eDNA Expeditions biodiversity survey of Everglades National Park

Saara Suominen, Pieter Provoost, Ward Appeltans

November 27, 2023

Highlights

With 50% of the samples analysed we can share the following highlights: 17.51 of water, roughly two buckets, contained:

- 12,500 unique sequences
- DNA from 194 identifiable species of which 77 species were not previously reported in the Everglades. The Everglades is home to over 2,500 marine species (source UNESCO/Ocean Biodiversity Information System OBIS).
- DNA of the following threatened species: TO BE ADDED

Introduction

Environmental DNA Expeditions is a global, citizen science initiative that will help measure marine biodiversity, and the impacts climate change might have on the distribution patterns of marine life, across UNESCO World Heritage marine sites.

Ocean species shed DNA into the water around them. The genetic material from waste, mucus or cells in one liter of water can determine the species richness in a given area, without the need to actually extract organisms from their environment. The cost effective, ethical nature of eDNA sampling has the potential to revolutionize knowledge about ecosystems and species diversity and to inspire the next generation of ocean researchers.

eDNA sampling was conducted in Everglades National Park in April 2023, by filtering up to 1800 ml of seawater through filter cartridges with a 0.8 µm pore size. 20 samples were collected at five locations in the park: Trout Creek, North Eagle Creek, Crocodile Dragover, Whip Ray, and Captain. From these 20 samples, a first batch of 11 samples covering all sites has been processed. DNA from these samples was extracted and amplified, and then sent to the sequencing facility.

Results

Sampling and DNA sequencing

Sequencing of the DNA from 11 samples resulted in over 20 million sequence reads. From these reads we were able to collect 12,507 unique sequences or ASVs. Matching those sequences with reference sequences in are not known from the park in OBIS.

public databases, we were able to detect 194 species. A total of 2566 are known from Everglades National Park in the OBIS database. Of the 193 species detected, 77

reads	species	asvs
20627859	194	12507

locality	materialSampleID	reads	species	asvs	sampleSize
Captain	EE0386	1715884	33	1261	1500
Captain	EE0391	1504564	77	5480	1800
Captain	EE0402	1768280	73	5873	1800
Crocodile Dragover	EE0389	1542386	64	5174	1500
Crocodile Dragover	EE0390	2070296	67	5042	450
North Eagle Key	EE0388	1586226	43	2831	1500
Trout Creek	EE0403	1854506	86	3590	1500
Whip Ray	EE0387	2902938	78	3101	1800
Whip Ray	EE0404	2195910	97	5838	1800
Whip Ray	EE0405	1994942	97	4808	1800
Whip Ray	EE0406	1491927	103	4685	1800

group	obis_species	edna_species	fraction
fish	643	97	0.15
mammal	13	4	0.31
turtle	6	1	0.17

category	obis_species	edna_species	fraction
CR	15	1	0.07
EN	12	1	0.08
NT	27	2	0.07
VU	35	8	0.23

