Supplementary material accompanying the following article:

Cimon, S., Deslauriers, A. and Cusson, M.* 2020. Multiple stressors and disturbance effects on eelgrass and epifaunal macroinvertebrate assemblage structure.

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1 Eelgrass bed characterization

A characterization of the eelgrass bed was done on the sampling site in June and August 2014. For June and August, the respective above-ground biomass (mean ± SE) was 137.85 ± 9.07 $g_{dw}·m^{-2}$ and 193.03 ± 9.08 $g_{dw}·m^{-2}$ (*n* = 40 and *n* = 39), and below-ground biomass was 437.41 ± 22.44 $g_{dw}·m^{-2}$ and 318.52 ± 17.68 $g_{dw}·m^{-2}$ (*n* = 40 and *n* = 37). Shoot density was measured using two different methods: a 20-cm diameter 20-cm deep core to collect material with the shoots then counted in the lab, and use a 20-cm diameter hoop with shoot counts directly in the field. The first method gave consistently higher (approx. 35-40% higher) and more stable shoot counts: 956.60 ± 36.77 shoots$·m^{-2}$ (June, *n* = 38) and 1345.88 ± 75.19 shoots$·m^{-2}$ (August, *n* = 39), whereas the hoop reported 622.29 ± 46.10 shoots$·m^{-2}$ (June, *n* = 20) and 808.51 ± 48.95 shoots$·m^{-2}$ (August, *n* = 20). Shoots were typically small with the longest leaf measuring on average (±SE) 37.22 ± 0.6 cm long and 0.32 ± 0.004 cm wide in June (*n* = 296) and 39.98 ± 0.76 cm long and 0.32 ± 0.005 cm wide in August (*n* = 281); the sheaths measured 9.26 ± 0.36 cm long and 0.34 ± 0.007 cm wide in June (*n* = 99) and 10.62 ± 0.3 cm long and 0.36 ± 0.009 cm wide in August (*n* = 100). Shoot typically have three to five leaves (average ±SE of 4.8 ± 0.08 leave$·shoot^{-1}$ in June and 4.11 ± 0.09 leave$·shoot^{-1}$ in August; respectively *n* = 99 and *n* = 100). Epifaunal organisms (unpublished data from Cimon and Cusson; see also Grant & Provencher 2007 for additional details) are dominated by the gastropods *Littorina saxatilis* and *Ecrobia truncata*. Isopods (*Jaera albifrons*, *Idotea phosphorea* and *Edotia triloba*), bivalves (*Mytilus edulis* and *Limecola balthica*), and amphipods (*Gammarus* spp. and *Phoxocephalus holbolli*) were also common. The crab *Cancer irroratus* was observed frequently. As for the fish assemblage, three-spined stickleback (*Gasterosteus aculeatus*, dominant), and juvenile *Cyclopterus lumpus*, *Microgadus tomcod* and *Ammodytes* sp. were the most commonly encountered.

2 Supplementary results: effects of treatments on species

2.1 Density reduction effect on species

The species that most contributed to the differences in structure between density treatments are listed in Tables S10, S11, and S12; we can observe a decrease in average dissimilarity through time. Two species showed a significant increase in standardized abundance in Period 1 under reduced eelgrass density: the gastropod *Ecrobia truncata* and the isopod *Edotia triloba*. The periwinkle *L. saxatilis* lost its dominance and shared its dominance with another gastropod *Ecrobia truncata* in Period 1.

Four species had a significant increase in their standardized abundance in Period 2 in the reduced-density eelgrass plots: the gastropods *E. truncata*, *Littorina saxatilis*, and *Lacuna vincta* and the bivalve *Mytilus* spp.

Three species had a significant increase in standardized abundance in Period 3 under conditions of reduced eelgrass density: the isopod *Idotea phosphorea*, and the gastropods *L. vincta* and *E. truncata*. Recruitment of *L. vincta*, which occurred in July–August, was higher in density-reduced plots. We also observed more *Mytilus* spp. in Period 3 compared to other periods; however, we observed no differences in their standardized abundances among the eelgrass density treatments.

2.2 Nutrient enrichment effect on species

The species that most contributed to the differences in structure between the shading treatments are listed in Supplementary Table S13. In Period 2, two third of the species, present in N- plots, showed a decrease in their standardized abundances with enrichment (N+). These decreases were significant for the gastropod grazers *L. saxatilis* and *E. truncata*, and the amphipod *Phoxocephalus holbolli*. *E. truncata* was absent from some enriched plots whereas *P. holbolli* was absent in more than half of the enriched plots.

2.3 Shading effect on species

The species that most contributed to the differences in structure between the shading treatments are listed in Supplementary Table S14. Four taxa had a significant change of standardized abundance: *L. saxatilis* decreased, while *E. truncata*, *E. triloba*, and juvenile *Gammarus* spp. increased under shading. The higher evenness can be attributed to the decrease of the dominant species, *L. saxatilis*, combined with an increase of other species (notably *E. truncata* and *E triloba)*. Although *L. saxatilis* remained the dominant species under conditions of shading, the total abundance of all other species was about 25% higher than the abundance of *L. saxatilis*, while *L. saxatilis* had about 40% more individuals than the total abundance of all other species under natural light conditions.

3 Supplementary tables

3.1 Table S1. Taxa found during sampling

Table S1. List and classification of taxa found during all sampling periods at Baie-St.-Ludger, Quebec, Canada.

