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Figure 1. Relationships between the density of *H. rubra* (m^{-2}) and the percentage cover of (i) non-calcareous red algae (NERA), (ii) non-geniculate coralline algae (NCA), (iii) ERA (combined NERA and NCA), (iv) sessile invertebrates, (v) sediment matrix, (vi) sediment matrix and sessile invertebrates combined, and (vii) foliose red algae at different depths, in quadrat sizes A. 0.25 × 0.25 m, B. 0.5 × 0.5 m, C. 1 × 1 m, D. 2 × 2 m and E. 4 × 4 m at George Third Rock. Results are the effects of depth and biotic factors, analysed using quantile regression models for the 90^{th} quantile (Table 3). Symbols are ― all depths, ●_ _ deep waters and ○… shallow waters. The quantile regression relationships and p-values are depicted for the optimal scale(s) ($p \geq 0.05$ is indicated by *, $p \geq 0.0001$ ** and $p < 0.5$ by ^{ns}).

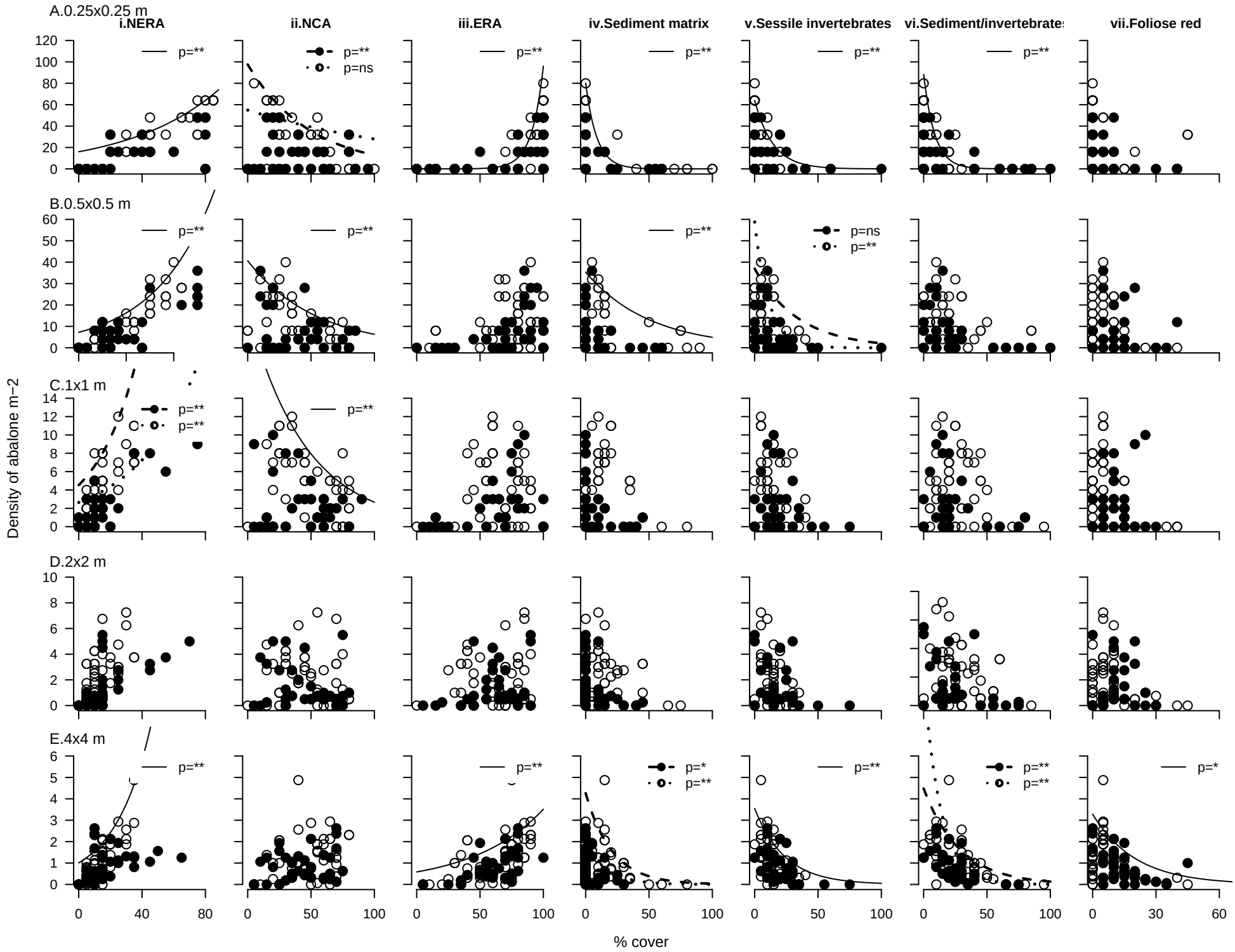
A.0.25x0.25 m
B.0.5x0.5 m
C.1x1 m
D.2x2 m
E.4x4 m
i.NERA
ii.NCA
iii.ERA
iv.Sediment matrix
v.Sessile invertebrates
vi.Sediment/invertebrates
vii.Foliose red
p=**
p=ns
p=*
Density of abalone m−2
% cover

