

CUBA'S MESOPHOTIC CORAL REEFS

Macroalgae Photo Identification Guide



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USA - Cuba Research Partnership

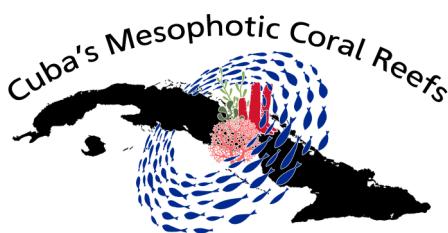
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Credits:

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Front Cover: *Halimeda copiosa* (green chains) and crustose red algae (Corallinophycidae), with various demosponges on vertical wall of mesophotic reef (37 m, Station 16A, Guanahacabibes National Park).

Back Cover: Top left- *Penicillllus dumetosus* on upper mesophotic zone (46 m; Station 10A, Banco San Antonio); Top Right- *Lobophora* sp. brown algae on upper mesophotic zone (41 m, Station 21, Punta de Pedernales MPA); Lower Left- Crustose Coralline Algae (Corallinophycidae) on lower mesophotic zone (70 m; Station 48, Desembarco del Gramma National Park); Lower Right- *Chrysymenia enteromorpha* red alga, on lower mesophotic zone (63 m, Station 58A, Cayo Coco).

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<http://www.cioert.org/cuba>.

INTRODUCTION

Mesophotic coral reef ecosystems (MCEs) are light-dependent benthic communities that occur deeper than shallow reefs and typically range from depths of 30 m to the bottom of the photic zone, which may extend to >150 m in some regions. MCEs represent in part an extension of shallow-water coral reef

ecosystems and support a diverse assemblages of habitat-building taxa, including corals, sponges and algae, and associated fish (Reed et al., 2018).

Many MCEs worldwide appear to be thriving compared to shallow reefs. The deep reef refugia hypothesis suggests that MCEs may be less impacted from natural and anthropogenic impacts than shallow coral reefs, and may be more stable and resilient than shallow reefs. MCEs may also act as refugia for shallow reef species through the export of fish and coral larvae. However, it is now apparent that MCEs are also vulnerable to disturbances from all facets of perturbations including climate change, bottom trawling, invasive species, and pollution.

Whereas considerable data have been reported regarding the distribution, ecology, and health of Cuba's shallow reefs, relatively little is known about the distribution, community structure and health of Cuba's deep mesophotic reefs. Cuba's strong marine policies and legislation has already resulted in 105 MPAs, covering nearly 25% of its insular shelf, yet overfishing, poaching, pollution and global warming are threats to these vulnerable ecosystems, as reefs worldwide are threatened.

This photo album of selected macroalgae associated with Cuba's mesophotic reefs resulted from a recent joint Cuba-U.S. expedition that was conducted from May 14 to June 13, 2017 to map and document the extent and health of MCEs along the entire coastline of Cuba. Total ship transit around the island covered ~2,778 km (~1,500 nmi). Forty-three Remotely Operated Vehicle (ROV) dives at 36 stations confirmed the presence of MCEs habitat on all coasts of Cuba (Reed et al. 2018; Figure 1, Table 1).

ROV dives surveyed reefs from depths of 188 m to 18 m, covered 27 km, totaled 99 hours of bottom time, and resulted in 110 hours of high-definition video. A total of 21,146 digital still images

documented habitat and species. The primary geomorphological features were the Deep Island Slope (125- >150 m), Deep Fore-Reef Escarpment (the ‘Wall’, 50-125 m), and Deep Fore-Reef Slope (30-50 m). Most vertical surfaces of the Wall were covered with dense sponges, algae, octocorals, and black corals. *Agaricia* was the most abundant scleractinian genus on the Wall at depths of 50-75 m, and was observed to 122 m.

A total of 63 taxa of macroalgae (29 Chlorophyta, 25 Rhodophyta, 9 Ochrophyta) and 1 Cyanobacteria (syn., Cyanophyta) have been identified to date (Reed et al., 2018). The most frequent taxa were crustose coralline algae (CCA), *Halimeda copiosa*, *Lobophora* spp., and *Dictyota* spp. In general, the diversity and coverage of algae were very low on the deep island slope where only CCA and thin encrusting green algae occurred. Between 50 and 100 m, the algal diversity and cover increased, with *H. copiosa* and CCA dominating. In the upper mesophotic zone (30-50 m), the species richness and cover increased even more, with *Lobophora* spp. and other Dictyotales dominating. Although many papers have reported the species *Lobophora variegata* in Caribbean coral reefs, recent taxonomy papers have confirmed, using molecular tools, that this genus includes, at least, five cryptic species in the Western Tropical and Subtropical Atlantic (Schultz et al., 2015; Wynne, 2017).

Some interesting records of maximum depth of algal occurrence include an unidentified green crust (169 m), CCA (169 m), Peyssonneliaceae (139 m), *Lobophora* spp. (139 m), and *Halimeda* spp. (127 m). Cyanobacteria were observed at eight sites. Detrital leaves of the marine angiosperm *Thalassia testudinum* were also observed on the deep island slope at some sites showing the vertical connectivity between coastal-marine ecosystems.

Macroalgal taxa that were common to all regions of the Cuban mesophotic coral reefs included the coralline red algae (Subclass

Corallinophycidae) and the family Peyssonneliaceae in the Rhodophyta; some green unidentified crustose forms, the genera *Halimeda* (particularly *H. copiosa*, *H. goreaui*, *H. tuna*), *Avrainvillea*, *Penicillus*, *Udotea* (particularly *U. cyathiformis*) in the Chlorophyta; and the genera *Dictyota* and *Lobophora* in the Ochrophyta (Reed et al., 2018). Site C-10 (Banco San Antonio, west coast) had the greatest number of taxa (24), whereas C-52 (southeast coast) which lacked the typical vertical wall had the least (4 taxa). The northeastern region had the highest number of macroalgal taxa identified so far (38 taxa), whereas the western regions had the least (24 taxa in the northwest region, and 25 in the southwest). These results could indicate better conditions for the development of macroalgae in the northeastern region of Cuba, and/or lower herbivory levels, but further work is still needed.

