**Supplementary material for “Temperature and Water Quality-Related Patterns in Sediment-Associated *Symbiodinium* Communities Impact Symbiont Uptake and Fitness of Juveniles in the genus *Acropora*”**

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**Supplementary Methods**

**Breeding and husbandry of *Acropora tenuis and A. millepora* juveniles**

Eight colonies of *A. tenuis* from Wilkie Bay (13°46’44.544’’S, 143°38’26.0154’’E), plus eight *A. tenuis* and six *A. millepora* colonies from south Orpheus Island (18°39’49.62’’S, 146°29’47.26’’E) were spawned in November 2013 at OIRS. Eggs and sperm from colonies of *A. tenuis* and *A. millepora* were combined in three bulk fertilisation bins: one for *A. tenuis* from Orpheus Island, one for *A. tenuis* from Wilkie Island, and one for *A. millepora* from Orpheus Island. At the 4-cell stage, embryos were washed three times then reared in three, 500 L culture tanks (corresponding to each fertilization batch described above) with 27°C 0.1 µM filtered flow-through seawater. Terracotta tiles were conditioned in raw seawater at OIRS for 1.5 months prior to spawning and then autoclaved (Tuttnauer, Netherlands). 25 tiles were added per culture tank six days post fertilization and included ground and autoclaved crustose coralline algae (*Porolithon onkodes*) to induce larval settlement and metamorphosis. Larvae were left to settle with low aeration and water flow for five days. Tiles with attached *A. tenuis* and *A. millepora* juveniles were randomly placed into each of the four experimental tanks with northern sediments 11 days post-fertilization. For *A. tenuis*, six tiles were placed in each of the four sediment treatments (one tank per treatment, n = 24 tiles and 4,012 juveniles). To have roughly equivalent numbers of *A. millepora* juveniles per sediment treatment, the number of tiles varied (n = 2 for the Wilkie sediment, 7 for Wallace, 4 for Great Detached, 7 for Tydeman; 903 juveniles). All surviving juveniles from each treatment were sampled after 35 days of sediment exposure (days post exposure: d.o.e.) and stored in 100% ethanol at -20°C until DNA extraction (Table S1).

For larval rearing in 2014, four *A. tenuis* colonies from Magnetic Island and eight *A. millepora* colonies from Trunk Reef were collected and kept in filtered flow-through seawater at 27°C with natural light in the Seasim at AIMS. *A. tenuis* and *A. millepora* were spawned in October and November 2014, respectively. Gametes from two colonies of *A. tenuis* and eight of *A. millepora* were mixed in one bulk fertilization per species (although only two colonies were used for *A. tenuis* to control for genetic effects). Fertilization and larval rearing followed the 2013 protocol except that larvae were settled onto 6-well plates (20 larvae per well), with a single piece of autoclaved *P. onkodes* in each well. Each juvenile was photographed and then placed into each of the sediment tanks for natural infection by *Symbiodinium* (number of replicate 6-well plates per tank: *A. tenuis-* 3-5, *A. millepora-* 1-2). Juveniles were sampled and stored in the same manner as those from the northern sector; representing 12 time points between 11 days to 145 days of sediment exposure (Table S1).

**Sequencing and data analysis**

Illumina Miseq was performed in three batches (2013 juveniles, 2014 juveniles, and sediments from both years). Raw reads from the 274 samples sequenced were analysed using the USEARCH and UPARSE pipeline (Edgar, 2013) (v. 7). Read mapping with a 97% identity threshold resulted in, on average, 39,260 (SE±1170) reads per sample. A total of 2,188 OTUs were identified with a custom *Symbiodinium* database built with all known *Symbiodinium* sequences retrieved from the complete NCBI database using Blast+ of taxon id: 2949 (Altschul et al., 1990; Camacho et al., 2009) (Table S2). OTUs were discarded if their Blast+ Expect value (E) was greater than 0.001 (De Wit *et al.*, 2012), as they likely represented non-specific amplification (i.e. other dinoflagellates), resulting in 1562 OTUs remaining.

Seven analyses were performed to compare *Symbiodinium* communities among the different treatments and samples (temporal sampling design in Table S1) using differential abundance testing implemented in ‘*DESeq2*’. Analysis One: comparison among sample type (all juveniles vs. all sediment samples), cross-shelf position (inshore vs. offshore), and sector (northern vs. central sector) and their interactions (type\*shore\*sector). Two: comparison among sediment treatments from northern inshore vs. northern offshore vs. central inshore vs. central offshore locations (sediments: shore\*sector). Within this analysis, the following comparisons were extracted: A) comparison between sediments from inshore vs. offshore locations (sediments: inshore\*offshore), and B) comparison between sediments from northern vs. central locations (sediments: north\*central). Three: comparison between pre- and post-experiment sediment treatments from each central reef location (sediments: reef\*pre/post). Pre- and post-experimental sediments had very similar *Symbiodinium* communities with the only significantly differentially abundant *Symbiodinium* OTUs being those that did not vary significantly in juveniles (Supplementary Results in Appendix D). Four: comparison of juveniles (both coral species after exposure to sediment treatments for 27-41 d.o.e.) from northern inshore vs. northern offshore vs. central inshore vs. central offshore locations (juveniles: shore\*sector). Within this analysis, the following comparisons were extracted: A) comparison between juveniles exposed to sediments from inshore vs. offshore locations (juveniles: inshore\*offshore) and B) comparison between juveniles exposed to sediments from northern vs. central locations (juveniles: north\*central). Five: comparison between *A. millepora* and *A. tenuis* juveniles exposed to northern sediment treatments for 35 days (*A. millepora*\**A. tenuis* in 2013). Six: comparison between *A. millepora* and *A. tenuis* juveniles exposed to central sediment treatments for 27- 30 days (*A. millepora*\**A. tenuis* in 2014). Seven: comparison between *A. tenuis* juveniles exposed to central sediment treatments from 11 to 90 days (*A.tenuis* juveniles: reef\*time point).

Generalized linear mixed models of initial infection and survival compared inshore and offshore treatments (inshore\* offshore), as well as pairwise comparisons between each central sector sediment location (Davies\*Rib\*Magnetic\*Pandora). Within the nested experimental design, locations were replicated within the inshore and offshore categories, and shore and location were treated as fixed effects. Replicate tanks within location and replicate settlement plates within tanks were accounted for as random effects. The intercept was allowed to vary among locations, among tanks within locations, and among plates within tanks. A negative binomial distribution accounted for over-dispersion in the time-to-infection models and a Poisson distribution was used for survival models. The overall impact of both of these fixed factors was assessed using the Likelihood Ratio Test through the ‘Anova’ function in the ‘*Car*’ package (Fox et al., 2010). Gradient was not significant and the survival model was refit without this factor. The glht function from the ‘*multcomp*’ package extracted Tukey post-hoc tests for each location (Hothorn et al., 2008). One Rib Reef tank was omitted because of unusually high mortality (only one of five plates survived), suggesting a specific issue with that tank.For the infection and survival models, outliers were statistically identified using the standard boxplot rule and Hampel identifier methods among plates within individual replicate tanks. The boxplot rule was then used to identify and remove outliers because it is not reliant on a median measure and thus has better performance in slightly asymmetric distributions. This resulted in the removal of three sub-replicate (plate) data points from the infection data (plate 25 in Pandora 1, plate 17 in Magnetic 1 and plate 27 in Davies 1) and two sub-replicate points in the survival data (plate 1 in Rib2 and plate 21 in Magnetic 1).