Species	Type	Phylum	Class	Order	Family
Invertebrates					
Nereis pelagica	Animal	Annelida	Polychaeta	Phyllodocida	Nereididae
Pholoe minuta	Animal	Annelida	Polychaeta	Phyllodocida	Pholoidae
Insect larvae*	Animal	Arthropoda	Insecta		
Calliopius laeviusculus	Animal	Arthropoda	Malacostraca	Amphipoda	Calliopiidae
Crassicorophium bonellii	Animal	Arthropoda	Malacostraca	Amphipoda	Corophiidae
Gammarus lawrencianus	Animal	Arthropoda	Malacostraca	Amphipoda	Gammaridae
Gammarus oceanicus	Animal	Arthropoda	Malacostraca	Amphipoda	Gammaridae
Gammarus spp. juvenile	Animal	Arthropoda	Malacostraca	Amphipoda	Gammaridae
Gammarus tigrinus	Animal	Arthropoda	Malacostraca	Amphipoda	Gammaridae
Phoxocephalus holbolli	Animal	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae
Pontogeneia inermis	Animal	Arthropoda	Malacostraca	Amphipoda	Pontogeneiidae
Cancer irroratus megalop	Animal	Arthropoda	Malacostraca	Decapoda	Cancridae
Hippolytidae shrimp	Animal	Arthropoda	Malacostraca	Decapoda	Hippolytidae
Edotia triloba	Animal	Arthropoda	Malacostraca	Isopoda	Idoteidae
Idotea phosphorea	Animal	Arthropoda	Malacostraca	Isopoda	Idoteidae
Jaera albifrons	Animal	Arthropoda	Malacostraca	Isopoda	Janiridae
Mysis gaspensis	Animal	Arthropoda	Malacostraca	Mysida	Mysidae
Mysis stenolepsis	Animal	Arthropoda	Malacostraca	Mysida	Mysidae
Mya arenaria	Animal	Mollusca	Bivalvia	Myida	Myidae
Mya truncata	Animal	Mollusca	Bivalvia	Myida	Myidae
Mytilus spp.✝	Animal	Mollusca	Bivalvia	Mytiloida	Mytilidae
Mesoderma arctatum	Animal	Mollusca	Bivalvia	Veneroida	Mesodesmatidae
Macoma balthica	Animal	Mollusca	Bivalvia	Veneroida	Tellinidae
Ecrobia truncata	Animal	Mollusca	Gastropoda	Littorinimorpha	Hydrobiidae
Lacuna vincta	Animal	Mollusca	Gastropoda	Littorinimorpha	Littorinidae
Littorina saxatilis	Animal	Mollusca	Gastropoda	Littorinimorpha	Littorinidae
Testudinalia testudinalis	Animal	Mollusca	Gastropoda	Patellogastropoda	Lottiidae
Margarites costalis	Animal	Mollusca	Gastropoda	Trochida	Margaritidae
*Obelia dichotoma**‡	Animal	Cnidaria	Hydrozoa	Leptothecata	Campanulariidae
Vertebrates					
*Cyclopterus lumpus**	Animal	Chordata	Actinopterygii	Scorpaeniformes	Cyclopteridae
Fish larvae*	Animal	Chordata	Actinopterygii		

* Taxa removed from analysis.
✝ Composed of *Mytilus edulis*, *Mytilus trossolus*, and hybrids (see Moreau et al. 2005)
‡ *Obelia dichotoma* individuals were lost while separating eelgrass and animals, then we preferred to exclude this rare taxon from the analysis.

3.2 Table S2. Eelgrass density for Period 0 and Period 3

Table S2. Summary of ANOVA showing the effects of sediment nutrient enrichment (Nu) and shading (Sh) factors on eelgrass density for Period 0 and Period 3. Significant values are shown in bold.

		Period 0		Period 3	
	df	*F*-ratio	*p*	*F*-ratio	*p*
Eelgrass density					
Nu	1	0.89	0.3592	0.11	0.7437
Sh	1	2.25	0.1532	2.16	0.1613
Nu × Sh	1	0.08	0.7848	1.50	0.2382
Residual	16				

3.3 Table S3. Tukey HSD results of eelgrass density from Period 2

Table S3. Summary of Tukey HSD post hoc test on the interaction of sediment nutrient enrichment (N) and shading (S) factors on eelgrass density for Period 2. (+) stress present; (-) stress absent. Significant values are shown in bold.

		p-value
N+S-	N+S+	**<.0001**
N+S-	N-S+	**<.0001**
N-S-	N+S+	**0.0084**
N+S-	N-S-	**0.0106**
N-S-	N-S+	0.0574
N-S+	N+S+	0.7694

3.4 Table S4. Epiphytic mass for Period 1

Table S4. Summary of ANOVA showing the effects of eelgrass density reduction (De), sediment nutrient enrichment (Nu), and shading (Sh) factors on epiphyte load for Period 1 (dry weight of epiphytes (g)/ dry weight of *Z. marina* (g)). Significant values are shown in bold.

		Period 1	
	df	*F*-ratio	*p*
e) Epiphyte load			
De	1	2.35	0.1352
Nu	1	0.81	0.3736
Sh	1	0.00	0.9967
De × Nu	1	3.44	0.0727
De × Sh	1	1.22	0.2775
Nu × Sh	1	3.32	0.0778
De × Nu × Sh	1	0.07	0.7933
Residual	32		

3.5 Table S5. PERMANOVA of total NSC for Period 2

Table S5. Summary of PERMANOVAs showing the effects of eelgrass density reduction (De), sediment nutrient enrichment (Nu), and shading (Sh) factors on normalized soluble sugars and starch for leaves and root-rhizomes separately using Euclidean distances for Period 2. Significant values are shown in bold.

	df	Pseudo-*F*	*p* perm
Total non-structural carbohydrate structure			
De	1	0.6340	0.617
Nu	1	0.7696	0.539
Sh	1	17.396	**0.001**
De × Nu	1	0.2254	0.919
De × Sh	1	3.0157	**0.016**
Nu × Sh	1	0.6626	0.590
De × Nu × Sh	1	0.4036	0.807
Residual	32		

Note: 999 permutations were used.