It is important to note that the macroalgal species included in this guide represent a subset of the 63 species documented to date on Cuba's mesophotic reefs during this expedition (Reed et al., 2018). Many of the identified species are epiphytic, so they are not observed in pictures taken in the field.

Although Cyanobacteria are not macroalgae, those are photosynthetic organisms that could indicate stress on marine ecosystems. They were abundant only at Cayo Largo del Sur MPA (Station 29) showing evidence of nutrient pollution (Reed et al., 2018).

Macroalgae taxa were identified using the scientific literature (mainly Littler and Littler, 2000; Littler et al. 2008) and taxonomy was updated using WoRMS and Wynne (2017).

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Figure 1. Map of Cuba showing ROV dive sites (red stars) on mesophotic reef sites (30-150 m depths) during the *F.G. Walton Smith* cruise, May 14 to June 12, 2017. Pink polygons- marine protected areas. (from REVISTA DE INVESTIGACIONES MARINAS Vol. 38(1):56-125).

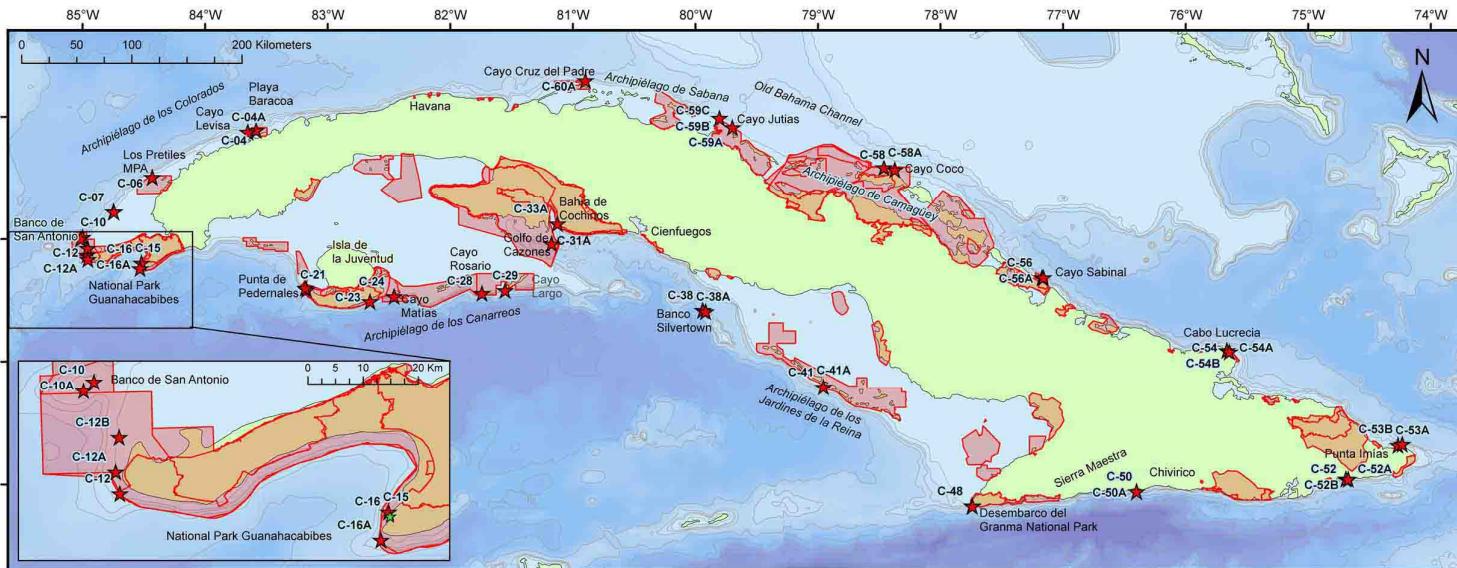


Table 1. ROV dive sites on Cuba's mesophotic reefs during the *F.G. Walton Smith* cruise, May 14 to June 12, 2017. (from REVISTA DE INVESTIGACIONES MARINAS Vol. 38(1):56-125).

Station	Dive No.	Location	Latitude	Longitude	Depth Range (m)
C-04	1	Cuba, NW coast, Cayo Levisa MPA	22°53.483'N	83°34.969'W	25-188
C-04A	2,3	Cuba, NW coast, 2 nmi north of Cayo Arenas, Cayo Levisa MPA	22°52.638'N	83°39.103'W	49-172
C-06	4,5	Cuba, NW coast, Norte de Los Pretiles MPA	22°30.487'N	84°25.907'W	43-170
C-07	6,7	Cuba, NW coast, Archipiélago de Los Colorados, No MPA	22°13.405'N	84°44.837'W	45-178
C-10	8	Cuba, W coast, Banco de San Antonio MPA, east wall	22°00.901'N	84°59.947'W	25-183
C-10A	9	Cuba, W coast, Banco de San Antonio MPA, south wall	22°00.017'N	85°00.977'W	30-150
C-12	10	Cuba, W coast, Los Cayuelos, Guanahacabibes National Park	21°50.005'N	84°57.426'W	149
C-12A	11	Cuba, W coast, Faro Roncali, off lighthouse, Guanahacabibes National Park	21°52.111'N	84°57.824'W	45-156
C-12B	12	Cuba, W coast, Las Tumbas, Guanahacabibes National Park	21°55.477'N	84°57.494'W	38-148
C-15	13	Cuba, W coast, El Almirante, Punto de Buceo, Cabo Corrientes, Guanahacabibes National Park	21°48.224'N	84°31.137'W	25-145
C-16A	14	Cuba, W coast, Cabo Corrientes, Guanahacabibes National Park	21°45.512'N	84°31.874'W	28-150
C-21	15	Cuba, S coast, SW tip of Isla de la Juventud, Punta de Pedernales MPA	21°35.263'N	83°10.325'W	25-158
C-21A	16	Cuba, S coast, SW Isla de la Juventud, bay on west side of point, Punta Francés MPA	21°36.010'N	83°10.943'W	28-150
C-23	17	Cuba, S coast, SE Isla de la Juventud, Punta Brava MPA	21°29.419'N	82°39.228'W	37-150
C-24	18	Cuba, S coast, E of Isla de la Juventud, Archipiélago de Los Canarreos, Cayo Matías MPA	21°31.924'N	82°27.480'W	40-150
C-28	19	Cuba, S coast, Archipiélago de Los Canarreos, Cayo Rosario MPA	21°33.469'N	81°44.401'W	29-150
C-29	20	Cuba, S coast, Archipiélago de Los Canarreos, Cayo Largo del Sur MPA	21°34.854'N	81°33.130'W	26-157
C-31A	21	Cuba, S coast, Golfo de Cazones, Punta Brava, Sur Ciénaga de Zapata, no MPA	21°57.650'N	81°10.355'W	18-150
C-33A	22	Cuba, S coast, Bahía de Cochinos, east wall, Zapata National Park	22°07.444'N	81°07.518'W	30-150
C-38	23,24	Cuba, S coast, south of Cienfuegos, Banco Silvertown, west wall, proposed MPA	21°25.180'N	79°56.377'W	24-150