**Physical characterisation of sediments from central locations in 2014**

*Environmental covariates*

Maxwell’s (1968) scheme for the Great Barrier Reef is defined as follows: mud categories were as follows: 1) pure mud (> 80%), 2) predominately mud (60 - 80%), 3) very high mud (40 - 60%), 4) high mud (20 - 40%), 5) moderate mud (10 -20%), 6) low mud (1 -10%), 7) non-mud, and mostly sand (< 1%). Carbonate categories were as follows: 1) pure facies (> 90%), 2) high carbonate facies (80 - 90%), 3) impure facies (60 - 80%), 4) transitional facies (40 - 60%), 5) terrigenous facies (20 -40%), and 6) high terrigenous facies (< 20%).

*Particle size distribution*

To compare particle size distributions in sediments among the four central sector locations, a representative sample (from across the tank and through the depth of sediment) of approximately 28 grams was collected from each of the three replicate tanks per locations (n = 12 samples). Samples were centrifuged at 3000 rpm for three minutes (Beckman-Coulter, Allegra X15R) and the pellet was washed three times in an equivalent volume of DI water to remove salts. Five grams of sediment from each sample were digested for 48 hours using 10 ml of 30% Hydrogen Peroxide, after which sediments were freeze-dried for 48 hours. Each sample was weighed and then sieved to achieve fractions (particles greater or less than 2000 µM in diameter). The percent volume per particle size from 0.02-2000 µM was determined in the <2000 µM fraction by laser ablation using the Mastersizer 2000 with hydro (Malvern; Worcestershire, UK) at the University of Western Australia.

To test whether the proportion of sediments in the two size fractions (i.e., greater or less than 2000 µM) differed among locations, a generalized linear model (GLM) with a binomial distribution was run using ‘*lme4*’, and contrasts were extracted using the glht function. A generalized additive model (GAM) was constructed, and the package ‘*mgcv*’ was used to determine if significant differences in particle size distributions were present across each location by applying a separate smoother to each location (variable coefficient models).

*Nutrient content in sediments*

Nutrient content (nutrients trapped on particles and in interstitial pore water) was analysed using approximately 15 ml of pre- and post-experiment sediment samples. Sediment samples were dried for 5 days in an 80°C SESS oven and then ground to a fine dust for 1-2 minutes using a Rocklab Ring Mill (Auckland, NZ) and agate mortar. 5-15 µg (5 decimal point balance, Mettler AE 163) of dried, ground sediments were digested with 32% HCl for 15 min at 80°C. Total Nitrogen and Total Carbon were measured using a SSM-5000A Shimadzu Solid Sample Module and TOC-L Total Organic Carbon Analyser and run with ten standards to construct standard curves for both Nitrogen and Carbon.

Total Nitrogen, Phosphorus and Calcium were compared among locations using linear models. Statistical tests of (Fe and Al) trace metal percentages were run using the package ‘*nlme*’ with the weights function ‘*varIdent*’ to allow different variance structures per location to obtain homogeneity of variance. Post-hoc tests were run using the package ‘*lsmeans*’ (Lenth and Hervé, 2015). Differences in Total Organic Carbon were assessed with a generalized linear model using a Poisson distribution, with a location by treatment (pre- and post-experimental) interaction. Statistical differences between nutrient concentrations in pre- and post-experimental sediments were determined using generalized linear models in the package ‘*lme4*’, with Tukey’s post-hoc tests performed using the glht function. Assumptions of homogeneity of variance, normality, and over-dispersion were met. Pre- and post-experimental sediments were similar in their nutrient characteristics (Supplementary Results in Appendix D).

**Supplementary results**

**Symbiodinium *communities compared between juveniles and sediments***

Of the three categories of comparisons used to test for similarities in the diversity and abundance of *Symbiodinium* OTUs among samples (i.e., comparisons of sediment vs. juvenile *Symbiodinium* communities, comparisons among communities in juveniles exposed to different sediment treatments, and comparisons among communities in sediments from different reefs; summarised in Figure 3), the diversity and abundance of *Symbiodinium* OTUs were the most dissimilar in the sediment-juvenile sample comparison (mean R2= 0.229 ± 0.04, Figure 3). Within this comparison category, *Symbiodinium* communities in northern sector juveniles and sediments were the most strongly correlated (R2=0.36-0.5; Figure 3), although communities in northern sector juveniles were also strongly correlated with communities in central sector inshore sediments (R2=0.37-0.39). Interestingly, central sector juveniles and sediments were not strongly correlated (R2=0.05-0.13), and central juvenile communities only slightly resembled northern sediment communities (R2 = 0.04-0.21).

**Patterns in *Symbiodinium* communities within sediments**

*Overall patterns in sediment communities across all locations*

Of the three categories of comparisons used to test for similarities in the diversity and abundance of *Symbiodinium* OTUs among samples, *Symbiodinium* communities in sediment samples were the most strongly correlated (mean R2 = 0.41 ± 0.06, Figure 3). Within this comparison category, *Symbiodinium* communities within inshore, central sediments were the most dissimilar to sediment communities at other locations (R2 = 0.18-0.27). Inshore locations had higher abundances of clade D, whereas offshore locations had significantly greater abundances of unidentified *Symbiodinium* types. Interestingly, whilst only one type from clade E is currently recognized (*S. voratum*), significant differences were detected among multiple *S. voratum* OTUs (i.e. sequence variants) from inshore and offshore sediments, suggesting that ecologically relevant diversity exists at the type and sub-type level (Figure 4). In comparison, northern sediments were more diverse and abundant in *Symbiodinium* OTUs from clades A, C, E, and F and the uncultured category compared to central sediments(Figure 5). No types from clade D differed significantly in abundance between northern and central reefs.

**Community comparisons among sediment-exposed, one month-old juveniles (27-41 d.o.e.)**

Symbiodinium *communities compared among juveniles exposed to different sediments*

The diversity and abundance of *Symbiodinium* OTUs in juveniles exposed to sediments from different locations were moderately correlated (mean R2=0.33 ± 0.14; Figure 3). *Symbiodinium* communities associated with northern juveniles were highly similar at inshore and offshore locations (R2=0.98), however, communities in central inshore juveniles were distinct from communities in both central and northern offshore juveniles (R2=0.07-.014).