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Figure 2: Relationship between the density of *H. rubra* (m^{-2}) and the percentage cover of (i) non-calcareous encrusting red algae (NERA), (ii) ERA (combined NERA and NCA), (iii) sessile invertebrates, (iv) sediment matrix, (v) sediment matrix and sessile invertebrates combined, and (vi) foliose red algae, at different depths in quadrat sizes A. 0.25 × 0.25 m, B. 0.5 × 0.5 m, C. 1 × 1 m, D. 2 × 2 m and E. 4 × 4 m at Maria Island. The effect of depth and the biotic factors, analysed using quantile regression models for the 90^{th} quantile (see Table 3). Symbols are ― all depths, ●_ _ deep waters and ○… shallow waters. The quantile regression relationships and p-values are depicted for the optimal scale(s) ($p \geq 0.05$ is indicated by *, $p \geq 0.0001$ ** and $p < 0.5$ by ^{ns}).

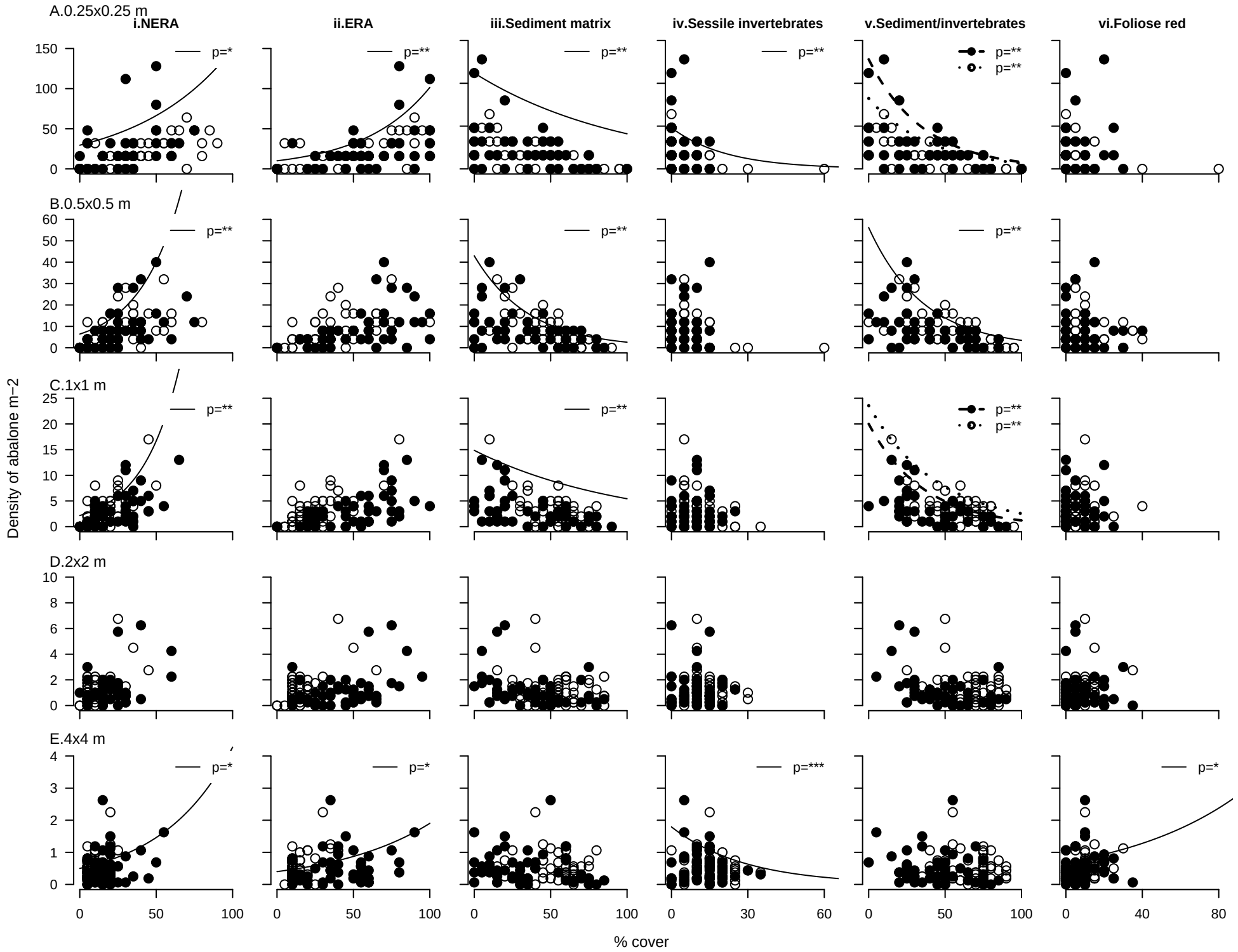
A.0.25x0.25 m
B.0.5x0.5 m
C.1x1 m
D.2x2 m
E.4x4 m
i.NERA
ii.ERA
iii.Sediment matrix
iv.Sessile invertebrates
v.Sediment/invertebrates
vi.Foliose red
p=*
p=**
p=***
Density of abalone m−2
% cover

