The following supplement accompanies the article

Effects of loss of algal canopies along temperature and irradiation gradients in continental Portugal and the Canary Islands

I. Bertocci[1,*], M. I. Seabra[2], R. Dominguez[1], D. Jacinto[2], R. Ramírez[3], J. Coca[4], F. Tuya[3]

[1]CIIMAR/CIMAR, Centro Interdisciplinar de Investigação Marinha e Ambiental, Rua dos Bragas, 289, 4050-123, Porto, Portugal

[2]CO-CIEMAR, Centro de Oceanografia, Laboratório de Ciências do Mar, Universidade de Évora, 7521-903 Sines, Portugal

3BIOGES, Faculty of Marine Sciences, Campus de Tafira s/n, Universidad de Las Palmas de Gran Canaria,

[3]5017 Las Palmas de Gran Canaria, Spain

[4]ROC-IUSIANI, División de Robótica y Oceanografía Computacional,
Instituto Universitario de Sistemas Inteligentes y Aplicaciones Numéricas en Ingeniería,
Universidad de Las Palmas de Gran Canaria, 35017, Las Palmas de Gran Canaria, Spain

*Corresponding author: ibertocci@ciimar.up.pt

Marine Ecology Progress Series 506: 47–60 (2014)

Supplement 1. Study locations in Portugal and the Canary Islands

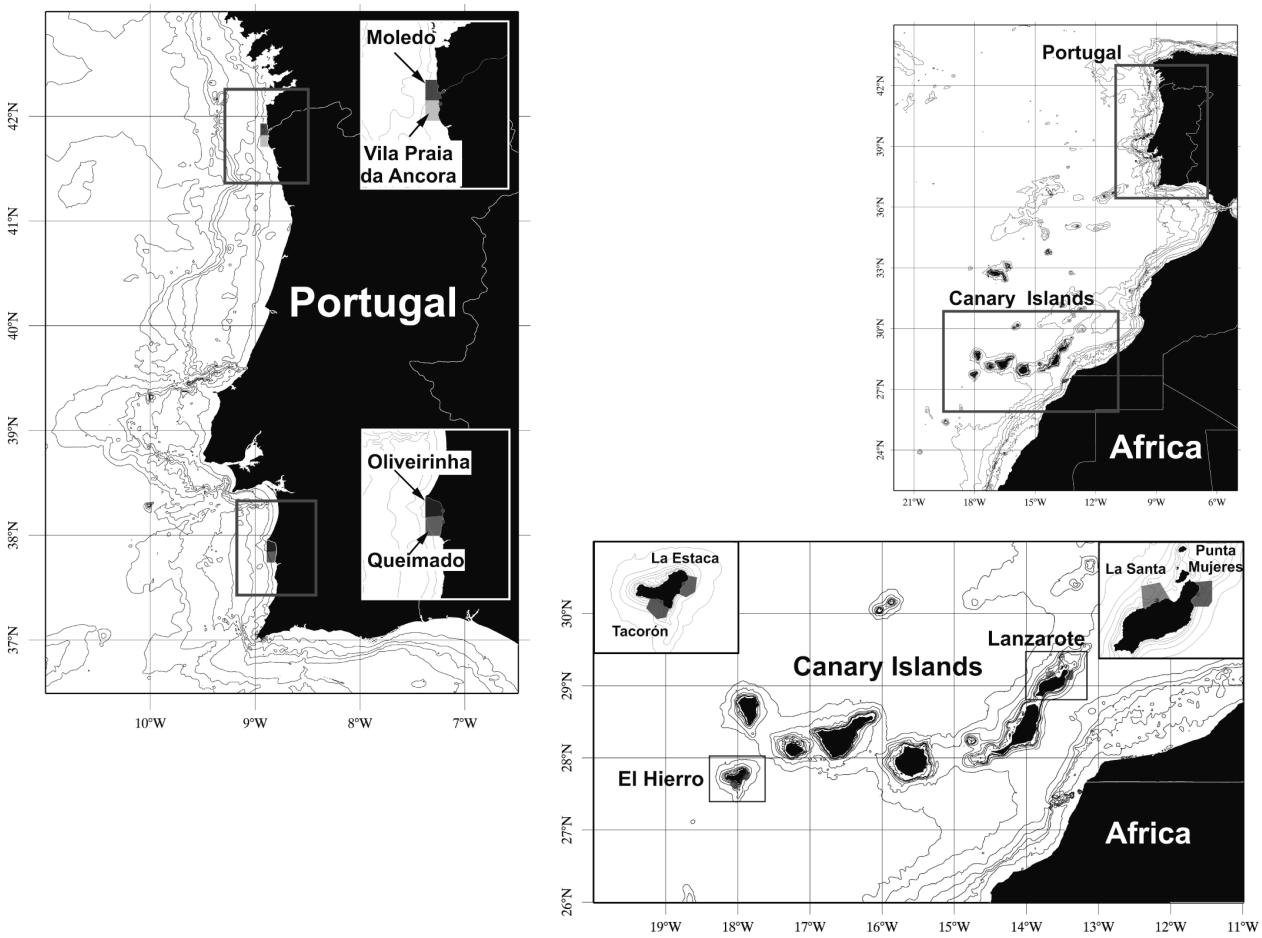

Fig. S1. Locations sampled in continental Portugal and the Canary Islands

Supplement 2. Values of climate variables at the study sites

Air temperature patterns

Air temperature data were collected from meteorological stations located close to our study locations. For continental Portugal (Fig. S2A), monthly average values of mean temperature integrated between 1981 and 2010 were obtained from those recorded by 2 stations managed by the Instituto Português do Mar e da Atmosfera (ipma, www.ipma.pt) and