2.352$  | $t = 2.423$  |
| $n_{2004} = 27$    | $P = 0.03$   | $P = 0.03$  | $P = 0.05$  |             | $P = 0.02$   | $P = 0.02$   |
| <b>1.50–1.74</b>   |              |             |             |             |              |              |
| $n_{1979-80} = 17$ | $t = 1.837$  | $t = 1.194$ | —           | —           | $t = 1.803$  | $t = 1.823$  |
| $n_{2004} = 24$    | $P = 0.07$   | $P = 0.24$  |             |             | $P = 0.08$   | $P = 0.08$   |
| <b>1.75–1.99</b>   |              |             |             |             |              |              |
| $n_{1979-80} = 33$ | $t = 1.722$  | $t = 1.976$ | $t = 1.483$ | $t = 0.776$ | $t = 1.709$  | $t = 0.715$  |
| $n_{2004} = 20$    | $P = 0.09$   | $P = 0.05$  | $P = 0.14$  | $P = 0.44$  | $P = 0.09$   | $P = 0.48$   |
| <b>2.00–2.24</b>   |              |             |             |             |              |              |
| $n_{1979-80} = 42$ | $t = 1.898$  | $t = 2.485$ | $t = 2.291$ | $t = 1.059$ | $t = 0.643$  | $t = 2.041$  |
| $n_{2004} = 47$    | $P = 0.06$   | $P = 0.01$  | $P = 0.02$  | $P = 0.29$  | $P = 0.52$   | $P = 0.04$   |
| <b>2.25–2.49</b>   |              |             |             |             |              |              |
| $n_{1979-80} = 16$ | $t = -0.021$ | —           | —           | —           | $t = 0.671$  | $t = 3.451$  |
| $n_{2004} = 35$    | $P = 0.98$   |             |             |             | $P = 0.51$   | $P < 0.01$   |
| <b>2.50–2.74</b>   |              |             |             |             |              |              |
| $n_{1979-80} = 16$ | $t = 2.638$  | $t = 2.913$ | —           | —           | $t = 1.000$  | $t = 1.289$  |
| $n_{2004} = 68$    | $P < 0.01$   | $P < 0.01$  |             |             | $P = 0.32$   | $P = 0.20$   |
| <b>2.75–2.99</b>   |              |             |             |             |              |              |
| $n_{1979-80} = 33$ | $t = 1.753$  | $t = 2.739$ | $t = 1.171$ | $t = 1.844$ | $t = -0.908$ | $t = 3.585$  |
| $n_{2004} = 45$    | $P = 0.08$   | $P < 0.01$  | $P = 0.25$  | $P = 0.07$  | $P = 0.37$   | $P < 0.01$   |
| <b>3.00–3.24</b>   |              |             |             |             |              |              |
| $n_{1979-80} = 72$ | $t = 0.481$  | $t = 3.045$ | $t = 1.359$ | $t = 1.540$ | $t = 2.062$  | $t = 3.667$  |
| $n_{2004} = 70$    | $P = 0.63$   | $P < 0.01$  | $P = 0.18$  | $P = 0.13$  | $P = 0.04$   | $P < 0.01$   |
| <b>3.25–3.49</b>   |              |             |             |             |              |              |
| $n_{1979-80} = 40$ | $t = 2.586$  | $t = 2.208$ | $t = 1.562$ | $t = 0.907$ | $t = 2.476$  | $t = 1.609$  |

**Table A2.** (Contd)

| Depth (m)                                                 | C.her                     | P.pus                     | P.per                      | P.cri                      | N.opa                      | filam. algae               |
|-----------------------------------------------------------|---------------------------|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| $n_{2004} = 33$<br><b>3.50–3.74</b>                       | $P = 0.01$                | $P = 0.03$                | $P = 0.12$                 | $P = 0.37$                 | $P = 0.02$                 | $P = 0.11$                 |
| $n_{1979-80} = 28$<br>$n_{2004} = 44$<br><b>3.75–3.99</b> | $t = 2.041$<br>$P = 0.04$ | $t = 1.350$<br>$P = 0.08$ | $t = 1.150$<br>$P = 0.25$  | $t = -0.458$<br>$P = 0.65$ | $t = -0.407$<br>$P = 0.68$ | $t = 2.370$<br>$P = 0.02$  |