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Figure 3: Relationships between the density of *H. rubra* (m^{-2}) and the percentage cover of (i) non-calcareous encrusting red algae (NERA), (ii) non-geniculate coralline algae (NCA), (iii) ERA (combined NERA and NCA), (iv) sessile invertebrates, (v) sediment matrix, (vi) sediment matrix and sessile invertebrates combined, and (vii) foliose red algae, at different sites in quadrat sizes A. 0.25 × 0.25 m, B. 0.5 × 0.5 m, C. 1 × 1 m, D. 2 × 2 m and E. 4 × 4 m at George Third Rock. The effects of site and the biotic factors were analysed using quantile regression model for the 90^{th} quantile (see Table 4). Symbols are —all sites, ■—Northeast, ●—Northwest, ▲—Southeast and ♦—Southwest. The quantile regression relationships and p-values are depicted for the optimal scale(s) ($p \geq 0.05$ is indicated by *, $p \geq 0.0001$ ** and $p < 0.5$ by ^{ns}).

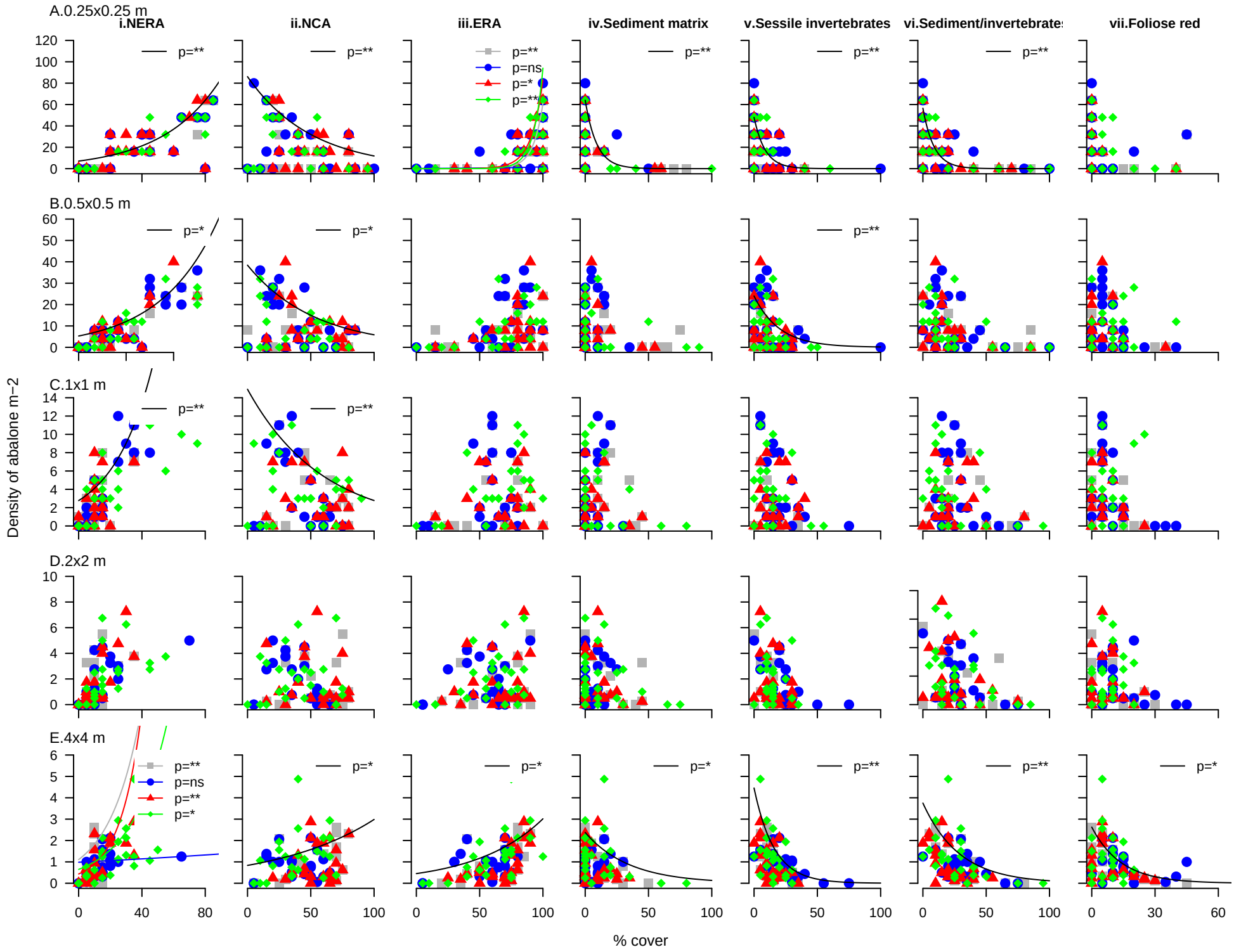
A.0.25x0.25 m
B.0.5x0.5 m
C.1x1 m
D.2x2 m
E.4x4 m
i.NERA
ii.NCA
iii.ERA
iv.Sediment matrix
v.Sessile invertebrates
vi.Sediment/invertebrate
vii.Foliose red
p=**
p=ns
p=*
Density of abalone m−2
% cover