located at Viana do Castelo (N Portugal: 41° 42' N, 08° 48' W) and Évora (SW Portugal: 38° 34' N, 07° 54' W). For the Canary Islands (Fig. S2B), the same type of data, integrated between 1973 and 2000, were obtained from those recorded by stations managed by the Agencia Estatal de Meteorología (AEMet, www.aemet.es/es/serviciosclimaticos/datosclimatologicos/valoresclimatologicos?k=coo) and located at the Lanzarote Airport (28° 57' N, 13° 36' W) and the El Hierro Airport (27° 49' N, 17° 53' W).

Sea surface temperature and irradiation patterns

Sea surface temperature (SST) and photosynthetically active radiation (PAR) data for the period January 2003 to December 2012 were extracted from monthly Level-3 Standard Mapped Image files derived from MODIS Aqua sensor data, available on NASA's Ocean Color Web (http://oceancolor.gsfc.nasa.gov/). The SST4 product was selected for SST data, corresponding to SST derived from near infrared bands detected by the MODIS sensor during night-time. Monthly data files in hierarchical data format were extracted from pixels encompassing the study areas (Fig. S1).

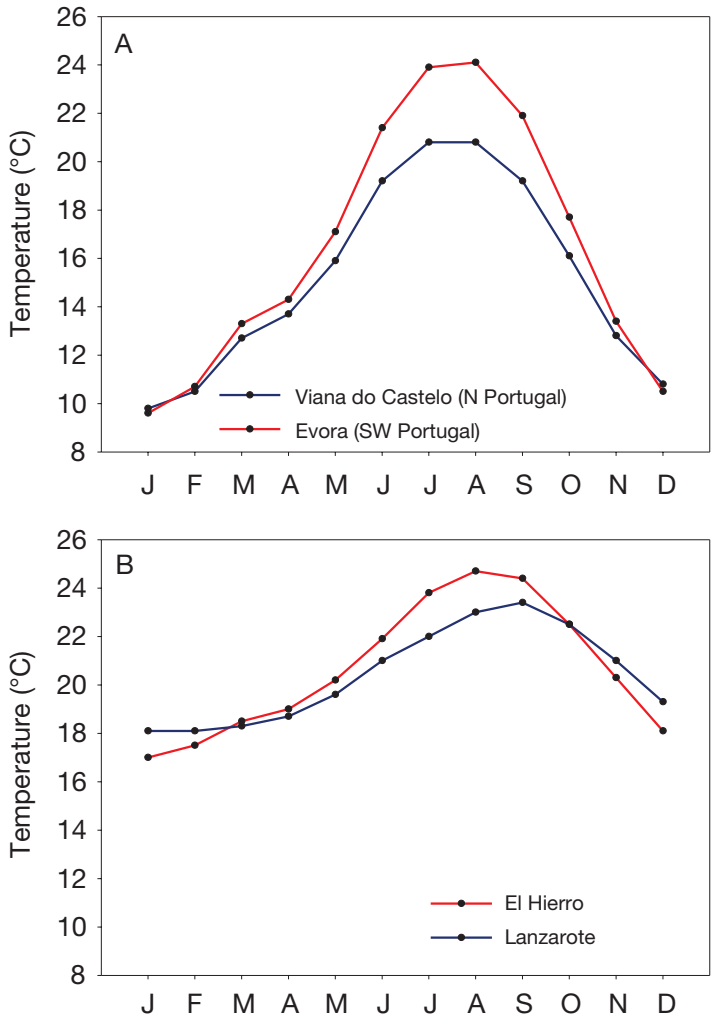

Fig. S2. Monthly average values of mean air temperatures recorded at (A) N and SW Portugal (modified from ipma, www.ipma.pt) and (B) the Canary Islands (modified from AEMet, www.aemet.es/es/serviciosclimaticos/datosclimatologicos/valoresclimatologicos?k=coo) meteorological stations. Data are climatological normals (see the World Meteorological Organization website: www.wmo.int) over the period 1981 to 2010 (continental Portugal) and 1973 to 2000 (Canary Islands)