3.6 Table S6. ANOVAs of eelgrass biomass collected with epifaunal samples

Table S6. Summary of ANOVAs showing the effects of eelgrass density reduction (De), sediment nutrient enrichment (Nu), and shading (Sh) factors on biomass of *Zostera marina* (g_{dw}) collected with epifaunal samples for Periods 1 to 3. *Z. marina* biomass was square-root transformed. Significant values are shown in bold.

		Period 1		Period 2		Period 3	
	df	*F*-ratio	*p*	*F*-ratio	*p*	*F*-ratio	*p*
a) *Z. marina* biomass							
De	1	21.392	**0.0001**	5.4348	**0.0262**	9.7571	**0.0038**
Nu	1	2.3672	0.1337	0.4195	0.5218	1.2006	0.2814
Sh	1	0.0824	0.7759	16.210	**0.0003**	0.1505	0.7006
De × Nu	1	1.7538	0.1948	5.3332	**0.0275**	3.7621	0.0613
De × Sh	1	0.5313	0.4714	2.2819	0.1407	0.2428	0.6256
Nu × Sh	1	1.2217	0.2773	2.5104	0.1229	0.0864	0.7707
De × Nu × Sh	1	0.1729	0.6803	4.5186	**0.0413**	3.7908	0.0604
Residual	32						

3.7 Table S7. ANOVAs of species diversity related indices for Periods 1 and 3

Table S7. Summary of the analyses of variance (ANOVAs) showing the effects of eelgrass density reduction (De), sediment nutrient enrichment (Nu), and shading (Sh) factors on total raw abundance (*N*), total standardized abundance ($N \cdot g^{-1}_{dw}$), Simpson's diversity index, richness, and Pielou's evenness of associated epifauna in Period 1 and 3 (see 'Methods'). Significant values are shown in bold. See Table 3 for Period 2.

		Period 1		Period 3	
	Df	*F*-ratio	*p*	*F*-ratio	*p*
a) Total raw abundance					
De	1	0.25	0.6196	2.84	0.1014
Nu	1	0.44	0.5135	0.04	0.8372
Sh	1	0.17	0.6845	0.04	0.8525
De × Nu	1	0.01	0.9190	1.54	0.2230
De × Sh	1	7.29	**0.0110**	0.01	0.9065
Nu × Sh	1	2.16	0.1514	0.17	0.6815
De × Nu × Sh	1	0.42	0.5208	0.88	0.3558
Residual	32				
b) Total standardized abundance					
De	1	12.79	**0.0011**	4.14	0.0504
Nu	1	0.49	0.4900	2.96	0.0950
Sh	1	0.14	0.7139	0.80	0.3784
De × Nu	1	0.02	0.8760	0.46	0.5039
De × Sh	1	3.10	0.0880	0.44	0.5138
Nu × Sh	1	0.86	0.3600	0.01	0.9156
De × Nu × Sh	1	1.36	0.2526	0.92	0.3458
Residual	32				
c) Richness					
De	1	0.14	0.7077	2.63	0.1146
Nu	1	0.14	0.7077	3.67	0.0642
Sh	1	0.02	0.3839	0.02	0.8837
De × Nu	1	0.78	0.9004	0.02	0.8837
De × Sh	1	1.92	0.1750	0.20	0.6612
Nu × Sh	1	0.78	0.3839	0.54	0.4664
De × Nu × Sh	1	0.14	0.7077	1.76	0.1939
Residual	32				
d) Evenness					
De	1	21.10	**0.0001**	11.50	**0.0019**
Nu	1	0.78	0.3851	0.07	0.7954
Sh	1	0.01	0.9132	0.05	0.8219
De × Nu	1	0.19	0.6673	3.50	0.0706
De × Sh	1	0.18	0.6758	0.01	0.9355
Nu × Sh	1	0.52	0.4384	1.56	0.2213
De × Nu × Sh	1	0.00	0.9594	2.35	0.1347
Residual	32				
e) Diversity					
De	1	14.78	**0.0005**	14.85	**0.0005**
Nu	1	0.17	0.6857	0.58	0.4505
Sh	1	0.04	0.8400	0.60	0.4443
De × Nu	1	0.00	0.9807	4.09	0.0516
De × Sh	1	1.04	0.3166	0.00	0.9441
Nu × Sh	1	1.58	0.2173	3.11	0.0873
De × Nu × Sh	1	0.00	0.9559	1.49	0.2311
Residual	32				

3.8 Table S8. PERMANOVAs of species assemblages for Periods 1 and 3

Table S8. Summary of permutational analysis of variance (PERMANOVAs) showing the effects of eelgrass density reduction (De), sediment nutrient enrichment (Nu), and shading (Sh) factors on the structure with (a) raw abundance (*N*) and (b) standardized abundance ($N \cdot g^{-1}{}_{dw}$), and (c) composition (transformed into presence-absence) of associated epifauna in Period 2 (see 'Methods'). Significant values are shown in bold.

		Period 1		Period 3	
	df	Pseudo-*F*	*p* perm	Pseudo-*F*	*p* perm
a) Assemblage structure (raw)					
De	1	4.54	**0.0009**	3.39	**0.0044**
Nu	1	0.39	0.8787	0.40	0.8466
Sh	1	0.56	0.7592	1.14	0.3540
De × Nu	1	0.52	0.7861	1.16	0.3370
De × Sh	1	1.89	0.0935	0.83	0.5526
Nu × Sh	1	0.98	0.4288	1.19	0.3139
De × Nu × Sh	1	0.71	0.6482	0.58	0.7167
Residual	32				
b) Assemblage structure (standardized)					
De	1	4.07	**0.0020**	5.96	**0.0002**
Nu	1	0.37	0.9023	1.27	0.2877
Sh	1	0.31	0.9219	1.08	0.3922
De × Nu	1	0.20	0.9674	0.62	0.7154
De × Sh	1	1.18	0.3139	1.01	0.4335
Nu × Sh	1	0.87	0.5136	0.98	0.4608
De × Nu × Sh	1	0.69	0.6599	1.16	0.3355
Residual	32				
c) Composition					
De	1	1.92	0.1092	2.43	0.0701
Nu	1	0.11	0.9347	1.05	0.3899
Sh	1	0.69	0.6149	1.33	0.2934
De × Nu	1	0.33	0.8441	1.29	0.3167
De × Sh	1	1.44	0.2335	Neg.	
Nu × Sh	1	0.44	0.7755	0.32	0.7775
De × Nu × Sh	1	0.76	0.5759	0.22	0.8304
Residual	32				

Neg.: negative values; 9999 permutations were run.