C-38A	25	Cuba, S coast, south of Cienfuegos, Banco Silvertown, south wall, proposed MPA	21°24.470'N	79°54.942'W	40-153
C-41	26	Cuba, S coast, Cayo Caballones, south slope, Jardines de La Reina MPA	20°47.495'N	78°57.323'W	30-150
C-48	27,28	Cuba, S coast, Cabo Cruz, Desembarco del Granma National Park	19°49.600'N	77°44.551'W	40-154
C-50	29,30	Cuba, S coast, Sierra Maestra, Chivirico Proposed MPA	19°56.551'N	76°23.937'W	27-155
C-52	31	Cuba, S coast, Sierra Purial, Punta Imías, no MPA	20°02.601'N	74°41.498'W	60-161
C-52A	32	Cuba, S coast, Sierra Purial, east tip of Punta Imías, 1 nmi east of ROV 31, no MPA	20°02.513'N	74°40.345'W	43-156
C-53A	33	Cuba, eastern tip of Cuba, NW Punta Maisí, Punta Silencio, no MPA	20°19.007'N	74°16.001'W	54-155
C-53B	34	Cuba, eastern tip of Cuba, NW Punta Maisí, Punta del Fraile, no MPA	20°19.482'N	74°13.940'W	50-142
C-54	35	Cuba, NE coast, Cabo Lucrecia, no MPA	21°05.508'N	75°39.821'W	45-151
C-54B	36	Cuba, NE coast, Cabo Lucrecia, proposed MPA	21°04.817'N	75°38.530'W	65-156
C-56	37,38	Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA	21°41.096'N	77°10.241'W	24-150
C-58	39	Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA	22°34.192'N	78°22.361'W	42-140
C-58A	40	Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA	22°35.262'N	78°27.706'W	46-144
C-59A	41	Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo La Vela MPA	22°54.858'N	79°41.854'W	22-143
C-59C	42	Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Jutía, ¼ nmi N of snorkel Station, no MPA	22°59.446'N	79°48.188'W	30-147
C-60A	43	Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Cruz del Padre, inside and outside MPA	23°17.792'N	80°53.809'W	40-161

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Cyanobacteria	45-46

Chlorophyta- thin encrusting

DEPTH:
-82 m



201705263_T-15-32-26_077_ALG.jpg

LOCATION: Cuba, S coast, E of Isla de la Juventud,
Archipiélago de Los Canarreos, Cayo Matías
MPA, Station C-24

Chlorophyta- thin encrusting

DEPTH:
-88 m

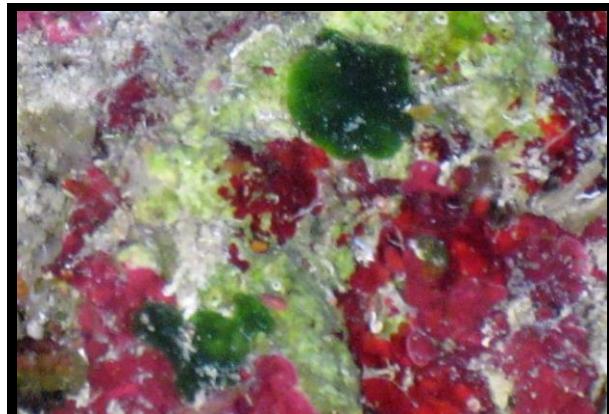


201705271_T-09-46-18_169_ALG.jpg

LOCATION: Cuba, S coast, Archipiélago de Los Canarreos,
Cayo Rosario MPA, Station C-28

Chlorophyta- thin encrusting

DEPTH:
-88 m



201705271_T-09-46-26_170_ALG.jpg

LOCATION: Cuba, S coast, Archipiélago de Los Canarreos,
Cayo Rosario MPA, Station C-28

Chlorophyta- thin encrusting

DEPTH:
-56 m



201705312_T-10-22-18_079_ALG.jpg

LOCATION: Cuba, S coast, south of Cienfuegos, Banco
Silvertown, west wall, proposed MPA, Station C-38

Caulerpa chemnitzia

(Esper) J.V.Lamououx, 1809

CLASS

Ulvophyceae

ORDER

Bryopsidales

FAMILY

Caulerpaceae

DEPTH:

-46 m



201705213_T-15-26-37_115_ALG.jpg

LOCATION: Cuba, W coast, Banco de San Antonio MPA, south wall, Station C-10A

Caulerpa chemnitzia

(Esper) J.V.Lamououx, 1809

CLASS

Ulvophyceae

ORDER

Bryopsidales

FAMILY

Caulerpaceae

DEPTH:

-40 m



201705213_T-16-38-35_207_ALG.jpg

LOCATION: Cuba, W coast, Banco de San Antonio MPA, south wall, Station C-10A

Caulerpa chemnitzia

(Esper) J.V.Lamououx, 1809

CLASS

Ulvophyceae

ORDER

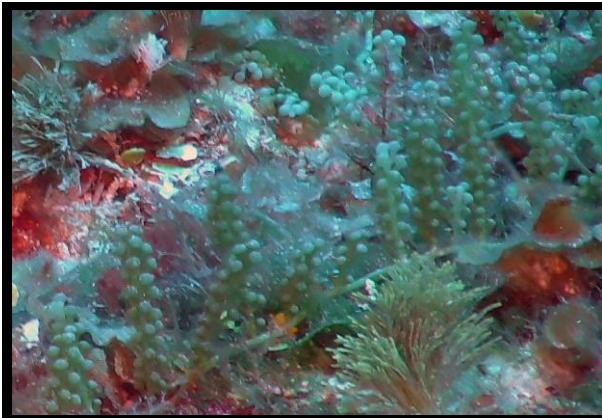
Bryopsidales

FAMILY

Caulerpaceae

DEPTH:

-40 m



201705213_T-16-38-40_258_ALG.jpg

LOCATION: Cuba, W coast, Banco de San Antonio MPA, south wall, Station C-10A

Caulerpa chemnitzia

(Esper) J.V.Lamououx, 1809

CLASS

Ulvophyceae

ORDER

Bryopsidales

FAMILY

Caulerpaceae

DEPTH:

-40 m



201705213004_Deck2_ALG.jpg

LOCATION: Cuba, W coast, Banco de San Antonio MPA, south wall, Station C-10A

Avrainvillea sp.