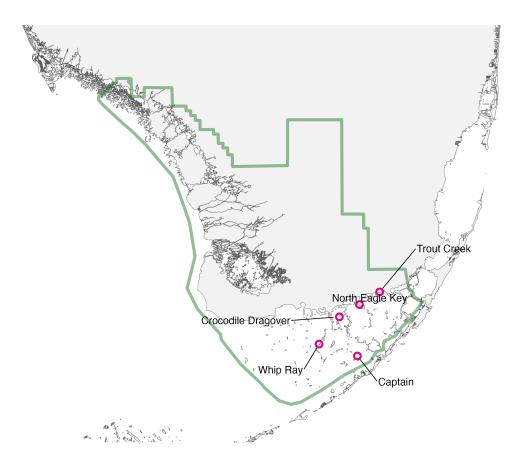


Figure 1: Map of eDNA sampling locations

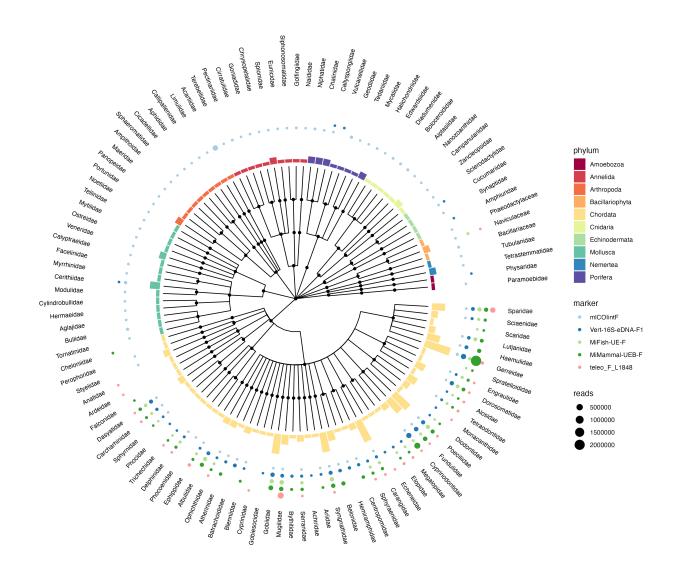


Figure 2: Number of DNA reads and species detected by family

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper. Lorem ipsum dolor sit

amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Species detection

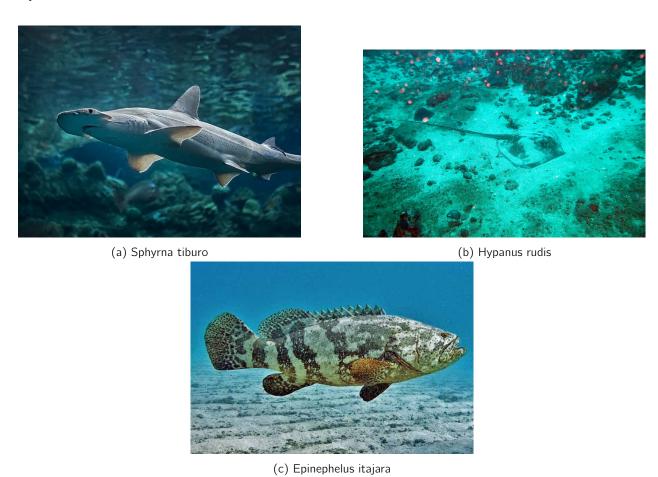


Figure 3: Some of the detected fish species.

Appendix: species list

Amoebozoa Amoebozoa Annelida Annelida	Discosas	NO(50,50,50,000,000,000,000,000,000,000,00		6.26222		
Amoebozoa Annelida Annelida	Discosca	Neopalallioeda aestualilla			yes	
Annelida Annelida Annelida	Myxogastrea	Craterium leucocephalum			yes	
Annelida	Clitellata	Thalassodrilides qurwitschi			yes	
Apilona	Polychaeta	Marphysa sanguinea				red rock worm
שבום בו ביים ביים ביים ביים ביים ביים ביי	Polychaeta	Bhawania goodei			Ves	
Annelida	Polychaeta	Glycinde multidens				
Annelida	Polychaeta	Polydora websteri			Ves	
Annelida	Polychaeta	Prionospio steenstrupi			}	
Appelida	Dolychoeta	Timovote covibous			507	
Allielida	Polychaeta	a ete calibous			y CD CD	
Amenda	Polyciideta					ice creain cone worm
Annelida	Polychaeta	Loimia medusa				medusa worm
Annelida		Golfingia (Golfingia) elongata				
Annelida		Siphonosoma cumanense			yes	
Arthropoda	Copepoda	Acartia (Acanthacartia) tonsa				
Arthropoda	Hexapoda	Rhopalosiphum padi			ves	
Arthropoda	Hexapoda	Macrosteles quadrilineatus			ves	
Arthropoda	Malacostraca	Cymadusa compta				
Arthropoda	Malacostraca	Flasmonis nkjaf			VAS	
/ :::::: Opoda Athropoda	Malaccostraca	Neonangan			}	Florida graceflat crab
Athropoda	Malacostraca	Callinotton paridin				Figure 91 assilate et ab
Atmopoda	Malacostiaca	Callificates sapidus				blood coottod comments and
Artiropoda	Malacostraca	Portunus sanguinoientus			yes	biood-sported swiffilling crab
Arthropoda	Malacostraca	Faracerceis caudata				-
Arthropoda	Merostomata	Limulus polyphemus		0>		horseshoe crab
Arthropoda	Pycnogonida	Callipallene brevirostris				
Ascomycota	Dothideomycetes	Cladosporium herbarum			yes	
Ascomycota	Eurotiomycetes	Aspergillus versicolor			yes	
Bacillariophyta	Bacillariophyceae	Cylindrotheca closterium			yes	
Bacillariophyta	Bacillariophyceae	Haslea crucigera			yes	
Bacillariophyta	Bacillariophyceae	Navicula minima			yes	
Bacillariophyta	Bacillariophyceae	Phaeodactylum tricornutum			yes	
Bryozoa	Gymnolaemata	Bugula rochae			yes	
Bryozoa	Gymnolaemata	Amathia evelinae			yes	
Cercozoa	Chlorarachnea	Chlorarachnion reptans			yes	
Chlorophyta	Mamiellophyceae				yes	
Chlorophyta	Mamiellophyceae	Micromonas pusilla				
Chordata	Ascidiacea	Ecteinascidia styeloides			yes	
Chordata	Ascidiacea	Botrylloides niger				Black synascidia, Synascidie noire
Chordata	Ascidiacea	Botrylloides simodensis			yes	
Chordata	Aves	Anas poecilorhyncha			yes	
Chordata	Aves	Ardea cinerea			yes	
Chordata	Aves	Falco sparverius			yes	
Chordata	Elasmobranchii	Negaprion brevirostris	fish	N		lemon shark
Chordata	Elasmobranchii	Sphyrna tiburo	fish	N EN		bonnethead
Chordata	Elasmobranchii	Hypanus americanus	fish	LN		
Chordata	Elasmobranchii	Hypanus rudis	fish	CR	yes	