*Inshore versus offshore sediment treatment comparison*

B1 made up a majority of reads from juveniles exposed to inshore sediments, followed by types: A3, D1, C1, CCMP828, C15, and C. Juveniles exposed to sediments from inshore locations also had background abundances of types C90, A4, F5, and uncultured *Symbiodinium*. Inshore locations had 5.9-9.17 log2 fold greater abundance of D1a, 8.6 log2 fold greater D1, and 5.4 log2 fold greater A4 (B-H adjusted p-values < 0.05). Offshore locations had 5.4-7.7 log2 fold greater abundances A3 and C15 types (B-H adjusted p-values < 0.05). Juveniles exposed to offshore sediments only had background abundances of B1, C90, D, and A4.

*Northern versus central sector sediment treatment comparison*

Juveniles exposed to northern sediments were characterized by clades A and C, and correspondingly, these clades were also at higher abundances in northern sediments. Juveniles exposed to northern sediments also had significantly greater abundances of D1 and D1a compared to juveniles exposed to central sediments, despite northern sediments not having significantly greater abundances of clade D. Juveniles exposed to central sediments had greater abundances of clade B, which again mirrored the greater abundances of clade B in central sediments.

**Pre- and post-experimental sediment**

**Comparison of *Symbiodinium* communities in pre- and post-experimental sediments**

The sediment community changed significantly for each central sector location over the 5-month long experiment (permutational multivariate analysis of variance: Df3,23, F=2.10, *p* = 0.001). In the Magnetic sediments, only one OTU increased significantly in abundance (OTU17\_A3, B-H adjusted p-value < 0.05) compared to the start of the experiment, whilst the remaining 31 significantly differentially abundant OTUs decreased (B-H adjusted p-values < 0.05). Of those, only OTU2129, a C15- type, had been previously identified as having significantly increased from time point 6 to 7 in Magnetic juveniles (however its overall abundance in the sediments significantly decreased). The same pattern was seen in Pandora sediments, with all but one OTU increasing in abundance (OTU90\_A3) whilst the other 14 decreased. None of the OTUs found to be significantly different in Pandora juveniles were identified as those that changed significantly in the sediments. This was also true for Rib sediments. Only four of the 45 significantly differentially abundant OTUs in Rib sediments increased (A3: OTUs 8/11; *Amphisorus*: 362; G3: 1967) and none of those were found to be significantly different in juveniles. Finally, there were 37 differentially abundant OTUs in Davies sediments between time points, where the abundance of A3 decreased significantly over time almost 7-fold. The opposite was true for Davies juveniles, with A3 (OTU1) increasing significantly between time points 5-6 and 6-7.

**Physical characterization of central sector sediments**

**Total Organic Carbon, Nitrogen, Phosphorus, Calcium, and trace metals**

Nutrient profiles of sediments differed significantly among locations. Rib sediments had significantly greater Total Nitrogen compared to Pandora sediments, but Total Nitrogen did not differ significantly in any other pairwise combination of locations (Table S3). Within post-experimental sediments, Magnetic and Pandora sediments had significantly lower percent calcium compared to Davies sediments (Table S3). Conversely, post-experimental Davies sediments had significantly lower percentages of Al and Fe compared to Magnetic and Pandora sediments (all p < 0.0001). Rib post-experimental sediments also had significantly less Al and Fe compared to Magnetic and Pandora sediments (all p < 0.0001), although Rib and Davies sediments did not differ significantly (Table S3). A similar pattern was detected in pre-experimental sediments, with both Davies and Rib sediments having significantly lower percentages of Al and Fe compared to Magnetic sediments (all p < 0.0001), but not compared to each other (p = 0.79). No significant differences in percentages of carbon or phosphorus were detected among locations (Figure S3, S4, Table S3).

**Sediment size classes**

The percentage of particles in sediment samples that were <2000 µM in size varied only marginally among the four central sector locations, i.e., between 84.5% ± 4.3 and 88.2% ± 4.4 of total sediment weight. Correspondingly, 11.8% ± 4.4 to 15.5% ± 4.3 of total sample weights comprised particles >2000 µM. No statistical differences in the proportion of sediments in size classes larger or smaller than the 2000 µM cut-off were detected among locations (Table S3). Considering sediments in the < 2000 µM particle size class, and using Davies as a reference location, sediment size distributions varied significantly among locations (Table S3). Davies, Pandora and Magnetic had the greatest proportion of sediments within the ~700 µM range, whereas Rib sediments were predominantly ~1000 µM (Figure S4). Davies and Pandora sediments had the largest range of fine particle sizes (0-250 µM), whereas Magnetic and Rib had the greatest abundance of particles from 1750-2000 µM.

**Comparison of Total Organic Carbon, Nitrogen, Phosphorus, Calcium, and trace metals in pre- and post-experimental sediment differences**

Overall the elemental composition of central sector sediments was similar both in the field and after ~6 months of experimentation in the laboratory (Figure S4, Table S8), with no significant difference in Total Organic Carbon content, Total Nitrogen, and Total Phosphorus between pre- and post-experimental sediments after post-hoc tests (Figure S4, Table S8, *p* = 0.2 - 0.934). However, pre- experimental sediments had significantly greater percent: calcium (*p* = 0.015), Al (*p* = 0.0285), and Fe (*p* = 0.018) compared to post- experimental sediments.

**Long-term symbiosis dynamics and temporal variation in *Symbiodinium* communities between central sector juveniles: differences within and between locations over time**

At 11 d.o.e., juveniles exposed to Davies, Rib and Magnetic sediments also contained high abundances of different C-types that differed by sediment source: C (Davies), C1 (Magnetic), C15 and C1 (Rib) (Figure 7). Juveniles exposed to Rib sediments were unique in having a high relative abundance of A3-type CCMP828, which was not detected in juveniles exposed to sediments from the other locations at this time-point. Interestingly the greatest number of differentially abundant OTUs were across inshore to offshore, with Rib/Davies and Magnetic/Pandora each having three differentially abundant OTUs between them. Although at background abundances, C15 was 7 log2 fold more abundant in Davies compared to Magnetic, with Davies also having 5.6 log2 fold less A3, and 6 log2 fold more C and D1 compared to Rib (B-H adjusted p-values < 0.05, Table S6). Magnetic also had 6 log2 fold greater abundances of D1 and C but 5.6 log2 fold less A3 compared to Pandora.

By 19 d.o.e., both Rib and Davies had C15 types in almost equal abundance compared to each other, although A3 dominated in Rib by 4 log2 fold greater abundances compared to Davies (B-H adjusted p-values < 0.05, Table S6). Both locations had juveniles with background abundances of C1 types, although significantly 3-5.3 log2 fold greater abundances in Davies, which also had background F2 and A13. Magnetic juveniles were heavily dominated by D1, which was at 4-5.4 log2 fold greater abundances compared to Rib and Davies juveniles. Magnetic juveniles also had abundant populations of D1a, C15 and C1 types, with significant changes in C and C1 compared to time-point 1 (B-H adjusted p-values < 0.05, Table S6). Magnetic also had significantly 3-5.3 log2 fold more C1 compared to Pandora. Finally, Pandora juveniles had greater dominance of four types belonging to B1, background C and C1 populations, and a significant decrease in D1 compared to time-point 1. Pandora also had ~4 log2 fold less C, and more D1 compared to Davies and Rib. It also had 4.4 log2 fold less A3 compared to Magnetic.

