**Supplementary material** for:

De Santiago, K., Palmer, T.A, Wetz, M.S. & Beseres Pollack, J. (2020) Response of macrobenthic communities to changes in water quality in a subtropical, microtidal estuary (Oso Bay, Texas). Experimental Results

Table S. Mean abundances of taxa occurring at each station (n/m2)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Taxa | AG | OI | DG | AI | WP | YB | Mean |
| Ostracoda | 3115 | 212 | 1770 | 1109 | 147901 | 47 | 25693 |
| *Streblospio benedicti* | 10184 | 1369 | 7328 | 22292 | 106 | 30376 | 11943 |
| *Capitella capitata* | 861 | 330 | 1617 | 802 | 12 | 460 | 681 |
| Nereididae | 496 | 0 | 920 | 590 | 177 | 118 | 384 |
| Amphipoda | 35 | 83 | 649 | 378 | 260 | 673 | 346 |
| Oligochaeta | 142 | 24 | 1027 | 71 | 555 | 0 | 303 |
| Chironomidae larvae | 0 | 0 | 12 | 0 | 920 | 0 | 155 |
| Bivalvia | 0 | 236 | 0 | 83 | 0 | 201 | 87 |
| *Scoloplos* sp. | 0 | 319 | 0 | 106 | 0 | 71 | 83 |
| *Polydora* sp. | 12 | 12 | 83 | 130 | 0 | 106 | 57 |
| *Mediomastus californiensis* | 0 | 59 | 0 | 0 | 0 | 248 | 51 |
| *Brania* sp. | 0 | 224 | 0 | 0 | 0 | 24 | 41 |
| *Hypereteone heteropoda* | 0 | 12 | 12 | 0 | 0 | 189 | 35 |
| *Heteromastus filiformis* | 0 | 12 | 0 | 0 | 0 | 201 | 35 |
| Cumacea | 0 | 118 | 0 | 0 | 12 | 12 | 24 |
| *Prionospio heterobranchia* | 0 | 0 | 0 | 0 | 0 | 94 | 16 |
| Tanaidacea | 0 | 59 | 12 | 0 | 0 | 0 | 12 |
| Gastropoda | 0 | 24 | 0 | 35 | 0 | 0 | 10 |
| Hesionidae | 0 | 0 | 0 | 24 | 0 | 35 | 10 |
| *Capitella aciculata* | 24 | 0 | 12 | 0 | 12 | 0 | 8 |
| Isopoda | 12 | 12 | 0 | 0 | 12 | 12 | 8 |
| Phyllodocidae | 0 | 24 | 0 | 0 | 0 | 24 | 8 |
| Syllidae | 12 | 12 | 0 | 0 | 12 | 12 | 8 |
| *Callinectes sapidus* | 0 | 0 | 12 | 0 | 12 | 0 | 4 |
| Insecta larvae | 12 | 0 | 0 | 0 | 12 | 0 | 4 |
| Mysida | 0 | 12 | 0 | 0 | 0 | 12 | 4 |
| Nemertea | 12 | 0 | 0 | 0 | 0 | 12 | 4 |
| *Sphaerosyllis aciculata* | 0 | 0 | 0 | 0 | 0 | 24 | 4 |
| *Arenicola cristata* | 0 | 12 | 0 | 0 | 0 | 0 | 2 |
| Bivalvia juvenile | 0 | 0 | 0 | 0 | 0 | 12 | 2 |
| *Cirriformia filigera* | 0 | 12 | 0 | 0 | 0 | 0 | 2 |
| *Glycinde* sp. | 0 | 12 | 0 | 0 | 0 | 0 | 2 |
| Goniadidae | 0 | 12 | 0 | 0 | 0 | 0 | 2 |
| Holothuroidea | 0 | 0 | 0 | 0 | 0 | 12 | 2 |
| Larval teleost | 0 | 0 | 12 | 0 | 0 | 0 | 2 |
| Lysidice spp. | 0 | 0 | 0 | 0 | 0 | 12 | 2 |
| Decapoda larvae | 0 | 0 | 0 | 0 | 12 | 0 | 2 |
| *Palaemon* sp. | 12 | 0 | 0 | 0 | 0 | 0 | 2 |
| *Sigambra tentaculata* | 0 | 0 | 0 | 0 | 0 | 12 | 2 |
| Sipuncula | 0 | 0 | 0 | 0 | 0 | 12 | 2 |
| Total | 14928 | 3198 | 13465 | 25620 | 150013 | 33007 | 40039 |