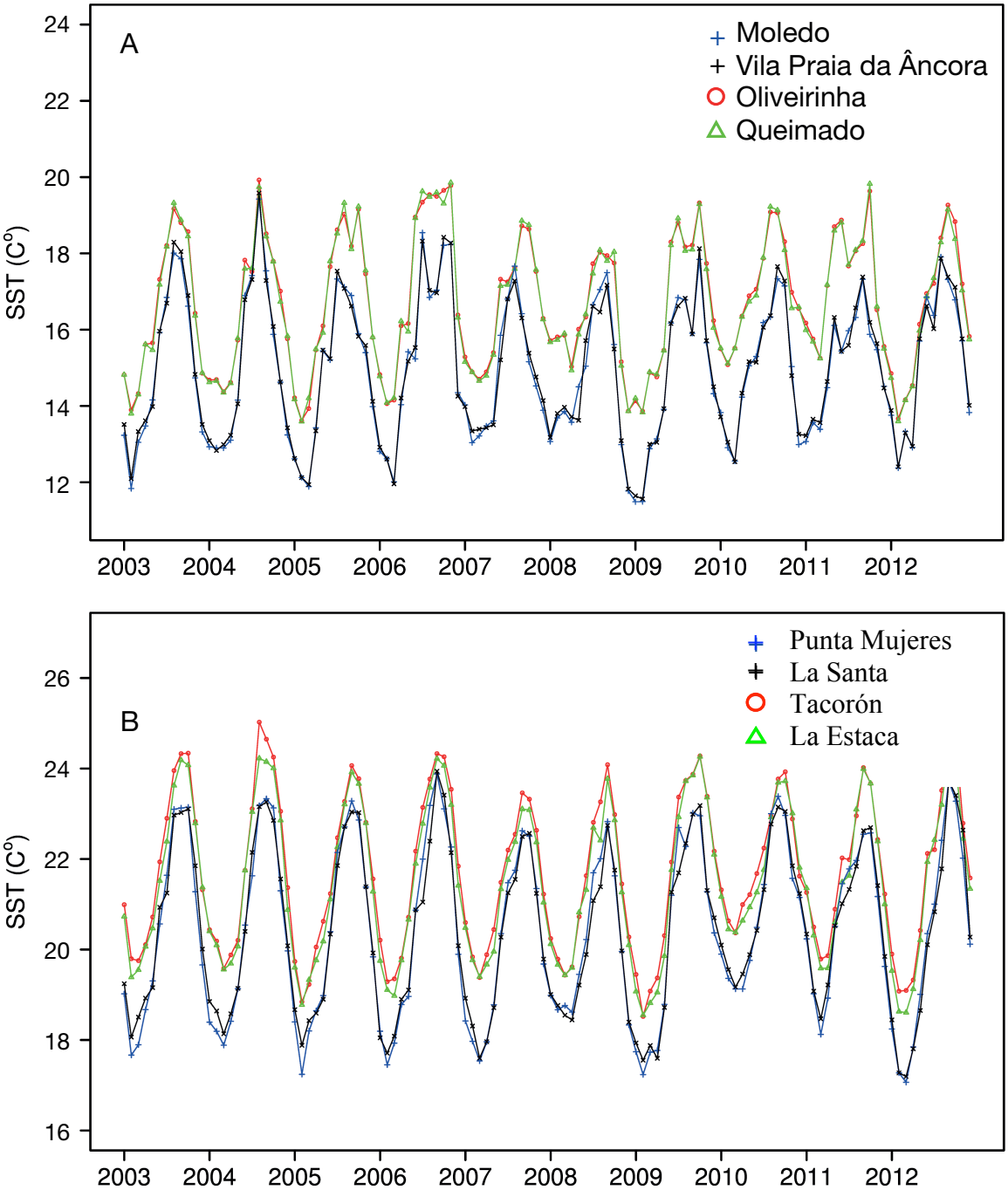

Fig. S3. Monthly mean sea surface temperature (SST) recorded at each of 2 locations in (A) continental Portugal (N Portugal: Moledo and Vila Praia da Âncora; SW Portugal: Oliveirinha and Queimado) and (B) the Canary Islands (Lanzarote: Punta Mujeres and La Santa; El Hierro: Tacorón and La Estaca) from 2003 to 2013. Note that the 2 panels have different scales