phylum	class	species	group	category	new	vernacular
Chordata	Mammalia	Mirounga leonina	mammal		yes	southern elephant seal
Chordata	Mammalia	Tursiops truncatus	mammal		,	bottlenose dolphin, grand dauphin
Chordata	Mammalia	Neophocaena phocaenoides	lemmem	=	VPS	Indian dolphin marsonin aptere
Chordata	Mammalia	Trichechus manatus	lemmem	2 >	}	West Indian manatee
Chordata	Teleostei	Chaetodinterus faber	fish)		Atlantic spadefish
(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)		Albula alongodasta	1 1		0	restance of paracellars
Chordo+2	Teleostei	Albula glossodolita	HSH Fish) <u> </u>	y CD	loundjaw bonensn Bongfigh
CIIOT da La	- eleostel	Albuia vuipes	X	_		
Chordata	leleostei	Myrophis punctatus	tish			speckled worm eel
Chordata	Teleostei	Myrophis vafer	fish		yes	Pacific worm eel
Chordata	Teleostei	Atherinomorus stipes	fish			hardhead silverside
Chordata	Teleostei	Opsanus beta	fish			Gulf toadfish
Chordata	Teleostei	Opsanus tau	fish			ovster toadfish
Chordata	Teleostei	Strongylina notata	fish			redfin needlefish
Chordata	Teleostei	Strongylina timilou	fish			timilcii
(included in the control of the cont	T.C.C.C.T.	Talogorana condina	1 40			7
CHOINGLA	Heleostel Heleostel		11511			
Chordata	leleostei	Chriodorus atherinoides	TISN			nardnead naitbeak
Chordata	Teleostei	Chasmodes bosquianus	fish			striped blenny
Chordata	Teleostei	Centropomus undecimalis	fish			common snook
Chordata	Teleostei	Sphyraena barracuda	fish			great barracuda
Chordata	Teleostei	Sphyraena iello	fish		ves	pickhandle barracuda
	Teleostei	Carany Chycos	fish		,	blue minner carancile combali
מישים בייניים בייניים בייניים בייניים בייניים ביינים בייני	Tologram		131			Common incl. Caramigue coupail
CIIOTUALA	i eleostel		11511			common jack, carangue crevane
Chordata	leleostei	Caranx ignobilis	tish		yes	giant trevally
Chordata	Teleostei	Caranx latus	fish			horse-eye jack
Chordata	Teleostei	Oligoplites saurus	fish			leatherjack
Chordata	Teleostei	Selene vomer	fish			lookdown
Chordata	Teleostei	Trachinotus carolinus	fish			pompano
Chordata	Teleostei	Echeneis naucrates	fish			sharksucker
Chordata	Teleostei	Brevoortia tyrannus	fish		Ves	mossbunker
Chordata	Teleostei	Harengula jaguana	fish		,	scaled sardine
Chordata	Teleostei		fish			Atlantic thread herring
Chordata	Teleostei	Anchoa mitchilli	fish			bay anchovy
Chordata	Teleostei	Jenkinsia lamprotaenia	fish			dwarf herring
Chordata	Teleostei	Carassius auratus	fish		Ves	aoldfish, aible
Chordata	Teleostei	Cyprinodon variegatus	fish			sheepshead minnow
Chordata	Teleostei	Floridichthys carbio	fish			anldsnotted killifish
Chordata	Teleostei	Findulus confluentus	fish			goraportea ministra marsh killifish
Chordata	Teleostei	Findulis grandis	fish			Gulf killifish
Chordata	Teleostei	Findulis venicis	fish			
Chordata	Teleostei		fich		700	
ליבילים לים	Tologito:		15:15		}	to interest in the second seco
CHOLUALA	Teleostel Teleostel	Eucallia parva	11511			all Water Kill Si :
Chordata	eleostel	Belonesox belizanus	TISN			pike Kilitish
Chordata	Teleostei		fish			mosquitofish
Chordata	Teleostei		fish			eastern mosquitofish
Chordata	Teleostei	Gambusia rhizophorae	fish			mangrove gambusia
Continued on next page						