Decaisne, 1842

CLASS

Ulvophyceae

ORDER

Bryopsidales

FAMILY

Dichotomosiphonaceae

DEPTH:

-42 m



201706081_T-12-16-53_264_ALG.jpg

LOCATION: Cuba, NE coast, Archipiélago Sabana-Camagüey,
Cayo Coco, proposed MPA, Station C-58

Avrainvillea sp.

Decaisne, 1842

CLASS

Ulvophyceae

ORDER

Bryopsidales

FAMILY

Dichotomosiphonaceae

DEPTH:

-42 m



201706081012_Deck1_ALG.jpg

LOCATION: Cuba, NE coast, Archipiélago Sabana-Camagüey,
Cayo Coco, proposed MPA, Station C-58

Halimeda copiosa

Goreau & E.A.Graham, 1967

CLASS

Ulvophyceae

ORDER

Bryopsidales

FAMILY

Halimedaceae

DEPTH:

-48 m



201705203_T-15-34-34_064_ALG.jpg

LOCATION: Cuba, NW coast, Archipiélago de Los Colorados,
No MPA, Station C-07

Halimeda copiosa

Goreau & E.A.Graham, 1967

CLASS

Ulvophyceae

ORDER

Bryopsidales

FAMILY

Halimedaceae

DEPTH:

-37 m



201705233_T-17-03-35_174_ALG.jpg

LOCATION: Cuba, W coast, Cabo Corrientes,
Guanahacabibes National Park, Station C-16A

Halimeda copiosa

Goreau & E.A.Graham, 1967

CLASS

Ulvophyceae

ORDER

Bryopsidales

FAMILY

Halimedaceae

DEPTH:

-39 m



201705314008_deck1_ALG.jpg

LOCATION: Cuba, S coast, south of Cienfuegos, Banco Silvertown, south wall, proposed MPA, Station C-38A

Halimeda copiosa

Goreau & E.A.Graham, 1967

CLASS

Ulvophyceae

ORDER

Bryopsidales

FAMILY

Halimedaceae

DEPTH:

-64 m



201706034_T-16-38-57_063_ALG.jpg

LOCATION: Cuba, S coast, Sierra Maestra, Chivirico Proposed MPA, Station C-50

Halimeda discoidea

Decaisne, 1842

CLASS

Ulvophyceae

ORDER

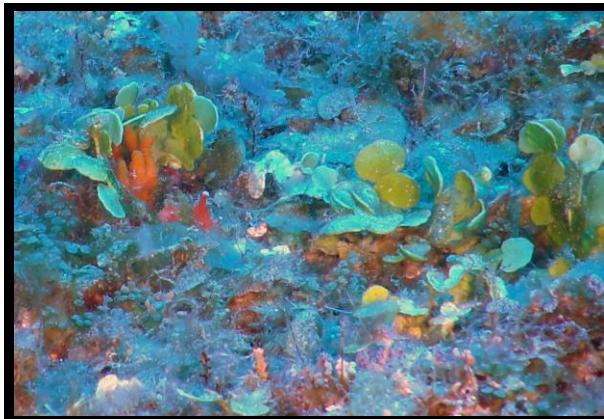
Bryopsidales

FAMILY

Halimedaceae

DEPTH:

-52 m



201706053_T-15-42-58_070_ALG.jpg

LOCATION: Cuba, eastern tip of Cuba, NW Punta Maisí, Punta del Fraile, no MPA, Station C-53B

Halimeda discoidea

Decaisne, 1842

CLASS

Ulvophyceae

ORDER

Bryopsidales

FAMILY

Halimedaceae

DEPTH:

-63 m



201705184_T-17-30-56_010_ALG.jpg

LOCATION: Cuba, NW coast, 2 nmi north of Cayo Arenas, Cayo Levisa MPA, Station C-04A

Halimeda goreaui

W.R.Taylor, 1962

CLASS

Ulvophyceae

ORDER

Bryopsidales

FAMILY

Halimedaceae

DEPTH:

-52 m



201705191_T-10-31-33_200_ALG.jpg

LOCATION: Cuba, NW coast, Los Pretiles MPA, Station C-06*Halimeda goreaui*

W.R.Taylor, 1962

CLASS

Ulvophyceae

ORDER

Bryopsidales

FAMILY

Halimedaceae

DEPTH:

-64 m



201706034_T-16-39-38_065_ALG.jpg

LOCATION: Cuba, S coast, Sierra Maestra, Chivirico Proposed MPA, Station C-50

***Halimeda* sp.**

J.V.Lamouroux, 1812

CLASS

Ulvophyceae

ORDER

Bryopsidales

FAMILY

Halimedaceae

DEPTH:

-56 m



201705231_T-09-23-52_134_ALG.jpg

LOCATION: Cuba, W coast, El Almirante, Punto de Buceo, Cabo Corrientes, Guanahacabibes National Park, Station C-15

***Halimeda* sp.**

J.V.Lamouroux, 1812

CLASS

Ulvophyceae

ORDER

Bryopsidales

FAMILY

Halimedaceae

DEPTH:

-61 m



201705273_T-15-49-02_157_ALG.jpg

LOCATION: Cuba, S coast, Archipiélago de Los Canarreos, Cayo Largo del Sur MPA, Station C-29

Halimeda sp.

J.V.Lamouroux, 1812

CLASS

Ulvophyceae

ORDER

Bryopsidales

FAMILY

Halimedaceae

DEPTH:

-61 m



201705273_T-15-49-18_158_ALG.jpg

LOCATION: Cuba, S coast, Archipiélago de Los Canarreos, Cayo Largo del Sur MPA, Station C-29

Halimeda sp.