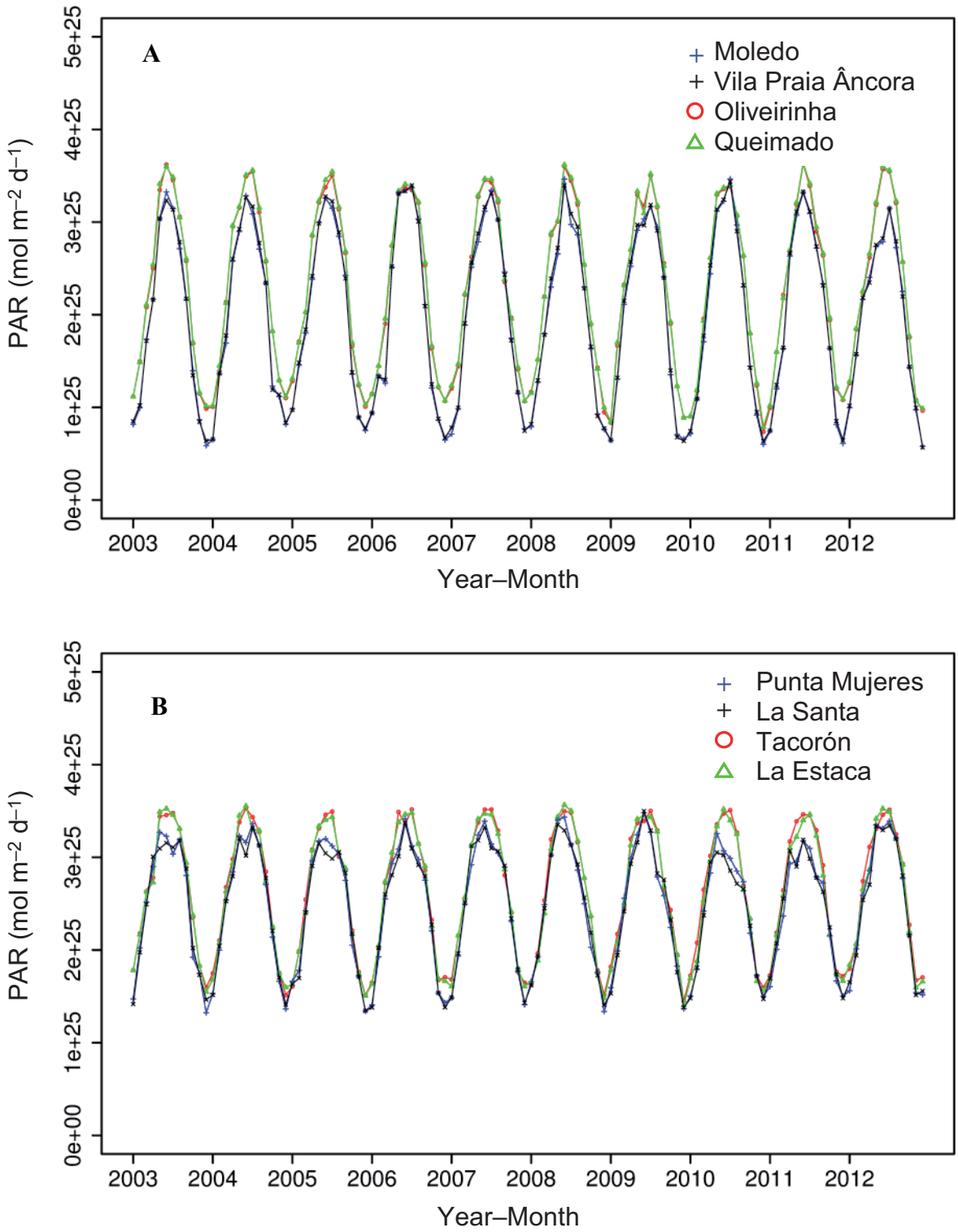

Fig. S4. Monthly mean values of photosynthetically active radiation (PAR) recorded at each of 2 locations in (A) continental Portugal (N Portugal: Moledo and Vila Praia da Âncora; SW Portugal: Oliveirinha and Queimado) and (B) the Canary Islands (Lanzarote: Punta Mujeres and La Santa; El Hierro: Tacorón and La Estaca) from 2003 to 2013