Table S2. Mean (and standard deviation) of water quality and sediment variables at each station. DOC = Dissolved Organic Carbon, TDN = Total Dissolved Nitrogen, DON = Dissolved Organic Nitrogen

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Medium | Variable | OI | AG | WP | DG | AI | YB |
| Water | Salinity | 36.3 | 9.8 | 7.0 | 25.0 | 30.8 | 40.7 |
|   |   | (4.0) | (7.6) | (9.1) | (12.0) | (15.5) | (7.8) |
|   | Temperature | 22.7 | 23.6 | 25.1 | 22.8 | 22.3 | 23.9 |
|   | (°C) | (6.0) | (5.4) | (4.7) | (6.1) | (6.9) | (6.3) |
|   | Dissolved Oxygen | 6.5 | 5.4 | 4.4 | 6.3 | 6.6 | 5.9 |
|   | (mg/L) | (1.6) | (2.8) | (2.6) | (2.7) | (2.1) | (1.1) |
|   | pH | 8.2 | 8.3 | 7.4 | 8.3 | 8.3 | 8.2 |
|   |   | (0.3) | (0.4) | (0.5) | (0.4) | (0.2) | (0.1) |
|   | Ammonia | 2.0 | 122.8 | 413.6 | 21.0 | 13.8 | 3.4 |
|   | (µM/L) | (2.2) | (183.5) | (273.6) | (33.3) | (28.2) | (2.9) |
|   | Chlorophyll-a | 6.4 | 34.6 | 5.5 | 23.2 | 25.7 | 10.1 |
|   | (µg/L) | (2.8) | (33.0) | (7.3) | (11.3) | (19.7) | (8.8) |
|   | DOC | 418.3 | 869.3 | 772.0 | 733.3 | 654.7 | 632.7 |
|   | (µM/L) | (138.4) | (246.1) | (74.1) | (198.5) | (322.6) | (243.3) |
|   | DON | 31.3 | 81.2 | 96.2 | 60.4 | 51.7 | 46.7 |
|   | (µM/L) | (10.9) | (51.6) | (57.9) | (18.7) | (27.9) | (17.2) |
|   | Nitrate+Nitrite | 1.6 | 160.0 | 456.7 | 16.4 | 12.6 | 7.4 |
|   | (µM/L) | (4.2) | (161.0) | (339.0) | (20.4) | (19.7) | (18.8) |
|   | Nitrite | 0.3 | 17.4 | 18.1 | 4.4 | 3.7 | 0.6 |
|   | (µM/L) | (0.6) | (13.1) | (11.1) | (7.1) | (6.3) | (0.9) |
|   | Orthophosphate | 0.4 | 28.2 | 47.5 | 7.5 | 5.0 | 1.6 |
|   | (µM/L) | (0.2) | (21.5) | (23.9) | (5.3) | (4.6) | (2.5) |
|   | Silicate | 22.1 | 134.1 | 192.3 | 102.9 | 50.7 | 38.3 |
|   | (µM/L) | (17.1) | (43.7) | (23.2) | (34.3) | (27.8) | (43.0) |
|   | TDN | 35.0 | 364.0 | 991.4 | 97.7 | 78.1 | 57.5 |
|   | (µM/L) | (13.3) | (328.0) | (267.8) | (46.2) | (44.9) | (20.5) |
| Sediment | Clay | 0.2 | 18.6 | 15.6 | 55.6 | 27.5 | 18.4 |
|   | (%) | (0.0) | (3.8) | (7.2) | (2.5) | (2.8) | (2.8) |
|   | Rubble | 2.4 | 10.6 | 0.9 | 1.4 | 1.3 | 8.1 |
|   | (%) | (0.4) | (1.6) | (0.2) | (1.1) | (0.2) | (4.0) |
|   | Sand | 97.2 | 58.5 | 75.1 | 14.9 | 56.3 | 63.9 |
|   | (%) | (0.4) | (5.7) | (12.1) | (2.8) | (3.8) | (8.3) |
|   | Silt | 0.3 | 12.3 | 8.6 | 28.3 | 15.0 | 9.8 |
|   | (%) | (0.1) | (0.3) | (4.7) | (6.2) | (0.8) | (1.5) |
|   | Chlorophyll-a | 6.5 | 11.3 | 30.5 | 32.7 | 12.1 | 5.8 |
|   | (mg/L) | (2.9) | (7.0) | (19.8) | (33.6) | (8.1) | (2.5) |