J.V.Lamouroux, 1812

CLASS

Ulvophyceae

ORDER

Bryopsidales

FAMILY

Halimedaceae

DEPTH:

-44 m



201706081_T-12-05-02_254_ALG.jpg

LOCATION: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA, Station C-58

Halimeda sp.

J.V.Lamouroux, 1812

CLASS

Ulvophyceae

ORDER

Bryopsidales

FAMILY

Halimedaceae

DEPTH:

-32 m



201706091_T-10-17-46_188_ALG.jpg

LOCATION: Cuba, NE coast, Archipiélago Sabana-Camagüey,
Cayo La Vela MPA, Station C-59A

Halimeda tuna

(J.Ellis & Solander) J.V.Lamouroux, 1816

CLASS

Ulvophyceae

ORDER

Bryopsidales

FAMILY

Halimedaceae

DEPTH:

-40 m



201705211_T-10-42-50_193_ALG.jpg

LOCATION: Cuba, W coast, Banco de San Antonio MPA, east wall, Station C-10

Halimeda tuna

(J.Ellis & Solander) J.V.Lamouroux, 1816

CLASS

Ulvophyceae

ORDER

Bryopsidales

FAMILY

Halimedaceae

DEPTH:

-43 m



201706021005_deck1_ALG.jpg

LOCATION: Cuba, S coast, Cabo Cruz, Desembarco del Gramma National Park, Station C-48

Penicillus dumetosus

(J.V.Lamouroux) Blainville, 1830

CLASS

Ulvophyceae

ORDER

Bryopsidales

FAMILY

Udoteaceae

DEPTH:

-46 m



201705213_T-15-24-54_112_ALG.jpg

LOCATION: Cuba, W coast, Banco de San Antonio MPA, south wall, Station C-10A

Penicillus dumetusosus

(J.V.Lamouroux) Blainville, 1830

CLASS

Ulvophyceae

ORDER

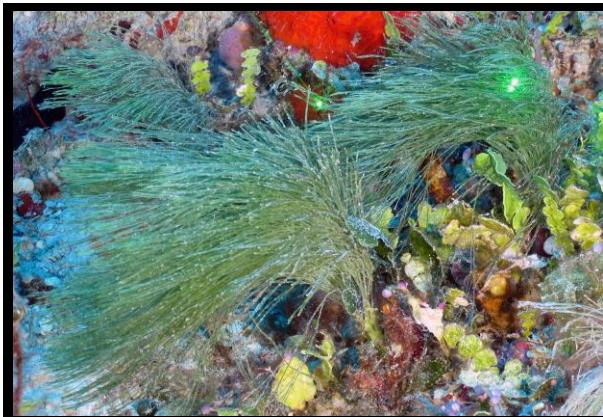
Bryopsidales

FAMILY

Udoteaceae

DEPTH:

-50 m



201706081_T-11-52-23_230_ALG.jpg

LOCATION: Cuba, NE coast, Archipiélago Sabana-Camagüey,
Cayo Coco, proposed MPA, Station C-58

Rhipocephalus phoenix

(J.Ellis & Solander) Kützing, 1843

CLASS

Ulvophyceae

ORDER

Bryopsidales

FAMILY

Udoteaceae

DEPTH:

-52 m



201706061_T-10-58-55_186_ALG.jpg

LOCATION: Cuba, NE coast, Cabo Lucrecia, no MPA, Station C-54

Rhipocephalus phoenix

(J.Ellis & Solander) Kützing, 1843

CLASS

Ulvophyceae

ORDER

Bryopsidales

FAMILY

Udoteaceae

DEPTH:

-52 m



201706061008_Deck1_ALG.jpg

LOCATION: Cuba, NE coast, Cabo Lucrecia, no MPA, Station C-54

Udotea cyathiformis

Decaisne, 1842

CLASS

Ulvophyceae

ORDER

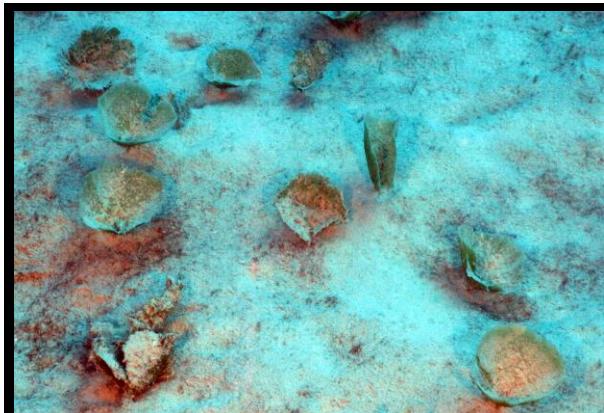
Bryopsidales

FAMILY

Udoteaceae

DEPTH:

-37 m



201705273_T-16-15-03_198_ALG.jpg

LOCATION: Cuba, S coast, Archipiélago de Los Canarreos, Cayo Largo del Sur MPA, Station C-29

Udotea cyathiformis

Decaisne, 1842

CLASS

Ulvophyceae

ORDER

Bryopsidales

FAMILY

Udoteaceae

DEPTH:

-37 m



201705273001_Deck1_ALG.jpg

LOCATION: Cuba, S coast, Archipiélago de Los Canarreos,
Cayo Largo del Sur MPA, Station C-29

Udotea dixonii

D.S.Littler & M.M.Littler, 1990

CLASS

Ulvophyceae

ORDER

Bryopsidales

FAMILY

Udoteaceae

DEPTH:

-59 m



201706083_T-16-46-07_154_ALG.jpg

LOCATION: Cuba, NE coast, Archipiélago Sabana-Camagüey,
Cayo Coco, proposed MPA (just north of NW
edge of MPA), Station C-58A

Udotea dixonii

D.S.Littler & M.M.Littler, 1990

CLASS

Ulvophyceae

ORDER

Bryopsidales

FAMILY

Udoteaceae

DEPTH:

-59 m



201706083011_Deck1_ALG.jpg

LOCATION: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA (just north of NW edge of MPA), Station C-58A