By 27 d.o.e., juveniles exposed to Pandora and Rib sediments maintained the same diversity previously described. Rib juveniles increased in C1, CCMP828, D, G2, although not significantly. Juveniles exposed to Davies sediments had less A3 than the previous sampling point and more equal populations of C, C15 and C1. Juveniles exposed to Magnetic sediments were no longer dominated by D1 (7.8 log2 fold decrease) or D1a (6.4 log2 fold decrease) (B-H adjusted p-values < 0.05, Table S6). The most dominant type was C1, which increased by 4.6 log2 fold from 19 d.o.e. with a 7.2 log2 fold decrease in C. The greatest differences in abundance was between Davies and Pandora, with Pandora having ~4 log2 fold greater B1 and a C-type and 3.7 log2 fold lower C15. The opposite trend was true for Rib and Magnetic, with Magnetic having significantly more of these types compared to Rib. Compared to the previous time point, Pandora also had significantly less D1 but significantly more B1, C1 and C.

No significantly differentially abundant OTUs were detected 41 d.o.e. between locations or from 27 d.o.e. to 41 d.o.e., most likely due to the low level of replication for this time point. However, qualitative differences did exist between locations. For example, Pandora juveniles were still dominated by B1, although D1 and D1a were now dominant compared to the previous C1 and C types. The emergence of a D-type was also seen in Davies/Rib and a re-emergence of D1 dominance in Magnetic juveniles such that the community looks very similar to the community seen in T2 (19 d.o.e.). Magnetic juveniles also have C, C1 and C15 types seen previously as well as increased background abundances of F5, B1, and A13. Davies are still dominated by C-types, although now almost completely by C15-types with an increase in B1 and consistently background presence of A13 at this location. Rib is again very similar to 19 and 27 d.o.e. with C1 and C-types and A3 dominating (although at lower abundance) and background populations of C15, and A2. Both Magnetic and Pandora have background abundances of A3 and uncultured *Symbiodinium*.

Juveniles exposed to Rib sediments were again dominated by C15, A3 and C1 types and background B1 by 48 d.o.e. Davies communities were now very similar to Rib, with the consistently background abundances of A3 which grew in abundance to become the second most dominant type in Davies juveniles. As in Rib juveniles, C15 was the most abundant, followed by C and C1 types and background B1. Rib did have significantly 3.2 log2 fold more A3 and 4.7 log2 fold less D1a compared to Davies (B-H adjusted p-values < 0.05, Table S6). Pandora was again consistent to previous time points being dominated by B1 followed by C1, D1, D, and D1a types, with a 5.2 log2 fold decrease in C. Magnetic juveniles greatly resembled Pandora juveniles in the diversity of C, C1, D1 and D1a, although they only housed background populations of B1. C-type OTU115 did increase 7.5 log2 fold increase in Magnetic juveniles from the previous time point. The abundance of D1a was significantly 4.8 log2 fold greater and A3 was 3.3 log2 fold less in Pandora compared to Magnetic. C15 was the main differentially abundant OTU between Rib and Pandora and Magnetic and Davies with both Rib and Magnetic having ~3.5 log2 fold greater abundances.

By 75 d.o.e., Magnetic and Pandora juveniles were very similar in OTU diversity. Both were dominated by C1 types, followed by D1, C and D1a types. The only qualitative differences are the presence of C15 and A1 in Magnetic juveniles. The background populations of B1 that were present in the preceding time point in Magnetic juveniles grew in abundance and were now more in line with abundances in Pandora juveniles. In regards to B1*,* Pandora had 4.8 log2 fold less and Rib had 5.7 log2 fold morecompared to 48 d.o.e. (B-H adjusted p-values < 0.05, Table S6). Alternatively, Davies and Rib diverged in community dominance, with Davies remaining very similar to previous time points in its dominance by A3 (although 7.1 log2 fold less of one type), C, C1 and C15 and with Rib now resembling Pandora and Magnetic (dominant C1 and background B1 and C). Two B1 types were in 5-6 log2 fold greater abundance in Rib compared to Magnetic and Pandora compared to Davies.

By 90 d.o.e., Rib and Davies communities are very similar in their dominance by C15 and C1 type communities with moderate A3 and background C-types and B1and some uncultured types*.* Rib juveniles did have additional diversity in F5, and A3. Davies also had background C90 and CCMP2455 types not observed in Rib. B1 and a C-type were found to be at 4.3-6.1 log2 fold lower abundance in Rib compared to Davies (B-H adjusted p-values < 0.05, Table S6). Davies juveniles resembled the four earliest time points due to the reduction in type A3 by 4.2 log2 fold, and a 4.7 log2 fold increase in B1. Pandora was dominated by 4-6 log2 fold more C and B1 compared to Magnetic juveniles, which were still dominated by C1 types. Pandora alternatively switched in dominance across a range of C types. Pandora juveniles also increased 4.8 log2 fold in B1 abundance compared to the previous time point although this type did not regain its former dominance. These juveniles also decreased in D1 (6.2 log2 fold) and D1a. Magnetic juveniles saw 6.7-fold increases in B1 types, ~5.8 log2 fold increase in C15 and 4.4 log2 fold decrease in D1 abundances compared to 75 d.o.e. Overall, D1 was quite variable, with significantly greater abundances in Pandora compared to Rib, but less in Rib and Davies compared to Magnetic.

Davies juveniles survived until 145 d.o.e. (four additional sampling points). No differentially abundant OTUs were detected between sampling points 90-102, 102-117, 117-129 d.o.e. in juveniles exposed to Davies sediments, however C15 was at 6.6 log2 fold greater abundances from 129-145 d.o.e.( B-H adjusted p-values < 0.05, Table S6). However, compared to 90 d.o.e., the overall abundance of A3 types was greater and continued to be variable until day 145. C1 and C15 types both oscillated in dominance for the remaining four time points. D1 and D1a were also detected in low abundance at 102 d.o.e. and D1 became one of the dominant types in 117 d.o.e. However, both D1 and D1a were at very low abundance in the final two time points.

*Patterns in photochemical efficiency and* Symbiodinium *community dynamics compared within and among locations*

Differences in Fv/Fm yields among juveniles exposed to sediments from different locations were potentially driven by distinct *Symbiodinium* communities in these juveniles (Figure 7, Figure 8C). For example, juveniles exposed to Pandora and Magnetic sediments had the most similar Fv/Fm values (~0.6) at day 41, when juveniles in both sediment treatments had substantial populations of D1 (OTU4, Magnetic: 16,141 ± 9488, Pandora: 17,200 ± 16207). Juveniles in Davies and Rib treatments, however, had lower Fv/Fm values (closer to 0.5), and were dominated by C15 (Davies juveniles) or C1 (Rib juveniles). By day 75, all Fv/Fm values were divergent, as were the symbiont communities in juveniles (Figure 8C). Interestingly, the greatest quantum yields for juveniles exposed to Rib sediments were recorded at day 90, when this location had its most diverse community of symbionts.