Chordata Chordata	Teleostei	. :- - -	-	6.060250		2
Chordata		Poecilia latipinna	fish			sailfin molly
Chordo+2	Teleostei	Poecilia sphenops	fish		yes	Mexican molly
CIOICALA	Teleostei	Elops saurus	fish			ladyfish
Chordata	Teleostei	Megalops atlanticus	fish	N		tarpon
Chordata	Teleostei	Diapterus auratus	fish			Irish mojarra
Chordata	Teleostei	Eucinostomus argenteus	fish			silver mojarra
Chordata	Teleostei	Eucinostomus gula	fish			Jenny mojarra
Chordata	Teleostei	Eucinostomus jonesii	fish			slender mojarra
Chordata	Teleostei	Eucinostomus melanopterus	fish			flagfin mojarra
Chordata	Teleostei	Eugerres plumieri	fish			striped mojarra
Chordata	Teleostei	Gerres cinereus	fish			yellowfin mojarra
Chordata	Teleostei	Ulaema lefroyi	fish			
Chordata	Teleostei	Haemulon aurolineatum	fish			tomtate grunt
Chordata	Teleostei	Haemulon parra	fish			sailors choice
Chordata	Teleostei	Haemulon plumierii	fish			grunt
Chordata	Teleostei	Haemulon sciurus	fish			bluestriped grunt
Chordata	Teleostei	Lutjanus argentimaculatus	fish		yes	river snapper
Chordata	Teleostei	Lutjanus griseus	fish		,	grey snapper
Chordata	Teleostei	Nicholsina usta	fish			emerald parrotfish
Chordata	Teleostei	Cynoscion nebulosus	fish			spotted weakfish
Chordata	Teleostei		fish			blackdrum
Chordata	Teleostei	Archosargus probatocephalus	fish			sheepshead
Chordata	Teleostei	Archosargus rhomboidalis	fish			Western Atlantic seabream
Chordata	Teleostei	Diplodus kotschvi	fish		ves	
Chordata	Teleostei	Lagodon rhomboides	fish		,	pinfish
Chordata	Teleostei	Gobiesox strumosus	fish			skilletfish
Chordata	Teleostei	Gobiosoma bosc	fish			naked goby
Chordata	Teleostei	Gobiosoma ginsburgi	fish		yes	seaboard goby
Chordata	Teleostei		fish		,	code goby
Chordata	Teleostei	Lophogobius cyprinoides	fish			crested goby
Chordata	Teleostei	Microgobius gulosus	fish			clown goby
Chordata	Teleostei	Microgobius microlepis	fish			banner goby
Chordata	Teleostei	Mugil cephalus	fish			grey mullet, muge
Chordata	Teleostei	Mugil curema	fish			silverside mullet
Chordata	Teleostei	Mugil rubrioculus	fish			
Chordata	Teleostei	Ogilbia cayorum	fish			key brotula
Chordata	Teleostei	Epinephelus itajara	fish	\cap		itajara
Chordata	Teleostei	Epinephelus lanceolatus	fish		yes	giant grouper
Chordata	Teleostei	Trinectes maculatus	fish			hogchoker
Chordata	Teleostei	Ariopsis felis	fish			hardhead catfish
Chordata	Teleostei	Anarchopterus criniger	fish			fringed pipefish
Chordata	Teleostei	Hippocampus zosterae	fish			dwarf seahorse
Chordata	Teleostei	Syngnathus floridae	fish			dusky pipefish
Chordata	Teleostei		fish			northern pipefish
Chordata	leleostei	Syngnathus schlegeli	tısh		yes	Seaweed pipetish