Anadyomene stellata

(Wulfen) C.Agardh, 1823

CLASS

Ulvophyceae

ORDER

Cladophorales

FAMILY

Anadyomenaceae

DEPTH:

-121 m



201706081_T-11-16-41_060_ALG.jpg

LOCATION: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA, Station C-58

Anadyomene stellata

(Wulfen) C.Agardh, 1823

CLASS

Ulvophyceae

ORDER

Cladophorales

FAMILY

Anadyomenaceae



201706081006_Deck2_ALG.jpg

LOCATION: Cuba, NE coast, Archipiélago Sabana-Camagüey,
Cayo Coco, proposed MPA, Station C-58

Microdictyon marinum

(Bory de Saint-Vincent) P.C.Silva, 1955

CLASS

Ulvophyceae

ORDER

Cladophorales

FAMILY

Anadyomenaceae



201705314010_deck1_ALG.jpg

LOCATION: Cuba, S coast, south of Cienfuegos, Banco
Silvertown, south wall, proposed MPA, Station C-
38A

Microdictyon sp.

Decaisne, 1841

CLASS

Ulvophyceae

ORDER

Cladophorales

FAMILY

Anadyomenaceae

DEPTH:

-35 m



201705314_T-16-47-12_290_ALG.jpg

LOCATION: Cuba, S coast, south of Cienfuegos, Banco Silvertown, south wall, proposed MPA, Station C-38A

Valonia macrophysa

Kützing, 1843

CLASS

Ulvophyceae

ORDER

Siphonocladales

FAMILY

Valoniaceae



201706083003_Deck4_ALG.jpg

DEPTH:

-82 m

LOCATION: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA (just north of NW edge of MPA), Station C-58A

***Valonia* sp.**

C.Agardh, 1823

CLASS

Ulvophyceae

ORDER

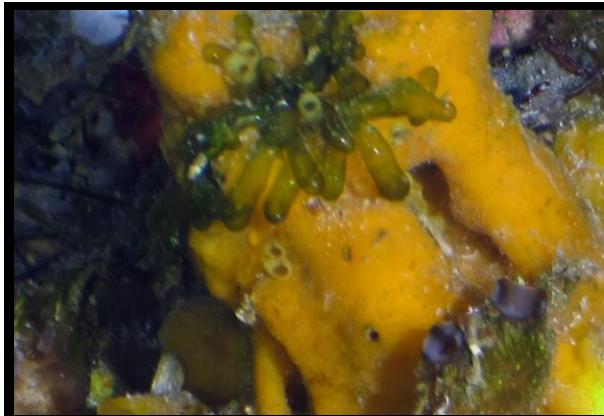
Siphonocladales

FAMILY

Valoniaceae

DEPTH:

-82 m



201705314_T-15-21-14_103_ALG2.jpg

LOCATION: Cuba, S coast, south of Cienfuegos, Banco Silvertown, south wall, proposed MPA, Station C-38A

Dictyota ciliolata

Sonder ex Kützing, 1859

CLASS

Phaeophyceae

ORDER

Dictyotales

FAMILY

Dictyotaceae

DEPTH:

-5 m



201705254006_Deck1_ALG.jpg

LOCATION: Cuba, S coast, SW Isla de la Juventud, bay on west side of point, outside Punta Francés MPA, Station C-21B

Dictyota sp.

J.V.Lamouroux, 1809

CLASS

Phaeophyceae

ORDER

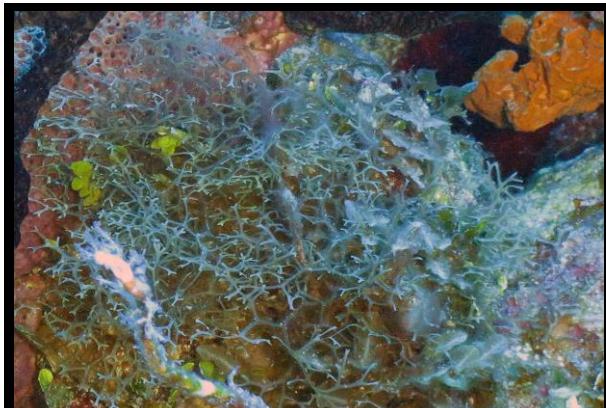
Dictyotales

FAMILY

Dictyotaceae

DEPTH:

-38 m



201705314_T-16-37-43_277_ALG.jpg

LOCATION: Cuba, S coast, south of Cienfuegos, Banco Silvertown, south wall, proposed MPA, Station C-38A

Dictyota sp.

J.V.Lamouroux, 1809

CLASS

Phaeophyceae

ORDER

Dictyotales

FAMILY

Dictyotaceae

DEPTH:

-30 m



201706011_T-10-17-02_177_ALG.jpg

LOCATION: Cuba, S coast, Cayo Caballones, south slope,
Jardines de La Reina MPA, Station C-41

Dictyota sp.

J.V.Lamouroux, 1809

CLASS

Phaeophyceae

ORDER

Dictyotales

FAMILY

Dictyotaceae

DEPTH:

-50 m



20170601_T-09-46-20_120_ALG.jpg

LOCATION: Cuba, NE coast, Archipiélago Sabana-Camagüey,
Cayo Cruz del Padre, inside and outside MPA,
Station C-60A

Lobophora sp.

J.Agardh, 1894

CLASS

Phaeophyceae

ORDER

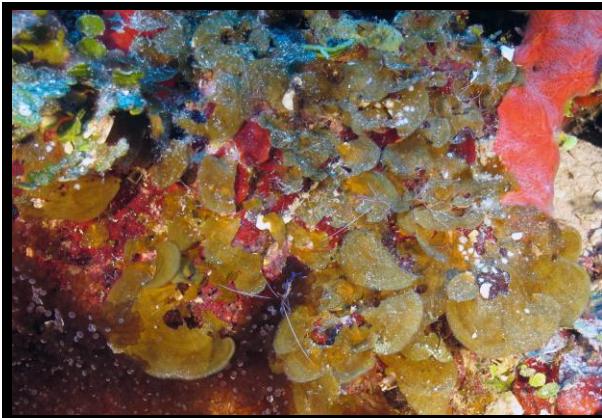
Dictyotales

FAMILY

Dictyotaceae

DEPTH:

-40 m



201705251_T-11-55-05_255_ALG.jpg

LOCATION: Cuba, S coast, SW tip of Isla de la Juventud,
Punta de Pedernales MPA, Station C-21

Lobophora sp.