| $n_{1979-80} = 35$<br>$n_{2004} = 34$<br><b>4.00–4.24</b> | $t = 1.242$<br>$P = 0.22$ | —                         | $t = -0.115$<br>$P = 0.91$ | $t = -1.291$<br>$P = 0.20$ | $t = -1.067$<br>$P = 0.29$ | $t = 3.026$<br>$P < 0.01$  |
| $n_{1979-80} = 58$<br>$n_{2004} = 56$<br><b>4.25–4.49</b> | —                         | $t = 1.468$<br>$P = 0.14$ | $t = 1.448$<br>$P = 0.15$  | $t = -0.920$<br>$P = 0.36$ | $t = -1.772$<br>$P = 0.08$ | $t = 6.642$<br>$P < 0.01$  |
| $n_{1979-80} = 9$<br>$n_{2004} = 26$<br><b>4.50–4.74</b>  | $t = 1.751$<br>$P = 0.09$ | —                         | $t = -0.190$<br>$P = 0.85$ | $t = -1.305$<br>$P = 0.20$ | $t = -0.998$<br>$P = 0.33$ | $t = -0.187$<br>$P = 0.85$ |
| $n_{1979-80} = 12$<br>$n_{2004} = 47$<br><b>4.75–4.99</b> | —                         | —                         | $t = -1.026$<br>$P = 0.31$ | $t = -1.312$<br>$P = 0.19$ | $t = -0.458$<br>$P = 0.65$ | $t = 2.020$<br>$P = 0.05$  |
| $n_{1979-80} = 8$<br>$n_{2004} = 30$<br><b>5.00–5.24</b>  | —                         | —                         | $t = -0.918$<br>$P = 0.36$ | $t = -1.267$<br>$P = 0.21$ | $t = -0.511$<br>$P = 0.61$ | $t = 0.703$<br>$P = 0.49$  |
| $n_{1979-80} = 34$<br>$n_{2004} = 37$<br><b>5.25–5.49</b> | $t = 1.044$<br>$P = 0.30$ | —                         | $t = -1.035$<br>$P = 0.30$ | $t = -2.755$<br>$P < 0.01$ | $t = -1.014$<br>$P = 0.31$ | $t = 5.990$<br>$P < 0.01$  |
| $n_{1979-80} = 13$<br>$n_{2004} = 22$<br><b>5.50–5.74</b> | —                         | $t = 1.315$<br>$P = 0.20$ | $t = -0.764$<br>$P = 0.45$ | $t = -0.745$<br>$P = 0.46$ | $t = -0.673$<br>$P = 0.51$ | $t = 0.206$<br>$P = 0.84$  |
| $n_{1979-80} = 14$<br>$n_{2004} = 37$<br><b>5.75–5.99</b> | —                         | —                         | $t = -0.611$<br>$P = 0.54$ | $t = -0.611$<br>$P = 0.54$ | $t = -0.893$<br>$P = 0.38$ | $t = -0.295$<br>$P = 0.77$ |
| $n_{1979-80} = 5$<br>$n_{2004} = 23$<br><b>6.00–6.24</b>  | —                         | —                         | —                          | —                          | $t = -0.459$<br>$P = 0.65$ | $t = -0.643$<br>$P = 0.53$ |
| $n_{1979-80} = 5$<br>$n_{2004} = 13$<br><b>6.25–6.49</b>  | —                         | —                         | —                          | —                          | —                          | $t = -2.179$<br>$P = 0.04$ |
| $n_{1979-80} = 3$<br>$n_{2004} = 6$                       | —                         | —                         | —                          | —                          | —                          | $t = -2.399$<br>$P = 0.05$ |

**Table A3.** Complete taxon-specific two-tailed  $t$  test results testing for temporal differences (1979–80 vs. 2004) in cover-weighted mean depth ( $T_i$ ), for the taxa in Figure 6. Sampling stations were treated as replicates and data were log-transformed before analysis. Stations at which taxa were not recorded were excluded from calculations. For all  $t$ -tests, d.f. =  $n_{1979-80} + n_{2004} - 2$ ; “—” = species absent in 2004; “nc” = not calculable ( $n_{1979-80}$  and/or  $n_{2004} < 3$ ). Negative  $t$  values indicate a deeper  $T_i$  value in 2004 (temporal comparisons), or a deeper  $T_{E.can}$  value (between taxa comparisons). Species abbreviations as genus initial plus first three letters of species name.