Syngnathus scovelli fish Chilomycterus schoepfiii fish Stephanolepis cirrhifer Stephanolepis cirrhifer Stephanolepis cirrhifer Stephanolepis cirrhifer Stephanolepis cirrhifer Stephanolepis cirrhifer Sphoeroides parvus Sphoeroides parvus Fish Sphoeroides pengleri Fish Sphoeroides spengleri Fish Caretta caretta Exaiptasia diaphana Boloceroides mcmurichi Diadunane leucolena Boloceroides mcmurichi Diadunane leucolena Boloceroides mcmurichi Diadunane leucolena Boloceroides mcmurichi Diadunane genucia Boloceroides mutiformis Leptosynapta tenuis Thyonella genmata Gusticula mutiformis Leptosynapta tenuis Thyonella genmata Graphaphibolis squamata Graphaphibolis squamata Graphaphibolis squamata Graphaphibolis squamata Graphaphibolis squamata Graphanolica puella Chione cancellata Philinopsis paca Bulla arabica Anomalocardia puella Chione cancellata Philinopsis poica Dondice occidentalis Bulla arabica Actecina conexa Learchis poica Dondice occidentalis Bulla arabica Crepidula convexa Learchis poica Dondice occidentalis Bulla arabica Cerithium muscarum Modulus modulus Cyerce antiliensis Gyerce antiliensis Gyerce antiliensis Gyerce antiliensis Gyerce antiliensis Amphidinium massartii Fish	f pipefish oed burrfish
Teleostei Chilomycterus schoepfii fish Teleostei Stephanolepis cirrfriifer fish Teleostei Stephanolepis cirrfriifer fish Teleostei Sphororides maculatus fish Teleostei Sphororides paruus fish Anthozoa Evaluatia daphana Anthozoa Boloceroides meruurichii yes Anthozoa Boloceroides meruurichii yes Anthozoa Boloceroides meruurichii yes Anthozoa Cardedasis dichotoma yes Hydrozoa Zancelopsis dichotoma Hydrozoa Jancelopsis dichotoma Hydrozoa Anthripolis gaumata Holothuroidea Triyorieli gemmata Holothuroidea Triyorieli gemmata Holothuroidea Triyorieli gemmata Holothuroidea Cardedacyla briareus Ophiuroidea Marcropisi admisi Bivalvia Arcropisi admisi Bivalvia Arcropisi admisi Bivalvia Arcropisi admisi Bivalvia Arcropisi busa Gastropoda Bulla arabica Gastropoda Certifium eburneum Gastropoda Certifium eburneum Gastropoda Certifium muscarum Gastropoda Certifium muscarum Gastropoda Gestropoda Certifium muscarum Gastropoda Gestropoda Acteccima canaliculata Gastropoda Gestropoda Certifium muscarum Gastropoda Gestropoda Acteccima canaliculata Gastropoda Certifium muscarum Gastropoda Certifium muscarum Gastropoda Certifium muscarum Gastropoda Certifium muscarum Gastropoda Certifium pulmin muscarum Gastropoda Acteccima canaliculata Holohomenteria Tertasterma elegans Holohomenteria Tertasterma elegans	oed burrfish
Teleostei Stephanolepis cirrifier fish yes l'eleostei Shephanolepis cirrifier fish Teleostei Shephanolepis hispida fish Teleostei Shokeroides parvus fish yes Teleostei Shokeroides menurirchi turrile VVU Sarkthozoa Boldoceroides menurirchi turrile VVU Sarkthozoa Boldoceroides menurirchi surrivora Charle si chotoma Nanozoanthu Arernacuus Arthozoa Charle in Marcoanthu Arernacuus Chyria hierispherica Chyria hierispherica Arthoroa Chyria hierispherica Chyria hierispherica Hydrozoa Chyria hierispherica Hydrozoa Chyria hierispherica Chyria hierispherica Chyria hierispherica Holothuroidea Thyonella genmata Holothuroidea Chyria hierispherica Castropoda Brilinopsis pusa Gastropoda Certhium muscarum elegans yes Dinophyree Amphidium mascartii polica Certhium elegans yes Dinophyree Amphidium mascartii polica Certhium elegans yes Dinophyree Amphidium mascartii gelans	