3.9 Table S9. Summary of the type of cumulative effect

Table S9. Summary of the type of interaction effect among eelgrass density reduction (De), sediment nutrient enrichment (Nu), and shading (Sh) treatments.

	Enrichment (Nu)	**Shading (Sh)**
De	• **Dominance by De** on richness	• **Dominance by Sh** on the soluble sugars of shoots • **Negative synergism** on the starch of the root-rhizome • **Antagonism** on evenness • **Additive** on relative leaf elongation rate
Nu		• **Dominance by Sh** on eelgrass density

3.10 SIMPER tables

3.10.1 Table S10. Density reduction in Period 1

Table S10. Summary of SIMPER (percentage of similarity) for eelgrass density reduction in Period 1. Table shows species that cumulatively contribute up to 70% to the dissimilarity between treatments. D-: eelgrass density untouched; D+: eelgrass density reduced; Av. nb.: average number (abundance); Av. diss.: average dissimilarity; Diss/SD: dissimilarity divided by standard deviation; Contrib.%: percentage of contribution; Cum.%: cumulated percentage of contribution. Species in bold have significant differences (p-values provided) of abundance between treatments (t-test).

Species	Av. nb. D-	Av. nb. D+	Av. diss.	Diss/SD	Contrib.%	Cum.%
Ecrobia truncata **$p < 0.0001$**	**0.48**	**1.37**	6.95	1.44	14.79	14.79
Jaera albifrons	0.57	0.67	5.16	1.17	10.99	25.79
Mytilus spp.	0.42	0.55	4.52	1.10	9.62	35.41
Edotia triloba **$p = 0.0190$**	**0.24**	**0.67**	4.49	1.13	9.55	44.96
Idotea phosphorea	0.53	0.38	4.43	1.08	9.44	54.41
Littorina saxatilis	2.50	2.61	3.91	1.23	8.33	62.73
Phoxocephalus holbolli	0.33	0.39	3.47	1.04	7.40	70.13

Note: average dissimilarity between D- and D+ = 46.96

3.10.2 Table S11. Density reduction in Period 2

Table S11. Summary of SIMPER (percentage of similarity) for eelgrass density reduction in Period 2. Table shows species that cumulatively contribute up to 70% to the dissimilarity between treatments. D-: eelgrass density untouched; D+: eelgrass density reduced; Av. nb.: average number (abundance); Av. diss.: average dissimilarity; Diss/SD: dissimilarity divided by standard deviation; Contrib.%: percentage of contribution; Cum.%: cumulated percentage of contribution. Species in bold have significant differences (p-values provided) of abundance between treatments (t-test).

Species	Av. nb. D-	Av. nb. D+	Av. diss.	Diss/SD	Contrib.%	Cum.%
Ecrobia truncata **$p < 0.0001$**	**0.47**	**1.42**	5.04	1.54	13.42	13.42
Littorina saxatilis **$p < 0.0001$**	**2.99**	**3.74**	4.69	1.35	12.47	25.89
Mytilus spp. **$p = 0.0176$**	**0.30**	**0.77**	3.94	1.10	10.49	36.39
Lacuna vincta **$p = 0.0215$**	**2.00**	**2.39**	3.43	1.38	9.13	45.51
Phoxocephalus holbolli	0.46	0.56	3.01	1.20	8.02	53.53
Gammarus oceanicus	0.32	0.41	2.59	0.95	6.90	60.43
Idotea phosphorea	0.32	0.41	2.57	0.94	6.85	67.28
Edotia triloba	0.29	0.45	2.50	1.02	6.66	73.94

Note: average dissimilarity between D- and D+ = 37.57

3.10.3 Table S12. Density reduction in Period 3

Table S12. Summary of SIMPER (percentage of similarity) for eelgrass density reduction in Period 3. Table shows species that cumulatively contribute up to 70% to the dissimilarity between treatments. D-: eelgrass density untouched; D+: eelgrass density reduced; Av. nb.: average number (abundance); Av. diss.: average dissimilarity; Diss/SD: dissimilarity divided by standard deviation; Contrib.%: percentage of contribution; Cum.%: cumulated percentage of contribution. Species in bold have significant differences (*p*-values provided) of abundance between treatments (*t*-test).

Species	Av. nb. D-	Av. nb. D+	Av. diss.	Diss/SD	Contrib.%	Cum.%
Idotea phosphorea p **< 0.0001**	**0.63**	**1.63**	7.79	1.60	26.15	26.15
Lacuna vincta p **= 0.0071**	**1.57**	**2.03**	4.73	1.45	15.87	42.02
Ecrobia truncata p **= 0.0117**	**0.49**	**0.95**	4.38	1.19	14.68	56.70
Mytilus spp.	1.18	1.20	3.83	1.30	12.85	69.56
Littorina saxatilis	2.48	2.52	3.22	1.13	10.82	80.37

Note: average dissimilarity between D- and D+ = 29.80

3.10.4 Table S13. Sediment nutrient enrichment in Period 2

Table S13. Summary of SIMPER (percentage of similarity) sediment nutrient enrichment in Period 2. Table shows species that cumulatively contribute up to 70% to the dissimilarity between treatments. N-: no nutrients added; N+: nutrients added; Av. nb.: average number (abundance); Av. diss.: average dissimilarity; Diss/SD: dissimilarity divided by standard deviation; Contrib.%: percentage of contribution; Cum.%: cumulated percentage of contribution. Species in bold have significant differences (*p*-values provided) of abundance between treatments (*t*-test).