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Figure 4: Relationships between the density of *H. rubra* (m^{-2}) and the percentage cover of (i) non-calcareous encrusting red algae (NERA), (ii) ERA (combined NERA and NCA), (iii) sessile invertebrates, (iv) sediment matrix, (v) sediment matrix and sessile invertebrates combined, and (vii) foliose red algae, at different sites in quadrat sizes A. 0.25 × 0.25 m, B. 0.5 × 0.5 m, C. 1 × 1 m, D. 2 × 2 m and E. 4 × 4 m at Maria Island. The effects of site and the biotic factors were analysed using quantile regression models for the 90th quantile (see Table 5). Symbols are — all sites, ■—Jetty, ●—Magistrates Point, ▲—Painted Cliffs and ♦—Return Point. The quantile regression relationships and p-values are depicted for the optimal scale(s) ($p \geq 0.05$ is indicated by *, $p \geq 0.0001$ ** and $p < 0.5$ by ^{ns}).

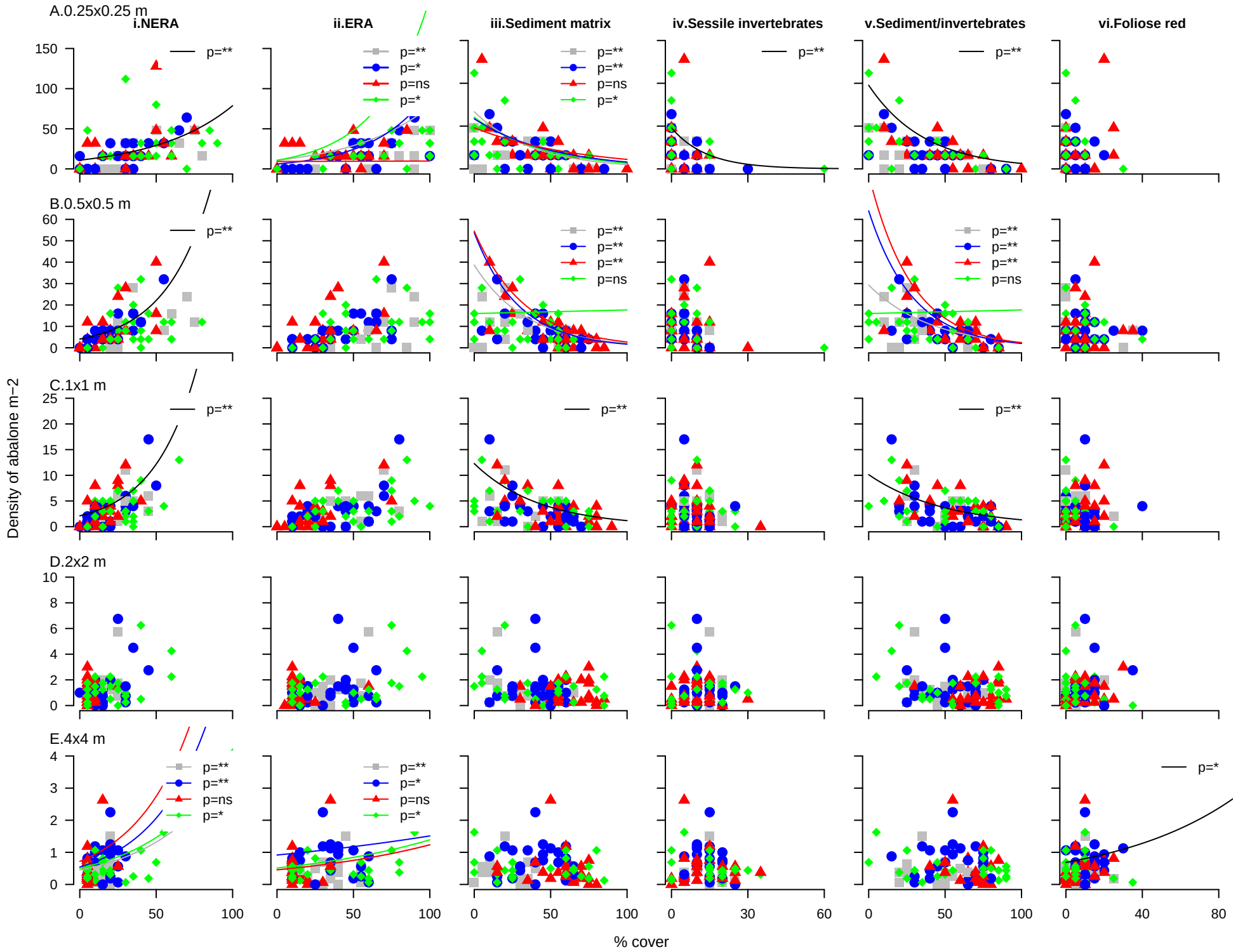
A.0.25x0.25 m
B.0.5x0.5 m
C.1x1 m
D.2x2 m
E.4x4 m
i.NERA
ii.ERA
iii.Sediment matrix
iv.Sessile invertebrates
v.Sediment/invertebrates
vi.Foliose red
p=**
p=*
p=ns
Density of abalone m−2
% cover

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Table 1. Abiotic and biotic factors (single variables and guilds) recorded in quadrat sizes 0.25 × 0.25 m, 0.5 × 0.5 m, 1 × 1 m, 2 × 2 m and 4 × 4 m at George Third Rock and Maria Island. Taxa found only at George Third Rock are indicated by (GIII).

Abiotic variables	**Biotic variables**	**Biotic groups**
Flat rock	Non-calcareous encrusting red algae (NERA)	Encrusting red algae (ERA)