Teleostei Stephanolepis hispida fish Teleostei Sphoeroides maculatus fish Anthozoa Evalptasia diaphana Anthozoa Boloceroides momurrichi Anthozoa Caracteopis dichotoma Anthozoa Caracteopis dichotoma Hydrozoa Coytia hemisphanetica Hydrozoa Obelia bidentata Tentraculata Vallicula multiformis Holothuroidea Leposynapta tenuis Holothuroidea Leposynapta tenuis Holothuroidea Coytia maculatus Amphipholis squamata Anthophipholis squamata Holothuroidea Amphipholis squamata Anthophipholis squamata Bivalvia Arcospis adamic Bivalvia Arcospis adamic Bivalvia Anomalocardia puella Bivalvia Crassostrea vigilica Bivalvia Anomalocardia puella Bivalvia Crassostrea vigilica Bivalvia Crassostrea vigilica Bivalvia Crassostrea vigilica Bivalvia Crassostrea vigilica Gastropoda Bulla arabica Gastropoda Crepidula convexa Gastropoda Cerithium eburneum Gastropoda Cerithium eburneum Gastropoda Cerithium muscarum Gastropoda Cerithium muscarum Gastropoda Cerithium muscarum Gastropoda Cerithium mascartii Holohomentea Tetrastemma uleganis Holohomentea	fish
Teleostei Sphoeroides maculatus fish Teleostei Sphoeroides pavus fish Teleostei Sphoeroides spavus fish Teleostei Sphoeroides memurichi Yosa Anthozoa Boloceroides memurichi Yosa Anthozoa Boloceroides memurichi Yosa Anthozoa Diadumene leucolena Anthozoa Diadumene leucolena Cylina hemisphaerica Hydrozoa Cylina hemisphaerica Hydrozoa Cylina hemisphaerica Hydrozoa Cylina hemisphaerica Holothuroidea Leptosymapta tenuis Holothuroidea Cylincheli gemmata Holothuroidea Sclerodactyla briareus Ophiuroidea Amphilpholis squamata Grathostomula mediterranea Bivalvia Arcopsis adamsi Chione cancellata Grathopoda Ameritella mitchelli Bivalvia Chione cancellata Gastropoda Philinopsis pusa Gastropoda Crepidula convexa Gastropoda Cerithium eburneum Gastropoda Cerithium muscarum Gastropoda Cerithium wairum Honlophycae Amphildiulum massartii Hoolophycae Amphildiulum wairum Wairum Honlophycae Amphildiulum wairum Wairum Honlophycae Amphildiulum wairum Wairum Honlophycae Amphildiulum wairum Wairum Honlophycae Amphildiulum wairum Wair	
Teleostei Sphoeroides panvus fish ves Teleostei Sphoeroides spangleri fish Caretta careta caretta caretta careta caret	er
Teleostei Sphoeroides spengleri fish Anthozoa Evaitasia diaphan Anthozoa Boloceroides mcmurrichi turrite VU Santhozoa Boloceroides mcmurrichi yes Anthozoa Diadumene feucolena Santhozoa Edwardaisa longicornia Anthozoa Chyta hemisphaerica Hydrozoa Chyta bremisphaerica Chyta hemisphaerica Chyta hemisphaerica Protectulata Valicula multiformis Holothuroidea Chyta briareus Cholothuroidea Thyonella germarta Holothuroidea Thyonella germarta Holothuroidea Thyonella germarta Holothuroidea Thyonella germarta Holothuroidea Calerodactyla briareus Cholothuroidea Calerodactyla briareus Cholothuroidea Cascotrea virginica Bivalvia Ameritella mitchelli Bivalvia Ameritella mitchelli Bivalvia Crassostrea virginica Bivalvia Chora cancellata Castoroda Cerpitulm convexa Gastropoda Acteocina canaliculata Gastropoda Cerpitum muscarum Gastropoda Cerpitum muscarum Gastropoda Cerpitum massartii Gastropoda Cerpitum massartii Gastropoda Cerpitum massartii Holothuromertea Tarvatemma alegans yes Dinophyceae Amphidinium massartii Holothuroenertea Tarvatemma alegans yes Holohonamertea Tarvatemma elegans	t puffer