Species	Av. nb. N-	Av. nb. N+	Av. diss.	Diss/SD	Contrib.%	Cum.%
Littorina saxatilis p **=0.0250**	**3.56**	**3.18**	4.16	1.20	11.38	11.38
Ecrobia truncata p **= 0.0139**	**1.09**	**0.80**	4.12	1.37	11.27	22.64
Mytilus spp.	0.62	0.45	3.72	1.03	10.19	32.84
Phoxocephalus holbolli p **= 0.0362**	**0.70**	**0.32**	3.30	1.28	9.03	41.86
Lacuna vincta	2.25	2.14	3.29	1.32	9.02	50.88
Gammarus oceanicus	0.33	0.41	2.59	0.95	7.09	57.97
Idotea phosphorea	0.32	0.41	2.57	0.96	7.04	65.01
Edotia triloba	0.43	0.31	2.49	1.01	6.82	71.83

Note: average dissimilarity between N- and N+ = 36.54

3.10.5 Table S14. Shading in Period 2

Table S14. Summary of SIMPER (percentage of similarity) for shading in Period 2. Table shows species that cumulatively contribute up to 70% to the dissimilarity between treatments. S-: natural light; S+: shading; Av. nb.: average number (abundance); Av. diss.: average dissimilarity; Diss/SD: dissimilarity divided by standard deviation; Contrib.%: percentage of contribution; Cum.%: cumulated percentage of contribution. Species in bold have significant differences (*p*-values provided) of abundance between treatments (*t*-test).

Species	**Av. nb. S-**	**Av. nb. S+**	**Av. diss.**	**Diss/SD**	**Contrib.%**	**Cum.%**
***Ecrobia truncata p* = 0.0232**	**0.73**	**1.15**	4.21	1.39	11.38	11.38
***Littorina saxatilis p* = 0.0319**	**3.55**	**3.19**	4.19	1.20	11.34	22.72
Mytilus spp.	0.70	0.37	3.77	1.10	10.20	32.92
Lacuna vincta	2.03	2.36	3.40	1.33	9.20	42.12
Phoxocephalus holbolli	0.36	0.66	3.11	1.23	8.40	50.52
***Edotia triloba p* = 0.0156**	**0.16**	**0.58**	2.73	1.09	7.38	57.90
Gammarus oceanicus	0.26	0.48	2.68	0.96	7.25	65.15
Idotea phosphorea	0.28	0.45	2.60	0.94	7.04	72.19

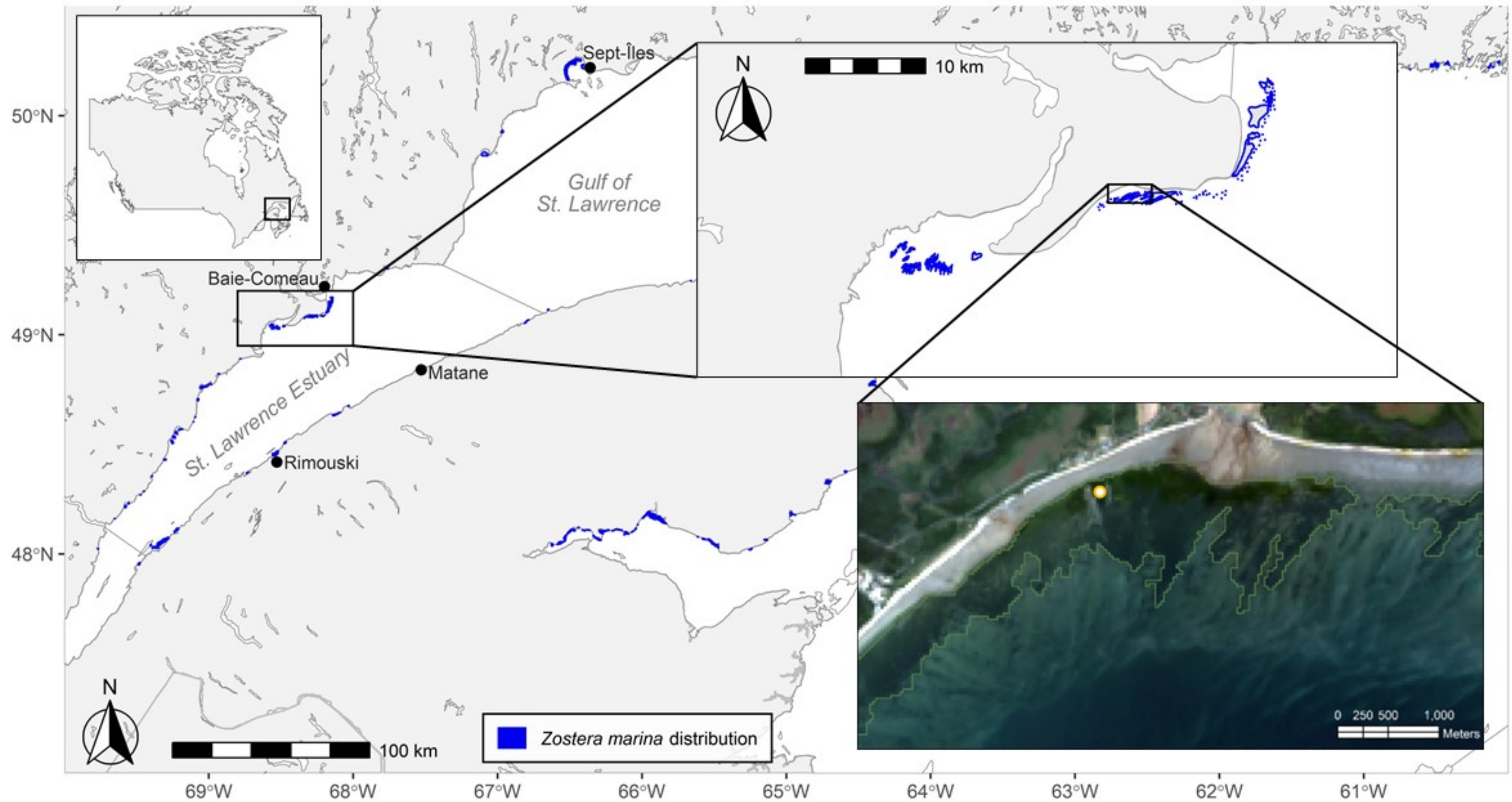
Note: Average dissimilarity between S- and S+ = 36.97; *Gammarus* spp. juvenile *p* = 0.0044 (average 0.41 shaded and 0.02 natural light, no transformations).