Very large boulder	Non-geniculate coralline algae (NCA)	
Large boulder	Filamentous green algae	Filamentous algae
Small boulder	Filamentous brown algae	
Bare rock	Filamentous red algae	
Cobbles	Filamentous algae/ sediment matrix	Sediment matrix and sessile invertebrates combined
Pebbles	Ascidian	Sessile invertebrates
Gravel	Bryozoan	
Sand	Sponge	
	Branching coralline algae	
	Foliose red algae	
	Caulerpa flexis	Foliose green algae
	Caulerpa geminata	
	Caulerpa trifaria	
	Caulerpa remotifolia	
	Other *Caulerpa* spp.	
	Other green algae	
	Carpoglossum confluens	Understorey foliose brown algae
	Caulocystis cephalornithos	
	Caulocystis wifera	
	Halopteris paniculata (GIII)	
	Perithalia caudata (GIII)	
	Undaria pinnatifida	
	Zonaria spp.	
	Lobophora spp.	
	Other understorey foliose brown algae	
	Cystophera spp.	Overstorey brown algae
	Duvillaea potatorum (GIII)	
	Ecklonia radiata	
	Phyllospora comosa	
	Macrocystis angustifolia (GIII)	
	Lessonia corrugata (GIII)	
	Sargassum spp.	
	Xiphophora gladiata (GIII)	
	Other overstorey brown algae	

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Table 2. Results of BEST analyses yielding the best rank order matches between similarity matrices based on benthic habitat characteristics and equivalent matrices based on densities of *H. rubra* at George Third Rock for the top ten individual habitat characteristics in 0.25 × 0.25 m, 0.5 × 0.5m, 1 × 1 m, 2 × 2 m and 4 × 4 m quadrat sizes. The values given for each individual or group of variables are the Spearman's rank correlation coefficient (Rho).