Anthozoa Exaiptasia diaphana turtle VU Anthozoa Boloceroides memurichi Anthozoa Boloceroides memurichi Anthozoa Boloceroides memurichi Anthozoa Boloceroides memurichi Anthozoa Carvedasia longicornis Anthozoa Carcelopsis derhotoma Hydrozoa Clytia hemisphaerica Hydrozoa Clytia hemisphaerica Hydrozoa Obelia bidentata Clytia hemisphaerica Holothuroidea Thyonella germarata Holothuroidea Thyonella germarata Holothuroidea Amphipholis squamata Gastropoda Ameritella mitchelli Bivalvia Ameritella mitchelli Bivalvia Ameritella mitchella Bivalvia Ameritella mitchella Bivalvia Ameritella mitchella Bivalvia Ameritella mitchella Bivalvia Antonalocarda puella Bivalvia Antonalocarda puella Gastropoda Acteocina canaliculata Gastropoda Cerithium escartii Gastropoda Cerithium muscarum Gastropoda Cerithium muscarum Gastropoda Cerithium massartii Holohuromenertea Tetrastemma alegans Holohomenertea Tetrastemma alegans Tetrastemma alegans	dtail puffer
Anthozoa Exaiptzaia diaphana Anthozoa Boloceroides memurrichi yes Anthozoa Boloceroides memurrichi yes Anthozoa Idadumene leucolena Anthozoa Nanozoanthus harenacus yes Hydrozoa Zancleopsis dichotoma Hydrozoa Clytia hemisphaerica Holothuroidea Clytia hemisphaerica Holothuroidea Inponella gemmata Holothuroidea Thyonella gemmata Holothuroidea Clerodactyla briareus Holothuroidea Clerodactyla briareus Dphiuroidea Grathostomula mediterranea Bivalvia Arcopsis adamsi Bivalvia Arcopsis adamsi Bivalvia Arcopsis adamsi Bivalvia Crassostrea virginica Bivalvia Arcopsis pusa Gastropoda Arceoria canaliculata Gastropoda Arceoria canaliculata Gastropoda Crepidula convexa Gastropoda Crepidula convexa Gastropoda Cerithium eburneum Gastropoda Cerithium beauii Gastropoda Cerithium massartii Holotomematas Holotomemetta Iteratemma elegans Holotomemetta Iteratemma elegans Holotomemetta	ogerhead sea turtle, tortue Caouanne
Anthozoa Boloceroides mcmurrichi yes Anthozoa Diadumene leucolena yes Anthozoa Anthozoa Cardeopsis dichotoma Hydrozoa Zancleopsis dichotoma Hydrozoa Cytia hemisphaerica Hydrozoa Obelia bidentata Tentaculata Vallicula multiformis Holothuroidea Cytia hemisphaerica Holothuroidea Sclerodactyla briareus Chlothuroidea Sclerodactyla briareus Ophiuroidea Sclerodactyla briareus Amphilipholis squamata Ancopsis adamsi Ancertiella mitchelli Bivalvia Ancertiella mitchelli Bivalvia Ancopsia adamsi Crassostrea virginica Bivalvia Anomalocardia puella Bivalvia Anomalocardia puella Bivalvia Crassostrea virginica Bivalvia Anomalocardia puella Gastropoda Acteocina canaliculata Gastropoda Crepidula convexa Gastropoda Cerithium nuscarum Gastropoda Cerithium nuscarum Gastropoda Cerithium muscarum Gastropoda Cerithium mascarum Gastropoda Cyerce antaliensis Dinophyceae Amphidinium mascartii yeson Dinophyceae Amphidinium mascartii Hydrocamaratas Tatratemma elegans	
Anthozoa Diadumene leucolena Anthozoa Anthozoa Edwardsia longicornis Anthozoa Edwardsia longicornis Anthozoa Ancleopsis dichotoma Hydrozoa Zancleopsis dichotoma Hydrozoa Obelia bidentata Civia hemisphaerica Obelia bidentata Holothuroidea Obelia bidentata Tentaculata Uallicula umfirifornis Holothuroidea Inyonella gemmata Holothuroidea Sclerodactyla binareus Ophiuroidea Sclerodactyla binareus Holothuroidea Sclerodactyla binareus Ophiuroidea Grastosomula mediterranea Bivalvia Ameritella michelli Bivalvia Ameritella michelli Bivalvia Ameritella michelli Bivalvia Chione cancellata Gastropoda Acteocina canaliculata Gastropoda Acteocina canaliculata Gastropoda Acteocina canaliculata Gastropoda Cerithium beumeum Gastropoda Cerithium beumeum Gastropoda Cerithium beumeum Gastropoda Cerithium beumeum Gastropoda Cerithium muscarum Gastropoda Cerithium muscarum Gastropoda Cerithium massartii Holotomeratea Tetratemma elegans Holotomeratea Tetratemma elegans Holotomeratea	