3.11 Tables S15. Coefficient calculated from Edgar (1990)

Table S15. Corrected coefficients calculated from the equation of Edgar (1990). Differences from published table are in italic.

	Sieve mesh size (mm)							
	0.5	0.71	1.0	1.4	2.0	2.8	4.0	5.6
Crustaceans	0.023	0.058	0.143	*0.361*	*0.911*	2.300	*5.807*	*14.659*
Molluscs	0.023	0.060	0.152	*0.395*	*1.027*	*2.672*	*6.950*	*18.076*
Polychaetes	0.028	0.067	*0.156*	*0.371*	*0.881*	*2.091*	*4.963*	*11.780*

4 Supplementary figures



4.1 Figure S1. *Zostera marina* distribution and site location

Figure S1. Location of study site in Baie-St.-Ludger, Quebec, Canada (indicated by a white dot with the yellow edging in the satellite photo). Data are from: DFO (2009) for *Zostera marina* distribution and from Landsat satellite imagery in July 2016 for the last close-up. The light green polygons show the continuous extent of *Z. marina* beds, credits: Carlos Araújo.

4.2 Figure S2. Non-structural carbohydrates and RLE (De × Sh)

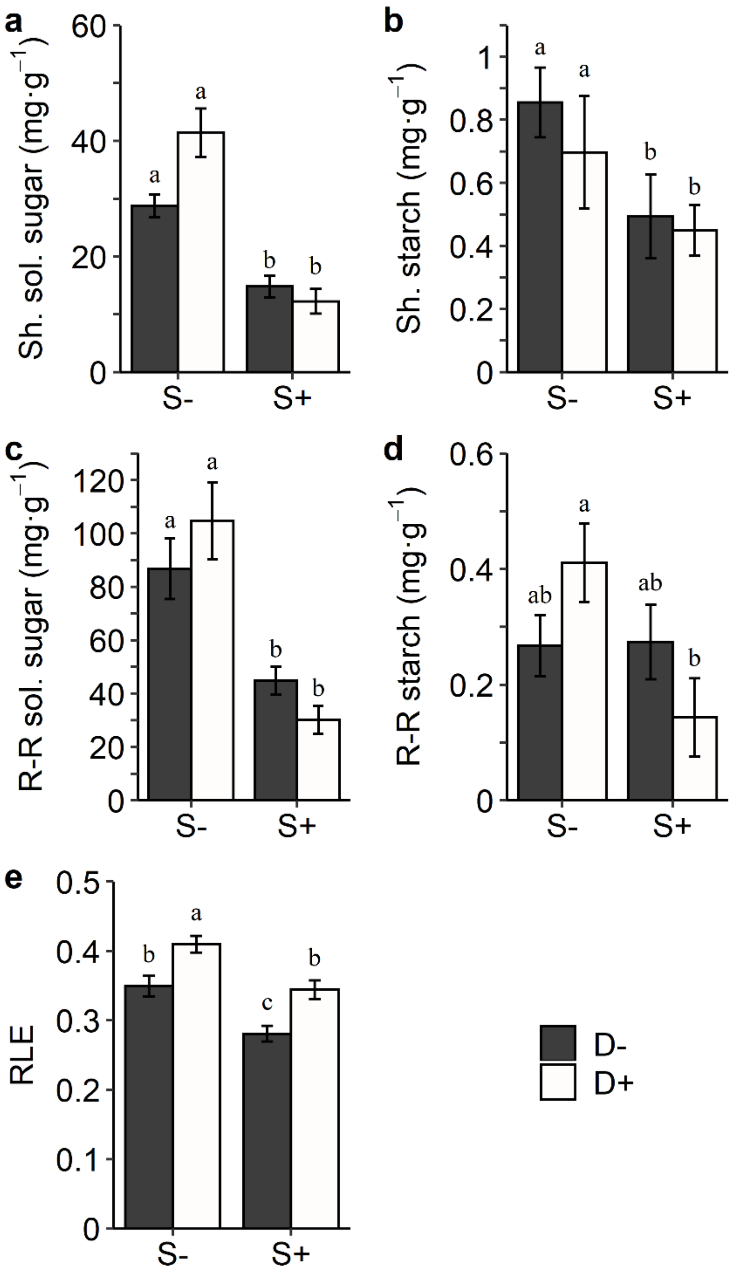


Figure S2. Mean (±SE) values of soluble sugars (mg·g^{-1}_{dw}) in (a) shoots and (c) root-rhizomes; starch content (mg·g^{-1}_{dw}) in (b) shoots and (d) root-rhizomes; and (e) relative leaf elongation. The reported values are from Period 2. Gray and white bars are the respective treatments with D-: eelgrass density untouched; D+: eelgrass density reduced; S-: natural light; S+: shading. The number of replicates used to obtain the averages was $n = 10$. Different letters above the bars indicate significant differences ($p < 0.05$, Tukey HSD).