J.Agardh, 1894

CLASS

Phaeophyceae

ORDER

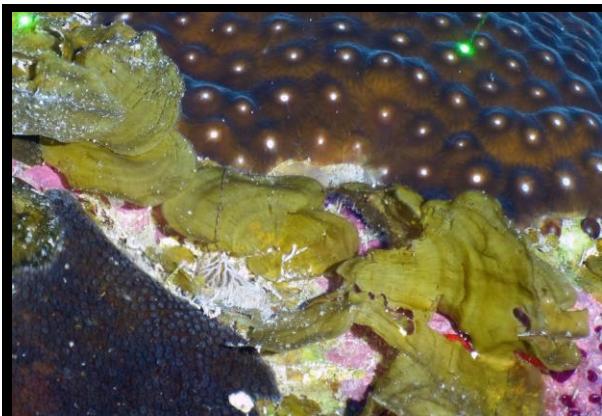
Dictyotales

FAMILY

Dictyotaceae

DEPTH:

-72 m



20170621_T-11-31-39_141_ALG.jpg

LOCATION: Cuba, S coast, Cabo Cruz, Desembarco del
Gramma National Park, Station C-48

Lobophora sp.

J.Agardh, 1894

CLASS

Phaeophyceae

ORDER

Dictyotales

FAMILY

Dictyotaceae

DEPTH:

-56 m



201706034_T-16-50-02_069_ALG.jpg

LOCATION: Cuba, S coast, Sierra Maestra, Chivirico Proposed MPA, Station C-50

Lobophora sp.

J.Agardh, 1894

CLASS

Phaeophyceae

ORDER

Dictyotales

FAMILY

Dictyotaceae

DEPTH:

-52 m



201706023004_deck2_ALG.jpg

LOCATION: Cuba, S coast, Cabo Cruz, Desembarco del Gramma National Park, Station C-48

Stylopodium zonale

(J.V.Lamouroux) Papenfuss, 1940

CLASS

Phaeophyceae

ORDER

Dictyotales

FAMILY

Dictyotaceae

DEPTH:

-114 m



LOCATION: Cuba, S coast, Sierra Purial, east tip of Punta Imías, 1 nmi east of ROV 31, no MPA, Station C-52A

Stylopodium zonale

(J.V.Lamouroux) Papenfuss, 1940

CLASS

Phaeophyceae

ORDER

Dictyotales

FAMILY

Dictyotaceae

DEPTH:

-62 m



LOCATION: Cuba, S coast, Sierra Purial, east tip of Punta Imías, 1 nmi east of ROV 31, no MPA, Station C-52A

Sargassum hystrix

J.Agardh, 1847

CLASS

Phaeophyceae

ORDER

Fucales

FAMILY

Sargassaceae

DEPTH:

-21 m



201705281_T-10-43-49_270_ALG.jpg

LOCATION: Cuba, S coast, Golfo de Cazones, Punta Brava, Sur Ciénaga de Zapata, no MPA, Station C-31A

Sargassum hystrix

J.Agardh, 1847

CLASS

Phaeophyceae

ORDER

Fucales

FAMILY

Sargassaceae

DEPTH:

-35 m



201705314_T-16-47-12_290_ALG2.jpg

LOCATION: Cuba, S coast, south of Cienfuegos, Banco Silvertown, south wall, proposed MPA, Station C-38A

Sporochnus sp.

C.Agardh, 1817

CLASS

Phaeophyceae

ORDER

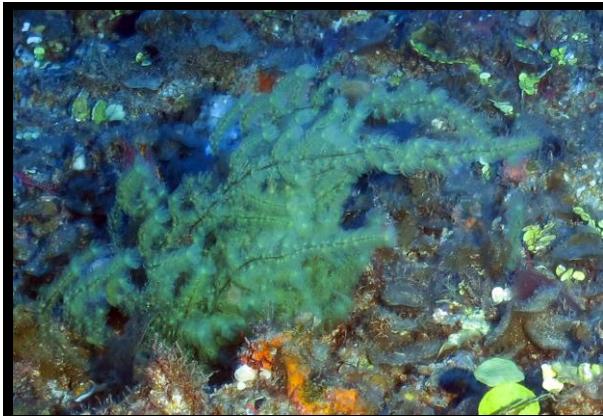
Sporochnales

FAMILY

Sporochnaceae

DEPTH:

-52 m



201706053_T-15-10-09_157_ALG.jpg

LOCATION: Cuba, eastern tip of Cuba, NW Punta Maisí, Punta del Fraile, no MPA, Station C-53B

Corallinophycidae (Crustose Coralline Algae)

CLASS

Florideophyceae

DEPTH:

-110 m



201705281_T-09-09-23_049_ALG.jpg

LOCATION: Cuba, S coast, Golfo de Cazones, Punta Brava, Sur Ciénaga de Zapata, no MPA, Station C-31A

Corallinophycidae (Crustose Coralline Algae)

CLASS

Florideophyceae

DEPTH:

-70 m



201706021_T-11-42-15_165_ALG.jpg

LOCATION: Cuba, S coast, Cabo Cruz, Desembarco del Gramma National Park, Station C-48

Peyssonneliaceae**CLASS**

Florideophyceae

ORDER

Peyssonneliales

FAMILY

Peyssonneliaceae

DEPTH:

-88 m



201705271_T-09-46-26_170_ALG2.jpg

LOCATION: Cuba, S coast, Archipiélago de Los Canarreos, Cayo Rosario MPA, Station C-28**Peyssonneliaceae****CLASS**

Florideophyceae

ORDER

Peyssonneliales

FAMILY

Peyssonneliaceae

DEPTH:

-28 m



201705283_T-17-02-28_265_ALG.jpg

LOCATION: Cuba, S coast, Bahía de Cochinos, east wall, Zapata National Park, Station C-33A

Peyssonneliaceae**CLASS**

Florideophyceae

ORDER

Peyssonneliales

FAMILY

Peyssonneliaceae

DEPTH:

-42 m



201706023_T-16-34-47_045_ALG.jpg

LOCATION: Cuba, S coast, Cabo Cruz, Desembarco del Gramma National Park, Station C-48**Peyssonneliaceae****CLASS**