Table S. Correlations among water quality variables. Numbers for each correlation represent Pearson Correlation Coefficient (r), Prob > |r| (p) and number of observations (N). Values have not been adjusted for possible multiple testing error.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variables | Chl-a | Sal | DO | pH | Temp | DOC | TDN | Ammonia | NO3+NO2 | Nitrite | DON | Silicate | OrthoP |
| Chlorophyll-a | 1 | 0.03682 | 0.14199 | 0.3885 | 0.1548 | 0.61801 | -0.17661 | -0.20787 | -0.16621 | 0.05734 | 0.26984 | 0.21835 | -0.08241 |
| (µg/L) |  | 0.7691 | 0.2554 | 0.0013 | 0.2146 | <.0001 | 0.1593 | 0.094 | 0.1823 | 0.6474 | 0.0311 | 0.0782 | 0.5107 |
|  | 66 | 66 | 66 | 66 | 66 | 65 | 65 | 66 | 66 | 66 | 64 | 66 | 66 |
| Salinity | 0.03682 | 1 | 0.1394 | 0.36432 | 0.02254 | -0.12413 | -0.58795 | -0.46218 | -0.5301 | -0.5105 | -0.32768 | -0.615 | -0.5771 |
|  | 0.7691 |  | 0.2297 | 0.0012 | 0.8467 | 0.3246 | <.0001 | <.0001 | <.0001 | <.0001 | 0.0082 | <.0001 | <.0001 |
|  | 66 | 76 | 76 | 76 | 76 | 65 | 65 | 66 | 66 | 66 | 64 | 66 | 66 |
| Dissolved Oxygen | 0.14199 | 0.1394 | 1 | 0.5995 | -0.32646 | -0.23126 | -0.32475 | -0.34055 | -0.21317 | -0.0897 | -0.30464 | -0.32083 | -0.35419 |
| (mg/L) | 0.2554 | 0.2297 |  | <.0001 | 0.004 | 0.0638 | 0.0083 | 0.0051 | 0.0857 | 0.4738 | 0.0144 | 0.0086 | 0.0035 |
|  | 66 | 76 | 76 | 76 | 76 | 65 | 65 | 66 | 66 | 66 | 64 | 66 | 66 |
| pH | 0.3885 | 0.36432 | 0.5995 | 1 | -0.07139 | 0.00212 | -0.58255 | -0.54668 | -0.47265 | -0.26116 | -0.21196 | -0.41858 | -0.51089 |
|  | 0.0013 | 0.0012 | <.0001 |  | 0.54 | 0.9866 | <.0001 | <.0001 | <.0001 | 0.0342 | 0.0927 | 0.0005 | <.0001 |
|  | 66 | 76 | 76 | 76 | 76 | 65 | 65 | 66 | 66 | 66 | 64 | 66 | 66 |
| Temperature | 0.1548 | 0.02254 | -0.32646 | -0.07139 | 1 | 0.4604 | 0.1065 | -0.01165 | 0.16339 | -0.09068 | 0.22105 | 0.28167 | 0.06717 |
| (°C) | 0.2146 | 0.8467 | 0.004 | 0.54 |  | 0.0001 | 0.3985 | 0.926 | 0.1899 | 0.469 | 0.0792 | 0.022 | 0.592 |
|  | 66 | 76 | 76 | 76 | 76 | 65 | 65 | 66 | 66 | 66 | 64 | 66 | 66 |
| DOC | 0.61801 | -0.12413 | -0.23126 | 0.00212 | 0.4604 | 1 | 0.27401 | 0.20695 | 0.17578 | 0.29888 | 0.57414 | 0.61839 | 0.26567 |
| (µM/L) | <.0001 | 0.3246 | 0.0638 | 0.9866 | 0.0001 |  | 0.0272 | 0.0981 | 0.1613 | 0.0156 | <.0001 | <.0001 | 0.0324 |
|  | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 64 | 65 | 65 |
| TDN | -0.17661 | -0.58795 | -0.32475 | -0.58255 | 0.1065 | 0.27401 | 1 | 0.81928 | 0.84853 | 0.71952 | 0.63279 | 0.79773 | 0.80681 |