Initial and subsequent decreases in Fv/Fm in juveniles exposed to Davies sediments coincided with increases in A3 abundance (Spearman’s rho R2= -0.74) (Table 2). Fv/Fm values for juveniles exposed to Magnetic sediments were highly positively correlated with increasing abundances of B1 (Spearman’s rho R2= 0.8). Patterns in the Fv/Fm values of juveniles exposed to Magnetic and Pandora sediments were also highly correlated with changes in the abundance of *Symbiodinium* types C and A3 (R2= 0.8 and 1.0, -0.8 and -1). However, patterns in Fv/Fm values as abundances of these types differed between sediment treatments. Specifically, Fv/Fm values increased when C and A3 abundances increased in juveniles exposed to Magnetic sediments, whereas Fv/Fm values decreased when abundances of these two types increased in juveniles exposed to Pandora sediments. Fv/Fm values in juveniles exposed to Rib sediments were most highly correlated with the abundances of types D1, C1 and C15 (R2= 1, 0.8, 0.8).

**Table S1.** Summary of number of *A. tenuis* (not bold) and *A. millepora* (*italic* **bold**) juveniles collected at different days of exposure to sediments (d.o.e). Time points are only discussed in relation to *A. tenuis* juveniles.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **D.o.e** | **11** | **19** | **27** | **30** | **35** | **41** | **48** | **75** | **90** | **102** | **117** | **129** | **145** |
| **Time point** | **1** | **2** | **3** | **-** | **-** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| **Northern** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Great Detach | - | - | - |  | 8, ***5*** | - | - | - | - | - | - | - | - |
| Tydeman | - | - | - |  | 24, ***0*** | - | - | - | - | - | - | - | - |
| Wallace | - | - | - |  | 9, ***4*** | - | - | - | - | - | - | - | - |
| Wilkie | - | - | - |  | 2, ***7*** | - | - | - | - | - | - | - | - |
| **Central** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Rib | 3 | 5 | 5 | ***6*** | **-** | 1 | 7 | 1 | 4 | 0 | 0 | 0 | 0 |
| Davies | 3 | 6 | 5 | ***6*** | **-** | 2 | 14 | 7 | 6 | 3 | 3 | 3 | 4 |
| Magnetic | 4 | 5 | 5 | ***4*** | **-** | 3 | 10 | 3 | 4 | 0 | 0 | 0 | 0 |
| Pandora | 3 | 5 | 5 | ***6*** | **-** | 2 | 11 | 7 | 5 | 0 | 0 | 0 | 0 |

**Table S2.** Summary table of the number of raw sequencing reads, filtered reads and merged reads, with the final number of OTUs per category.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sample type** | **N°**  **samples** | **Raw reads** | **Merged/ Filtered Reads** | **Merged reads (%) with 97% identity** | **N° OTUs** |
| Juveniles | 235 | 11,978,668 | 9,353,073 | 99.4 | 970 |
| Sediments | 39 | 1,910,315 | 1,480,059 | 97.6 | 1321 |
| Total | 274 | 13,888,983 | 10,833,132 | 99.3 | 2,188 |
| E-value < 0.001 | - | - | - | - | 1,562 |