Quadrat size				
0.25 × 0.25 m	0.5 × 0.5 m	1 × 1 m	2 × 2 m	4 × 4 m
Small boulders **0.2**	NERA **0.6**	NERA **0.33**	NERA **0.29**	ERA **0.38**
E. radiata **0.11**	ERA **0.32**	ERA **0.32**	ERA **0.23**	NERA **0.38**
ERA **0.08**	Small boulders **0.16**	NCA **0.21**	NCA **0.21**	NCA **0.28**
ERA **0.06**	Sediment matrix/ sessile invertebrates **0.14**	Sediment matrix/ sessile invertebrates **0.17**	*C. confluens* **0.17**	*E. radiata* **0.23**
Branching coralline **0.05**	NCA **0.13**	*E. radiata* **0.15**	Foliose red algae **0.17**	Small boulders **0.23**
Foliose red algae **0.05**	Foliose red algae **0.08**	Sessile invertebrates **0.13**	Understorey foliose brown algae **0.16**	*Zonaria* spp. **0.16**
C. confluens **0.05**	Bare rock **0.07**	Small boulders **0.13**	Small boulders **0.14**	Understorey foliose brown algae **0.15**
NCA **0.01**	Branching coralline algae **0.07**	Foliose red algae **0.13**	Sessile invertebrates **0.12**	Foliose red algae **0.15**
Sediment matrix/ sessile invertebrates **0.01**	*P. comosa* **0.03**	*C. remotifolia* **0.12**	Sediment matrix/ sessile invertebrates **0.09**	Sessile invertebrates **0.13**
Sessile invertebrates **0.01**	Sessile invertebrates **0.02**	*C. confluens* **0.1**	Foliose red algae **0.04**	*D. potatorum* **0.12**

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Table 3. Results of BEST analyses yielding the best rank order matches between similarity matrices based on benthic habitat characteristics and equivalent matrices based on densities of *H. rubra* at Maria Island for top ten individual habitat variables in 0.25 × 0.25 m, 0.5 × 0.5 m, 1 × 1 m, 2 × 2 m and 4 × 4 m quadrat sizes. The values given for each individual or group of variables are the Spearman's rank correlation coefficient (Rho).

Quadrat size				
0.25 × 0.25 m	0.5 × 0.5 m	1 × 1 m	2 × 2 m	4 × 4 m
NERA **0.37**	NERA **0.51**	NERA **0.34**	*Sargassum* spp. **0.15**	Other foliose green algae **0.19**
ERA **0.37**	ERA **0.43**	ERA **0.28**	Understorey foliose brown algae **0.13**	Sessile invertebrates **0.11**
Sediment matrix/ sessile invertebrates **0.21**	NCA **0.25**	NCA **0.19**	NCA **0.11**	*Zonaria* spp. **0.1**
Sediment matrix **0.15**	Overstorey brown algae **0.13**	Overstorey brown algae **0.18**	ERA **0.11**	Other understorey foliose brown algae **0.07**
NCA **0.14**	*Sargassum* spp. **0.11**	*Sargassum* spp. **0.12**	NERA **0.11**	NCA **0.07**
Sargassum spp. **0.08**	Sediment matrix/ sessile invertebrates **0.1**	*Zonaria* spp. **0.1**	Sessile invertebrates **0.09**	ERA **0.06**
Overstorey brown algae **0.06**	Sediment matrix **0.07**	Other foliose green algae **0.07**	*Zonaria* sp. **0.08**	Flat rock **0.05**
Bare rock **0.04**	Understorey foliose brown algae **0.05**	Large boulder **0.07**	Other foliose green algae **0.07**	*Sargassum* spp. **0.05**
C. flexis **0.04**	Other foliose green algae **0.05**	Sediment matrix/ sessile invertebrates **0.04**	*P. comosa* **0.05**	Filamentous red algae **0.05**
P. comsa **0.03**	*Cystophera* spp**. 0.05**	Foliose green algae **0.03**	Large boulder **0.04**	NERA **0.05**