| (µM/L) | 0.1593 | <.0001 | 0.0083 | <.0001 | 0.3985 | 0.0272 |  | <.0001 | <.0001 | <.0001 | <.0001 | <.0001 | <.0001 |
|  | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 64 | 65 | 65 |
| Ammonia | -0.20787 | -0.46218 | -0.34055 | -0.54668 | -0.01165 | 0.20695 | 0.81928 | 1 | 0.40827 | 0.60677 | 0.48815 | 0.62403 | 0.52486 |
| (µM/L) | 0.094 | <.0001 | 0.0051 | <.0001 | 0.926 | 0.0981 | <.0001 |  | 0.0007 | <.0001 | <.0001 | <.0001 | <.0001 |
|  | 66 | 66 | 66 | 66 | 66 | 65 | 65 | 66 | 66 | 66 | 64 | 66 | 66 |
| Nitrate+Nitrite | -0.16621 | -0.5301 | -0.21317 | -0.47265 | 0.16339 | 0.17578 | 0.84853 | 0.40827 | 1 | 0.58813 | 0.43954 | 0.68078 | 0.81865 |
| (µM/L) | 0.1823 | <.0001 | 0.0857 | <.0001 | 0.1899 | 0.1613 | <.0001 | 0.0007 |  | <.0001 | 0.0003 | <.0001 | <.0001 |
|  | 66 | 66 | 66 | 66 | 66 | 65 | 65 | 66 | 66 | 66 | 64 | 66 | 66 |
| Nitrite | 0.05734 | -0.5105 | -0.0897 | -0.26116 | -0.09068 | 0.29888 | 0.71952 | 0.60677 | 0.58813 | 1 | 0.4409 | 0.63019 | 0.64532 |
| (µM/L) | 0.6474 | <.0001 | 0.4738 | 0.0342 | 0.469 | 0.0156 | <.0001 | <.0001 | <.0001 |  | 0.0003 | <.0001 | <.0001 |
|  | 66 | 66 | 66 | 66 | 66 | 65 | 65 | 66 | 66 | 66 | 64 | 66 | 66 |
| DON | 0.26984 | -0.32768 | -0.30464 | -0.21196 | 0.22105 | 0.57414 | 0.63279 | 0.48815 | 0.43954 | 0.4409 | 1 | 0.64982 | 0.40933 |
| (µM/L) | 0.0311 | 0.0082 | 0.0144 | 0.0927 | 0.0792 | <.0001 | <.0001 | <.0001 | 0.0003 | 0.0003 |  | <.0001 | 0.0008 |
|  | 64 | 64 | 64 | 64 | 64 | 64 | 64 | 64 | 64 | 64 | 64 | 64 | 64 |
| Silicate | 0.21835 | -0.615 | -0.32083 | -0.41858 | 0.28167 | 0.61839 | 0.79773 | 0.62403 | 0.68078 | 0.63019 | 0.64982 | 1 | 0.74113 |
| (µM/L) | 0.0782 | <.0001 | 0.0086 | 0.0005 | 0.022 | <.0001 | <.0001 | <.0001 | <.0001 | <.0001 | <.0001 |  | <.0001 |
|  | 66 | 66 | 66 | 66 | 66 | 65 | 65 | 66 | 66 | 66 | 64 | 66 | 66 |
| Orthophosphate | -0.08241 | -0.5771 | -0.35419 | -0.51089 | 0.06717 | 0.26567 | 0.80681 | 0.52486 | 0.81865 | 0.64532 | 0.40933 | 0.74113 | 1 |
| (µM/L) | 0.5107 | <.0001 | 0.0035 | <.0001 | 0.592 | 0.0324 | <.0001 | <.0001 | <.0001 | <.0001 | 0.0008 | <.0001 |  |
|  | 66 | 66 | 66 | 66 | 66 | 65 | 65 | 66 | 66 | 66 | 64 | 66 | 66 |



Figure S. Non-metric multidimensional scaling plot of spatial variation in macrofaunal community composition for six stations sampled over 11 months.



Figure S. Concentrations of salinity (A), silicate (B) and dissolved organic carbon (C) at each station. Diamonds represent means. Circles represent outliers (>|1.5 IQR +/- 75th/25th percentiles|)