**Table S3.** Summary table for differential abundance testing using DESeq2. Values were derived from negative binomial model with the following experimental design formula: Reef\*Time point of only *A.tenuis* and *A.millepora* juveniles from 2014 between time points 1- 7 in which all four reefs were represented. Padj values represent DESeq2 Bejamini-Hochberg p-adjusted values for multiple comparisons (alpha < 0.05).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Time points by Reef** | **Comparison** | **OTU name and number** | **Basemean** | **Log2 fold** | **Padj** |
| 1 | Rib vs. Davies | OTU\_4\_\_D1 | 6191.9 | 6.071784 | 0.0001 |
| 1 | Rib vs. Davies | OTU\_115\_\_C | 8595.7 | 6.020704 | 0.0001 |
| 1 | Rib vs. Davies | OTU\_1\_\_A3 | 5188.7 | -5.652263 | 0.005 |
| 1 | Rib vs. Pandora | OTU\_427\_\_C15 | 1993.3 | 6.770046 | 7.7e-05 |
| 1 | Davies vs. Magnetic | OTU\_427\_\_C15 | 1993.3 | -6.819606 | 8e-05 |
| 1 | Pandora vs. Magnetic | OTU\_4\_\_D1 | 6191.9 | -6.09893 | 0.0001 |
| 1 | Pandora vs. Magnetic | OTU\_115\_\_C | 8595.7 | -6.034413 | 0.0001 |
| 1 | Pandora vs. Magnetic | OTU\_1\_\_A3 | 5188.7 | 5.572767 | 0.007 |
| 2 | Rib vs. Davies | OTU\_1\_\_A3 | 5188.7 | 4.053373 | 0.04 |
| 2 | Rib vs. Davies | OTU\_3\_\_C1 | 9153.4 | -3.053511 | 0.04 |
| 2 | Rib vs. Davies | OTU\_1616\_\_C1 | 125 | -5.381309 | 0.04 |
| 2 | Rib vs. Pandora | OTU\_4\_\_D1 | 6192 | -5.425658 | 3.3e-05 |
| 2 | Rib vs. Magnetic | OTU\_4\_\_D1 | 6192 | 4.200565 | 0.02 |
| 2 | Davies vs. Pandora | OTU\_4\_\_D1 | 6192 | -4.18538 | 0.02 |
| 2 | Davies vs. Magnetic | OTU\_4\_\_D1 | 6192 | 5.440843 | 3e-05 |
| 2 | Pandora vs. Magnetic | OTU\_1\_\_A3 | 5189 | -4.019176 | 0.04 |
| 2 | Pandora vs. Magnetic | OTU\_3\_\_C1 | 9153 | 3.030816 | 0.04 |
| 2 | Pandora vs. Magnetic | OTU\_1616\_\_C1 | 125 | 5.348544 | 0.04 |
| 3 | Rib vs. Magnetic | OTU\_2\_\_B1 | 14665 | -4.169964 | 0.02 |
| 3 | Rib vs. Magnetic | OTU\_115\_\_C | 8596 | -4.366293 | 0.02 |
| 3 | Rib vs. Magnetic | OTU\_427\_\_C15 | 1993 | 3.760846 | 0.05 |
| 3 | Pandora vs. Davies | OTU\_115\_\_C | 8596 | 4.375606 | 0.004 |
| 3 | Pandora vs. Davies | OTU\_2\_\_ B1 | 14665 | 4.154799 | 0.004 |
| 3 | Pandora vs. Davies | OTU\_427\_\_C15 | 1993.3 | -3.745216 | 0.01 |
| 5 | Rib vs. Davies | OTU\_1\_\_A3 | 5188.7 | 3.284569 | 0.03 |
| 5 | Rib vs. Davies | OTU\_6\_\_D1a | 284.1 | -4.730965 | 0.03 |
| 5 | Rib vs. Pandora | OTU\_2129\_\_C15 | 8326 | 3.558164 | 0.001 |
| 5 | Davies vs. Magnetic | OTU\_2129\_\_C15 | 8325.761 | -3.564269 | 0.001 |
| 5 | Pandora vs. Magnetic | OTU\_1\_\_A3 | 5188.7 | -3.262855 | 0.03 |
| 5 | Pandora vs. Magnetic | OTU\_6\_\_D1a | 284.1 | 4.794863 | 0.03 |
| 6 | Rib vs. Magnetic | OTU\_2\_\_ B1 | 14665.1 | 5.709697 | 0.001 |
| 6 | Rib vs. Magnetic | OTU\_159\_\_ B1 | 26.1 | 6.154792 | 0.01 |
| 6 | Davies vs. Pandora | OTU\_2\_\_ B1 | 14665.0548 | -5.710563 | 0.001 |
| 6 | Davies vs. Pandora | OTU\_159\_\_ B1 | 26.1 | -6.170069 | 0.01 |
| 7 | Rib vs. Davies | OTU\_115\_\_C | 8595.7 | -6.133098 | 2e-05 |
| 7 | Rib vs. Davies | OTU\_2\_\_ B1 | 14665.1 | -4.337019 | 1.6e-02 |
| 7 | Rib vs. Pandora | OTU\_4\_\_D1 | 6192 | 5.254881 | 0.002 |
| 7 | Rib vs. Magnetic | OTU\_4\_\_D1 | 6192 | -5.047767 | 0.005 |
| 7 | Rib vs. Magnetic | OTU\_115\_\_C | 8596 | 4.035173 | 0.05 |
| 7 | Davies vs. Pandora | OTU\_4\_\_D1 | 6192 | -5.047767 | 0.005 |
| 7 | Davies vs. Pandora | OTU\_115\_\_C | 8596 | 4.035173 | 0.05 |
| 7 | Davies vs. Magnetic | OTU\_4\_\_D1 | 6192 | -5.308002 | 0.002 |
| 7 | Pandora vs. Magnetic | OTU\_115\_\_C | 8596 | 6.150571 | 2e-05 |
| 7 | Pandora vs. Magnetic | OTU\_2\_\_ B1 | 14665.1 | 4.342293 | 2e-02 |
| Davies | 5 vs. 6 | OTU\_1\_\_A3 | 5188.7 | 7.136933 | 1.4e-06 |
| Davies | 6 vs. 7 | OTU\_2\_\_ B1 | 14665.1 | -4.724339 | 0.007 |
| Davies | 6 vs. 7 | OTU\_1\_\_A3 | 5188.7 | 4.278615 | 0.02 |
| Rib | 5 vs. 6 | OTU\_2\_\_ B1 | 14665.1 | 5.690951 | 0.03 |
| Pandora | 1 vs. 2 | OTU\_4\_\_D1 | 6192 | -5.791766 | 0.002 |
| Pandora | 2 vs. 3 | OTU\_4\_\_D1 | 6192 | -7.502493 | 9e-08 |
| Pandora | 2 vs. 3 | OTU\_2\_\_ B1 | 14665.1 | 6.453674 | 9e-06 |
| Pandora | 2 vs. 3 | OTU\_115\_\_C | 8595.7 | 6.177159 | 2e-05 |
| Pandora | 2 vs. 3 | OTU\_3\_\_C1 | 9153.4 | 3.392168 | 1.2e-02 |
| Pandora | 4 vs. 5 | OTU\_115\_\_C | 8595.7 | -5.245648 | 0.03 |
| Pandora | 5 vs. 6 | OTU\_2\_\_ B1 | 14665.1 | -4.8057 | 0.01 |
| Pandora | 6 vs. 7 | OTU\_4\_\_D1 | 6191.9 | 6.174213 | 0.0001 |
| Pandora | 6 vs. 7 | OTU\_2\_\_ B1 | 14665.1 | -4.804427 | 0.01 |
| Magnetic | 1 vs. 2 | OTU\_115\_\_C | 8595.7 | -6.18168 | 0.001 |
| Magnetic | 1 vs. 2 | OTU\_1616\_\_C1 | 125 | 6.214637 | 0.03 |
| Magnetic | 2 vs. 3 | OTU\_4\_\_D1 | 6192 | 7.811593 | 5.4e-08 |
| Magnetic | 2 vs. 3 | OTU\_115\_\_C | 8595.7 | -7.203004 | 2.3e-06 |
| Magnetic | 2 vs. 3 | OTU\_427\_\_C15 | 1993.3 | 4.560852 | 1.2e-02 |
| Magnetic | 2 vs. 3 | OTU\_2186\_\_D1a | 267 | 6.388701 | 4e-02 |
| Magnetic | 4 vs. 5 | OTU\_115\_\_C | 8596 | 7.501243 | 2e-06 |
| Magnetic | 6 vs. 7 | OTU\_2\_\_ B1 | 14665.1 | 6.796346 | 3e-05 |
| Magnetic | 6 vs. 7 | OTU\_2129\_\_C15 | 8325.8 | 5.754242 | 3e-05 |
| Magnetic | 6 vs. 7 | OTU\_4\_\_D1 | 6191.9 | -4.439306 | 1.5e-02 |
| Davies | 10 vs. 11 | OTU\_2129\_C15 | 12191.7 | 6.632362 | 0.005 |

**Table S4.** Impact of reef location and the interaction of time and location to maximum quantum yield. Output from a generalized additive mixed effects model.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Df** | **Ref.Df** | **F** | ***P*** |
| Location | 3 | - | 3.064 | 0.0283 |
| s(Day:Davies) | - | 1.984 | 29.849 | 1.72-12 |
| s(Day:Magnetic) | - | 1 | 0.083 | 0.774 |
| s(Day:Pandora) | - | 1 | 1.426 | 0.233 |
| s(Day:Rib) | - | 1 | 1.757 | 0.186 |

**Table S5.** Summary table for differential abundance testing using DESeq2 comparing *A. tenuis* (n= 43) and *A. millepora* (n= 16) juveniles after 35 days post Northern sediment exposure. Values were derived from negative binomial model. Padj values represent DESeq2 Bejamini-Hochberg p-adjusted values for multiple comparisons (alpha < 0.05).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Comparison** | **OTUs** | **Basemean** | **Log2 fold** | **Padj** |
| *A.millepora* vs. *A.tenuis* | OTU\_1460\_A4 | 25.9 | -5.281482 | 1.2e-10 |
| *A.millepora* vs. *A.tenuis* | OTU\_2094\_C1 | 190.9 | 4.056097 | 1.6e-05 |
| *A.millepora* vs. *A.tenuis* | OTU\_427\_C15 | 87 | -5.273507 | 3.6e-05 |
| *A.millepora* vs. *A.tenuis* | OTU\_2129\_C15 | 1063.2 | -3.116852 | 3.6e-05 |
| *A.millepora* vs. *A.tenuis* | OTU\_35\_A4 | 3.6 | -5.573386 | 4e-04 |
| *A.millepora* vs. *A.tenuis* | OTU\_356\_G4 | 10.2 | -6.879293 | 2e-03 |
| *A.millepora* vs. *A.tenuis* | OTU\_674\_A1 | 2.2 | 6.508087 | 2.7e-03 |
| *A.millepora* vs. *A.tenuis* | OTU\_831\_A4 | 1.6 | -5.316148 | 3e-03 |
| *A.millepora* vs. *A.tenuis* | OTU\_3\_C1 | 4394.8 | 1.802522 | 3.9e-03 |