| Temporal changes (1979–80 vs. 2004) |                                     |                                     |                           |                                     |                            |                            |                                     |                                     |                                     |                           |
|-------------------------------------|-------------------------------------|-------------------------------------|---------------------------|-------------------------------------|----------------------------|----------------------------|-------------------------------------|-------------------------------------|-------------------------------------|---------------------------|
| E.can                               | M.alt                               | P.ber                               | N.fle                     | C.glo                               | C.her                      | P.pus                      | P.cri                               | P.per                               | N.opa                               | I.lac                     |
| $t = -0.485$<br>$P = 0.64$          | $t = 0.110$<br>$P = 0.91$           | $t = -2.253$<br>$P = 0.05$          |                           | $t = 0.835$<br>$P = 0.43$           |                            |                            | $t = -3.444$<br>$P = 0.01$          | $t = -2.712$<br>$P = 0.02$          | $t = -1.145$<br>$P = 0.28$          |                           |
| $n_{1979-80} = 6$<br>$n_{2004} = 7$ | $n_{1979-80} = 6$<br>$n_{2004} = 7$ | $n_{1979-80} = 6$<br>$n_{2004} = 7$ | nc                        | $n_{1979-80} = 3$<br>$n_{2004} = 6$ | nc                         | —                          | $n_{1979-80} = 3$<br>$n_{2004} = 6$ | $n_{1979-80} = 6$<br>$n_{2004} = 5$ | $n_{1979-80} = 7$<br>$n_{2004} = 6$ | nc                        |
| Comparisons with $T_{E.can}$        |                                     |                                     |                           |                                     |                            |                            |                                     |                                     |                                     |                           |
|                                     | M.alt                               | P.ber                               | N.fle                     | C.glo                               | C.her                      | P.pus                      | P.cri                               | P.per                               | N.opa                               | I.lac                     |
| 1979–80<br>$n_{E.can} = 6$          | $t = -2.732$<br>$P = 0.02$          | $t = -0.837$<br>$P = 0.42$          | $t = 1.202$<br>$P = 0.26$ | $t = -2.037$<br>$P = 0.08$          | $t = -1.759$<br>$P = 0.11$ | $t = -0.156$<br>$P = 0.88$ | $t = -0.110$<br>$P = 0.91$          | $t = -0.111$<br>$P = 0.91$          | $t = -0.974$<br>$P = 0.35$          | $t = 0.395$<br>$P = 0.70$ |
|                                     | $n_{M.alt} = 6$                     | $n_{P.ber} = 6$                     | $n_{N.fle} = 5$           | $n_{C.glo} = 3$                     | $n_{C.her} = 5$            | $n_{P.pus} = 7$            | $n_{P.cri} = 3$                     | $n_{P.per} = 6$                     | $n_{N.opa} = 7$                     | $n_{I.lac} = 3$           |
| 2004<br>$n_{E.can} = 7$             | $t = -5.710$<br>$P < 0.01$          | $t = 2.450$<br>$P = 0.03$           | nc                        | $t = -9.445$<br>$P < 0.01$          | nc                         | —                          | $t = 7.370$<br>$P < 0.01$           | $t = 5.061$<br>$P < 0.01$           | $t = 0.102$<br>$P = 0.92$           | nc                        |
|                                     | $n_{M.alt} = 7$                     | $n_{P.ber} = 7$                     |                           | $n_{C.glo} = 6$                     |                            |                            | $n_{P.cri} = 6$                     | $n_{P.per} = 5$                     | $n_{N.opa} = 6$                     |                           |