4.3 Figure S3. PCA of non-structural carbohydrates with links to RLE

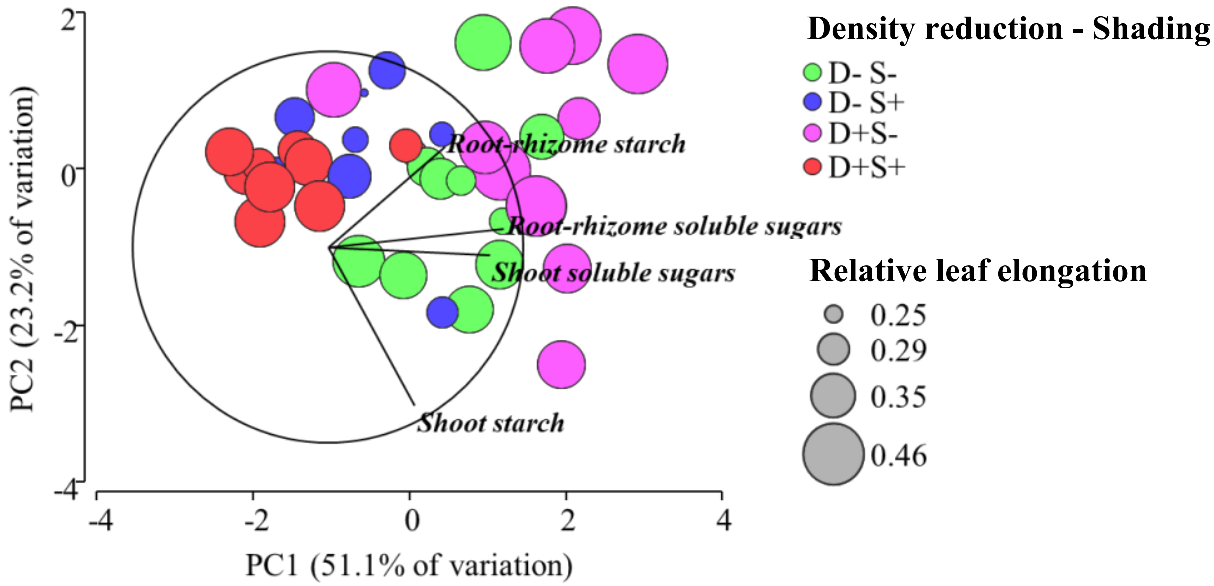


Figure S3. Principal component analysis (PCA) plot of normalized non-structural carbohydrates in shoots and root-rhizomes. Values are from Period 2. D-: eelgrass density untouched; D+: eelgrass density reduced; S-: natural light; S+: shading. Each bubble represents a plot. Bubble size is proportional to the relative leaf elongation rate (day^{-1}; RLE).