**Table S6.** Summary table for differential abundance testing using DESeq2 comparing *A. tenuis* (n= 20) and *A. millepora* (n= 22) juveniles after 27-30 days post central sediment exposure. Values were derived from negative binomial model. Padj values represent DESeq2 Bejamini-Hochberg p-adjusted values for multiple comparisons (alpha <0.05).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Comparison** | **OTU name and number** | **Basemean** | **Log2 fold** | **Padj** |
| *A.millepora* vs. *A.tenuis* | OTU\_2094\_C1 | 206.8 | 7.326397 | 2.28e-15 |
| *A.millepora* vs. *A.tenuis* | OTU\_632\_A1 | 13.8 | 8.254241 | 1.18e-07 |
| *A.millepora* vs. *A.tenuis* | OTU\_1616\_C1 | 201.3 | 5.462061 | 1.18e-07 |
| *A.millepora* vs. *A.tenuis* | OTU\_1600\_A1 | 13.3 | 8.127423 | 8.03e-07 |
| *A.millepora* vs. *A.tenuis* | OTU\_79\_C15 | 17.4 | 6.889934 | 3.93e-04 |
| *A.millepora* vs. *A.tenuis* | OTU\_831\_A4 | 3.9 | -7.05868 | 1.63e-03 |
| *A.millepora* vs. *A.tenuis* | OTU\_4\_D1 | 33.4 | 3.783966 | 2.29e-03 |
| *A.millepora* vs. *A.tenuis* | OTU\_35\_A4 | 2.4 | -6.39979 | 7.69e-03 |
| *A.millepora* vs. *A.tenuis* | OTU\_700\_F5\_1363 | 4.5 | -6.91795 | 8.03e-03 |
| *A.millepora* vs. *A.tenuis* | OTU\_877\_C | 14.5 | 3.632376 | 9.04e-03 |
| *A.millepora* vs. *A.tenuis* | OTU\_2\_B1 | 1412.7 | -1.9531 | 1.13e-02 |
| *A.millepora* vs. *A.tenuis* | OTU\_96\_OTU18 | 1.8 | -5.89206 | 2.00e-02 |
| *A.millepora* vs. *A.tenuis* | OTU\_1460\_A4 | 1.7 | -5.40764 | 2.00e-02 |
| *A.millepora* vs. *A.tenuis* | OTU\_275\_OTU28 | 1.5 | -5.6886 | 2.64e-02 |
| *A.millepora* vs. *A.tenuis* | OTU\_103\_C1 | 1.8 | -5.82352 | 2.84e-02 |
| *A.millepora* vs. *A.tenuis* | OTU\_985\_A1 | 1.7 | 5.115434 | 3.07e-02 |
| *A.millepora* vs. *A.tenuis* | OTU\_1814\_D1a | 2.9 | 5.581719 | 3.07e-02 |

**Table S7.** Model outputs from Generalized Additive Models (GAMS). Each *Symbiodinium* type is fit as a single model, which may include linear and smoothing functions. To account for normality and heterogeneity of variance, log transformations (abbreviated Trans.) were used. Significant linear or smoothing terms are italicized.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Type** | **Factor** | **Trans.** | **edf** | **Ref.df** | **F or /t-value** | ***P*** | **Model type** | **R2 (adj)** | **Variance explained (%)** |
| ***S. natans*** |  |  |  |  |  |  |  | 0.581 | 58.1 |
|  | WQT |  | 1.563 | 1.809 | 13.668 | *0.00013* | smoothers |  |  |
|  | SST |  | 2 | 2 | 10.039 | *0.00088* | smoothers |  |  |
|  | Mud |  | 2 | 2 | 7.362 | *0.00395* | smoothers |  |  |
|  | Carbonate |  | 1 | 1 | 22.031 | *0.00012* | smoothers |  |  |
| **A1** |  |  |  |  |  |  |  | 0.471 | 58.6 |
|  | WQT |  |  |  | 5.83 | 0.355 | lm |  |  |
|  | SST |  | 1 | 1 | 16.839 | *0.00048* | smoothers |  |  |
|  | Mud |  | 1.741 | 1.933 | 6.969 | *0.00347* | smoothers |  |  |
|  | Carbonate |  | 1.926 | 1.994 | 8.4 | *0.00266* | smoothers |  |  |
| **A2** |  |  |  |  |  |  |  | 0.166 | 19.9 |
|  | SST |  |  |  | 2.488 | *0.0199* | lm |  |  |
| **A3** |  |  |  |  |  |  |  | 0.349 | 40.8 |
|  | WQT | log10 |  |  | -2.627 | *0.0253* | lm |  |  |
| **B2** |  |  |  |  |  |  |  | 0.334 | 39.4 |
|  | SST |  | 1 | 1 | 9.221 | *0.00563* | smoothers |  |  |
|  | Mud |  | 1.34 | 1.565 | 3.717 | *0.02712* | smoothers |  |  |
| **B4** |  |  |  |  |  |  |  | 0.319 | 46.2 |
|  | WQT |  | 1 | 1 | 3.203 | 0.088 | smoothers |  |  |
|  | SST |  | 1.693 | 1.905 | 3.654 | 0.0782 | smoothers |  |  |
|  | Mud |  | 1 | 1 | 4.727 | *0.0413* | smoothers |  |  |
|  | Carbonate |  | 1.762 | 1.942 | 1.849 | 0.2343 | smoothers |  |  |
| **C1** |  |  |  |  |  |  |  | 0.175 | 27 |
|  | WQT |  |  |  | -1.646 | 0.1135 | lm |  |  |
|  | Carbonate |  |  |  | 2.613 | *0.0155* | lm |  |  |
|  | SST |  |  |  | 1.619 | 0.119 | lm |  |  |
| **C3** |  |  |  |  |  |  |  | -0.15 | 16.3 |
|  | SST |  |  |  | 1.243 | 0.249 | lm |  |  |
|  | Carbonate |  |  |  | -0.606 | 0.562 | lm |  |  |
|  | WQT | log10 |  |  | 0.261 | 0.801 | lm |  |  |
|  | Mud |  |  |  | -1.238 | 0.251 | lm |  |  |
| **C15** |  |  |  |  |  |  |  | -0.0543 | 10.8 |
|  | WQT |  |  |  | -1.238 | 0.229 | lm |  |  |
|  | Carbonate |  |  |  | 0.504 | 0.619 | lm |  |  |
|  | SST |  |  |  | 0.204 | 0.84 | lm |  |  |
|  | Mud |  |  |  | 0.882 | 0.387 | lm |  |  |
| **C90** |  |  |  |  |  |  |  | 0.0616 | 23.2 |
|  | WQT | log10 |  |  | -1.649 | 0.133 | lm |  |  |
|  | Carbonate |  |  |  | 1.284 | 0.231 | lm |  |  |
| **D1** |  |  |  |  |  |  |  | 0.559 | 60.7 |
|  | Carbonate | log10 | 1.824 | 1.969 | 15.05 | *2.79E-05* | smoother |  |  |
|  | SST |  |  |  | 1.088 | 0.288 | lm |  |  |
| **D1a** |  |  |  |  |  |  |  | 0.226 | 27.7 |
|  | Carbonate | log10 | 1.706 | 1.913 | 5.183 | *0.0296* | smoother |  |  |
| **E** |  |  |  |  |  |  |  | 0.58 | 66.6 |
|  | Carbonate |  |  |  | -2.548 | *0.032* | lm |  |  |
|  | WQT | log10 | 1.264 | 1.459 | 0.096 | 0.828 | smoother |  |  |
| **F1** |  |  |  |  |  |  |  | -0.0374 | 12.2 |
|  | WQT |  |  |  | -0.893 | 0.382 | lm |  |  |
|  | Carbonate |  |  |  | 0.391 | 0.7 | lm |  |  |
|  | SST |  |  |  | -0.386 | 0.703 | lm |  |  |
|  | Mud |  |  |  | 0.636 | 0.531 | lm |  |  |
| **G3** |  |  |  |  |  |  |  | -0.065 | 9.8 |
|  | WQT |  |  |  | -0.978 | 0.339 | lm |  |  |
|  | Carbonate | log10 |  |  | 1.208 | 0.24 | lm |  |  |
|  | SST |  |  |  | 0.958 | 0.348 | lm |  |  |
|  | Mud | log10 |  |  | 0.761 | 0.455 | lm |  |  |
| **G6** |  |  |  |  |  |  |  | 0.0328 | 18.2 |
|  | WQT |  |  |  | 0.572 | 0.573 | lm |  |  |
|  | Carbonate |  |  |  | -0.857 | 0.401 | lm |  |  |
|  | SST |  |  |  | 0.52 | 0.608 | lm |  |  |
|  | Mud |  |  |  | -0.55 | 0.588 | lm |  |  |