Supplement 3. List of sampled taxa

Table S1. List of algal (plus cyanobacterial) taxa sampled in the 'cool' and the 'warm' regions of continental Portugal (N and SW Portugal, respectively) and the Canary Islands (Lanzarote Island and El Hierro Island, respectively), with their assignment to each of 6 morpho-functional groups (MFG, arc: articulated calcareous algae, fol: foliose algae, cor: corticated algae, fil: filamentous algae, lea: leathery algae, enc: encrusting algae, na: not assigned, *: manipulated canopy-forming species)

	Continental Portugal		Canary Islands		MFG
Taxon	('cool') N	('warm') SW	('cool') Lanzarote	('warm') El Hierro	
Chlorophyta					
Acetabularia acetabulum (Linnaeus) P.C. Silva			+	+	na[a]
Caulerpa racemosa (Forsskål) J. Agardh			+	+	cor
Caulerpa webbiana Montagne			+	+	cor
Cladophora spp.		+	+	+	fil
Codium adhaerens C. Agardh		+			enc
Codium tomentosum Stackhouse		+			cor
Dasycladus vermicularis (Scopoli) Krasser				+	fil
Ectocarpales			+	+	fil
Ulva spp.	+	+	+	+	fol
Ulvella lens P.L. Crouan & H.M. Crouan			+	+	fol
Undetermined filamentous	+	+			fil
Valonia utricularis (Roth) C. Agardh			+	+	fil
Ochrophyta					
Bifurcaria bifurcata Ross	+				*
Colpomenia sinuosa Derbès & Solier		+			fol
Cystoseira abies-marina (S.G. Gmelin) C. Agardh			+	+	lea
Cystoseira compressa (Esper) Gerlof & Nizamuddin			+	+	lea
Cystoseira humilis Schousboe ex Kützing		+	+	+	*
Cystoseira tamariscifolia (Hudson) Papenfuss		+			lea
Dictyota spp.	+	+	+	+	fol
Dictyopteris membranacea (Stackhouse) Batters	+				fol

Lobophora variegata (J.V. Lamouroux) Womersley ex E.C. Oliveira		+	+	+	lea
Nemoderma tingitanum Schousboe ex Bornet		+			enc
Padina pavonia (Linnaeus) J.V. Lamouroux		+	+	+	arc
Ralfsia verrucosa (Areschoug) Areschoug		+			enc
Sargassum muticum (Yendo) Fensholt	+	+			lea
Sargassum vulgare C. Agardh			+	+	lea
Stypocaulon scoparium (Linnaeus) Kützing	+	+			cor
Rhodophyta					
Ahfeltiopsis devoniensis (Greville) P.C. Silva & DeCew	+				cor
Asparagopsis spp.		+			cor
Ceramium spp.	+	+			fil
Champia spp.			+	+	cor
Chondracanthus acicularis (Roth) Fredericq	+				cor
Chondracanthus teedei (Mertens ex Roth) Kützing	+				cor
Chondria spp.		+			cor
Chondrus crispus Stackhouse	+				cor
Corallina spp.	+	+			arc
Cryptopleura ramosa (Hudson) L. Newton	+				cor
Encrusting Corallinales	+	+	+	+	enc
Galaxaura rugosa (J. Ellis & Solander) J.V. Lamouroux			+	+	arc
Gelidium spp.	+				cor
Gigartina pistillata (S.G. Gmelin) Stackhouse		+			cor
Gymnogongrus griffithsiae (Turner) Martius	+	+			cor
Hildenbrandia rubra (Sommerfelt) Meneghini		+	+	+	enc
Hydroclathrus clathratus (C. Agardh) M.A. Howe			+	+	fol
Hypnea spinella (C. Agardh) Kützing			+	+	cor
Jania spp.	+	+	+	+	arc
Laurencia spp.		+	+	+	cor
Mastocarpus stellatus (Stackhouse) Guiry	+				cor
Microcladia spp.		+			cor
Osmundea pinnatifida (Hudson) Stackhouse	+				cor
Palisada perforata (Bory de Saint-Vincent) K.W. Nam			+	+	cor
Plocamium cartilagineum (Linnaeus) P.S. Dixon	+	+			cor

Polysiphonia spp.		+			fil
Pterocladia spp.		+			cor
Rhodymenia spp.		+			cor
Spyridia spp.			+	+	fil
Undetermined filamentous	+	+	+	+	fil
Undetermined foliose		+			fol
Cyanobacteria					
Schizothrix spp.			+	+	fil
Scytonema hofmannii C. Agardh ex Bornet & Flahault			+	+	fil

[a]Unicellular species not assigned to any group and not analysed individually, as it was sampled only in treated (canopy-removed) plots in each of 2 pools from the Punta Mujeres location at Lanzarote Island, with a mean ± SE cover of 1.9 ± 1.9%