4.4 Figure S4. Raw abundance results

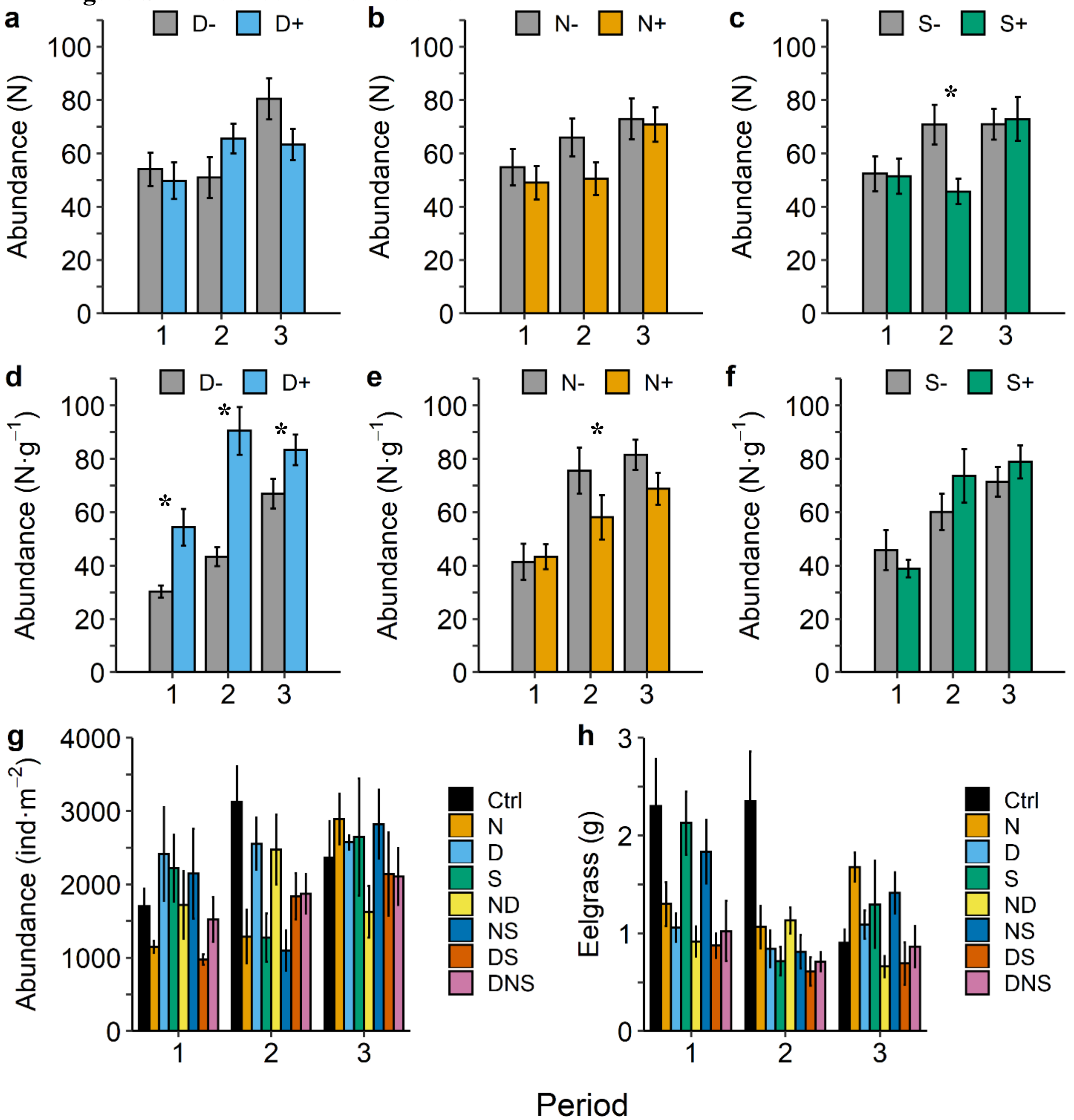


Figure S4. Mean (±SE) values of total raw abundance by sample (a–c); total abundance standardized per shoot dry weight (d–f); estimated total abundance by square meter (g); and (h) dry weight of *Zostera marina* from epifaunal samples. Values are from Periods 1, 2, and 3 (see 'Methods'). D-: eelgrass density untouched; D+: eelgrass density reduced; N-: no nutrients added; N+: nutrients added; S-: natural light; S+: shading. In (g) and (h) legend is by treatment: Ctrl: no stessor added; N: nutrients added; D: eelgrass density reduced; S: shading; ND: nutrients added and eelgrass density reduced; and so on. The numbers of replicates used to obtain the averages were *n* = 20 in (a–f) and *n* = 5 in (g–h).

4.5 Figure S5. nMDS

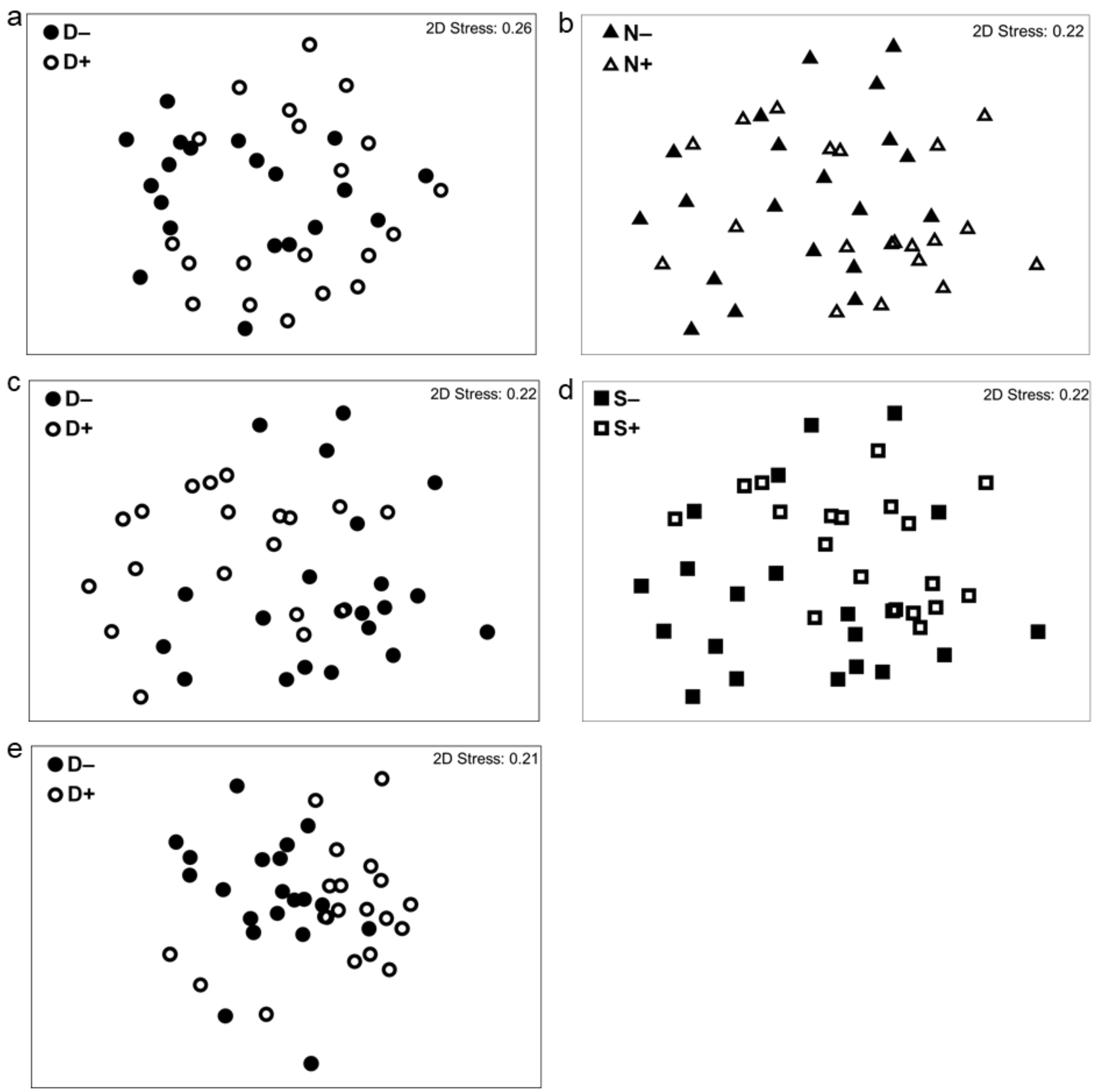


Figure S5. Non-metric multidimensional scaling plots illustrating the effect (cf. Table 4 for details) on assemblage structure of (a, c, e) eelgrass density reduction; (b) sediment nutrient enrichment; and (d) shading in Period 1 (a), Period 2 (b–d), and Period 3 (e). Values were calculated based on Bray-Curtis similarities of the dispersion-weighted and square-root transformed standardized abundance of species. Black and white symbols are the respective treatments with - stress absent, + stress present; D: eelgrass density reduction, N: sediment nutrient enrichment, S: shading.

5 References for the supplementary material

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