**Table S8.** Summary statistics for nutrient and grain size characteristics of sediments from the central sector in 2014. Abbreviations are as follows: Tukey’s post-hoc test (TPH), Linear Model (LM), Generalized Linear Model (GLM), Generalized Least Squares (GLS), Generalized Additive Models (GAM).

|  |  |  |  |
| --- | --- | --- | --- |
| **Nutrient** | **Comparison** | **Method** | ***P* =** |
| Total Organic Carbon (%) | Pre- and post | Poisson GLM: TPH | 0.934 |
|  | Location | Poisson GLM: TPH | 0.997-1 |
| Total Nitrogen (TN=PN+TDN) (%) | Pre- and post- experimental | LM: TPH | 0.2 |
|  | Location | LM: TPH | Rib > Pandora (**0.01**)  All other pairwise comparisons insignificant (0.07-0.88) |
| Total Phosphorus (TP=PP+TDP) (mg/kg) | Pre- and post- experimental | LM: TPH | 0.651 |
|  | Location | LM: TPH | 0.1-0.99 |
| Calcium (%) | Pre- and post- experimental | LM: TPH | **0.015 (Pre > Pre)** |
|  | Location | LM: TPH | Pre: 0.08-1  Post: Magnetic, Pandora < Davies (**0.0315, 0.0541**) |
| Al (%) | Pre- and post- experimental | GLS | **0.0285 (Pre > Pre)** |
|  | Location | GLS TPH | Pre: Davies, Rib < Magnetic (< **0.0001)**  Post: Davies, Rib < Magnetic, Pandora (both < **0.0001**), no difference Rib and Davies (0.79 - 0.98) |
| Fe (%) | Pre- and post- experimental | GLS | **0.018 (Pre > Pre)** |
|  | Location | GLS TPH | Pre: Davies, Rib < Magnetic (< **0.0001)**  Post: Davies, Rib < Magnetic, Pandora (both < **0.0001**), no difference Rib and Davies (0.79 - 0.98) |
| Sediment particles size > 2000 µM and < 2000 µM | Location | GLM TPH | All pairwise comparisons insignificant (> 0.761) |
| Sediment particles size > 2000 µM and < 2000 µm | Location | GAM | ***<* 2-16** |
| Distribution of particles < 2000 µM | Location compared to Davies | GAM | Magnetic (*p =* **1.98-09**)  Pandora (*p*  = **4.89-10**)  Rib (*p =* **0.0245**) |



**Figure S1.** Map of sediment sampling locations along the Queensland coast in Australia (**A**). The warmer, northern locations are in red and orange colours and correspond to the red box on the inset. Central locations are in blue and green colours. Offshore locations are in lighter tones to correspond to the less turbid environments on offshore reefs and inshore reef colours are in dark tones as the water is more turbid. Panel **B** gives the long-term temperature profile of each location from October to April (around spawning period), including experimental temperature treatments for juvenile exposure to sediments in 2013 (light grey-Orpheus ambient temperature) and 2014 (black). The line colours correspond to the filled in circle colours for each location from panel A.

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**Figure S2.** Number of *Symbiodinium* OTUs retrieved uniquely in **A**) juveniles samples, **B**) sediment samples, **D**) both juvenile and sediment samples. The values above individual bars represent the percent for that category (i.e., 35 clade A OTUs were retrieved from juveniles samples, which represents ~17% of all clade A OTUs (total number = 212) retrieved across all categories. **C**) Venn diagram of overlap in OTU diversity between juvenile and sediment samples including and names per venn diagram category and includes the percent of reads from that category (i.e., *S. minutum* reads made up 79.5% of all the uniquely juvenile reads).



**Figure S3.** Maps showing different environmental covariates of water-quality along the Queensland coast. These ten variables were combined to create an overall water-quality index (WQI). **A)** Irradiance measures include Secchi depth, chlorophyll *a* concentration and suspended sediments whilst **B)** and **C)** are nutrient measures. Group **C)** represent dissolved inorganic nitrogen (DIN).

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**Figure S4.** Nutrient and sediment size profiles for central sector sediments collected in 2014 at the time of initial collection (pre-) and at the end of the experiment (post-). **A**) From top to bottom: total nitrogen, total organic carbon, phosphorus, calcium, aluminium, iron. **B**) Sediment profiles in percent volume of sample per location for sediment particles less than 2000 µM in size. Treatments include frozen (pre-experimental sediments in dark grey) versus experimental (post-experimental in light grey). Colours correspond to each sediment location, with inshore locations represented by dark hues and offshore locations as light hues.



**Figure S5.** Partial plots of Generalized Additive Models along Water Quality Index (WQI), Sea Surface Temperatures (SST), mud (3 = very high mud, 6 = low mud; see Methods) and carbonate content (1 = pure carbonate, 4 = transitional carbonate). Note that the y-axis representing variance normalized *Symbiodinium* abundances varies per type. The solid line shows the modelled abundances and the grey areas are the modelled confidence limits.