Florideophyceae

ORDER

Peyssonneliales

FAMILY

Peyssonneliaceae

DEPTH:

-56 m



201706034_T-16-53-15_072_ALG.jpg

LOCATION: Cuba, S coast, Sierra Maestra, Chivirico Proposed MPA, Station C-50

Peyssonneliaceae**CLASS**

Florideophyceae

ORDER

Peyssonneliales

FAMILY

Peyssonneliaceae

DEPTH:

-82 m



201706061_T-09-36-53_078_ALG.jpg

LOCATION: Cuba, NE coast, Cabo Lucrecia, no MPA, Station C-54

Chrysomenia enteromorpha

Harvey, 1853

CLASS

Florideophyceae

ORDER

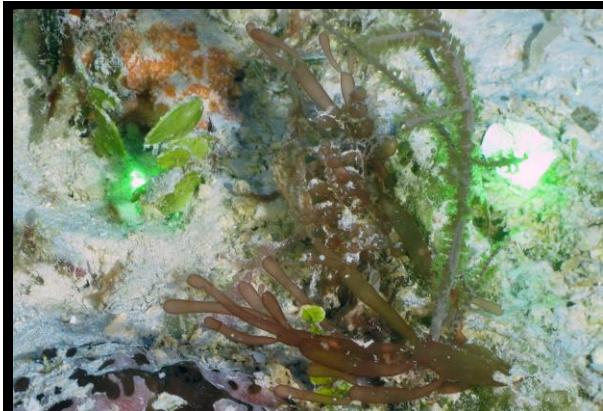
Rhodymeniales

FAMILY

Rhodymeniaceae

DEPTH:

-60 m



201706083_T-16-37-43_152_ALG.jpg

LOCATION: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA (just north of NW edge of MPA), Station C-58A

Chrysymenia enteromorpha

Harvey, 1853

CLASS

Florideophyceae

ORDER

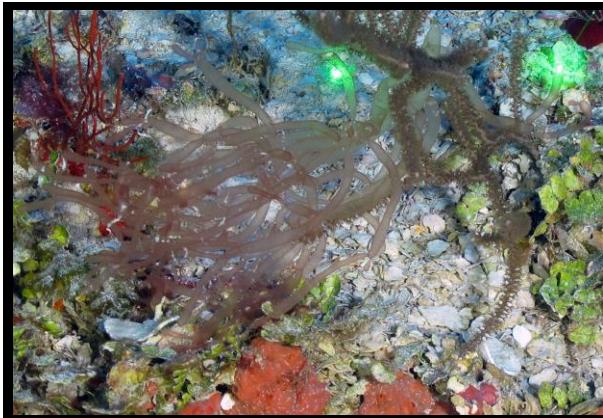
Rhodymeniales

FAMILY

Rhodymeniaceae

DEPTH:

-63 m



201706083_T-16-20-24_139_ALG.jpg

LOCATION: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA (just north of NW edge of MPA), Station C-58A

Chrysymenia enteromorpha

Harvey, 1853

CLASS

Florideophyceae

ORDER

Rhodymeniales

FAMILY

Rhodymeniaceae

DEPTH:

-63 m



201706083004_Deck2_ALG.jpg

LOCATION: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA (just north of NW edge of MPA), Station C-58A

Cyanobacteria

DEPTH:
-54 m

201705201_T-11-01-35_223_ALG.jpg

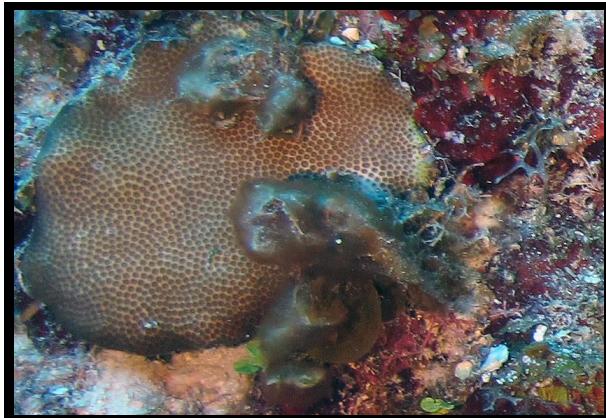
LOCATION: Cuba, NW coast, Archipiélago de Los Colorados,
No MPA, Station C-07

Cyanobacteria

DEPTH:
-62 m

201705224_T-16-31-59_167_ALG.jpg

LOCATION: Cuba, W coast, Las Tumbas, Guanahacabibes
National Park, Station C-12B

Cyanobacteria

DEPTH:
-31 m

201705253_T-16-27-23_226_ALG.jpg

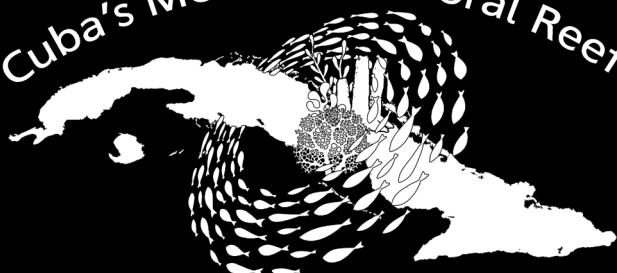
LOCATION: Cuba, S coast, SW Isla de la Juventud, bay on west side of point, Punta Francés MPA, Station C-21A

CUBA'S MESOPHOTIC CORAL REEFS

Macroalgae Photo Identification Guide



Cuba's Mesophotic Coral Reefs



USA - Cuba Research Partnership



Beatriz Martínez-Daranas, Patricia M. González-Sánchez, Amanda Ramos, Emma E. Gómez, Yusimí Alfonso, Ana M. Suárez, M. Dennis Hanisak. 2018. Cuba's Mesophotic Coral Reefs- Macro Algae Photo Identification Guide: Editors- John K. Reed, Stephanie Farrington. Cooperative Institute for Ocean Exploration, Research, and Technology (CIOERT) at Harbor Branch Oceanographic Institute- Florida Atlantic University (HBOI-FAU). First Edition: November 2018. Ironside Press, Vero Beach, Florida. HBOI Contribution Number 2192 . <http://www.cioert.org/cuba>.