Anthozoa Edwardsia longicornis yes Anthozoa Zanceopsis dichotoma Hydrozoa Zanceopsis dichotoma Hydrozoa Clytia hemisphaerica Hydrozoa Obelia bidentata Tentaculata Vallicula mutifiormis Holothuroidea Cletrosynapta tenuis Holothuroidea Thyonella gemmata Holothuroidea Thyonella gemmata Holothuroidea Carlosynapta tenuis Ophiuroidea Arcopsis adamsi Bivalvia Arcopsis adamsi Bivalvia Arcopsis adamsi Bivalvia Arcopsis adamsi Bivalvia Choine cancellata Bivalvia Anomalocardia puella Bivalvia Choine cancellata Gastropoda Bulla arabica Gastropoda Acteocina canaliculata Gastropoda Cerithium eburneum Gastropoda Cerithium massartii Holotomerere Tetrastemma elegans	te anemone
Anthozoa Nanozoanthus harenaceus yes Hydrozoa Zanceopsis dichotoma Hydrozoa Obelia bidentata Cancelopsis dichotoma Hydrozoa Obelia bidentata Pydrozoa Obelia bidentata Perizoa Obelia bidentata Petrosonala ultiformis Holothuroidea Leptosynapta tenuis Holothuroidea Cercodactyla brianca Captionula amediterranea Amphipholis squamata Ginathostomula mediterranea Amphipholis squamata Ameritela mitchelli Bivalvia Ameritela mitchelli Bivalvia Ameritela mitchelli Bivalvia Ameritela mitchelli Bivalvia Crassostrea virginica Bivalvia Crassostrea virginica Bivalvia Chione cancellata Gastropoda Crepidula convexa Gastropoda Crepidula convexa Gastropoda Crepidula convexa Gastropoda Cerithium muscarum Gastropoda Cerithium mascarum Mileconi Colice o Colice del Colice o Colice del Colice o Colice del Colice o Colice del Colice del Colice o Colice del Colice o Colice del Colice o Colic	
Hydrozoa Zancleopsis dichotoma Hydrozoa Clytia hemisphaerica Hydrozoa Obelia de misphaerica Hydrozoa Obelia multiformis Holothuroidea Leptosynapta tenuis Holothuroidea Thyonella germanata Holothuroidea Carendactyla biarens Bivalvia Ameritella mitchelli Bivalvia Ameritella mitchelli Bivalvia Ameritella mitchelli Bivalvia Ameritella mitchelli Bivalvia Anomalocardia puella Bivalvia Anomalocardia puella Bivalvia Chione cancellata Gastropoda Philinopsis pusa Gastropoda Acteocina canaliculata Gastropoda Cerithium elemeum Gastropoda Cerithium elemeum Gastropoda Cerithium elemeum Gastropoda Cerithium muscarum Gastropoda Cerithium muscarum Gastropoda Cerithium massartii Gastropoda Cerithium massartii Holonomertea Tetrastemma elegans Holonomertea Tetrastemma elegans Holonomertea Tetrastemma viiconi Tetrastemma viiconi Diophyceae	
Hydrozoa Clytia hemisphaerica Hydrozoa Obelia bidentata Thracculata Vallicula multiformis Holothuroidea Leptosynapta tennis Holothuroidea Leptosynapta tennis Holothuroidea Thyonella gemmata Holothuroidea Thyonella gemmata Holothuroidea Sclerodactyla briareus Ophiuroidea Amphipholis squamata Arcopsis adamsi Arcopsis adamsi Ameritella mitchelli Bivalvia Arcopsis adamsi Brachidontes exustus Bivalvia Crassostrea virginica Bivalvia Anomalocardia puella Bivalvia Anomalocardia puella Bivalvia Anomalocardia puella Bivalvia Anomalocardia puella Bivalvia Crinocardia puella Bivalvia Anomalocardia puella Bivalvia Crassostrea virginica Bivalvia Anomalocardia puella Gastropoda Acteccina canaliculata Gastropoda Acteccina canaliculata Gastropoda Acteccina canaliculata Gastropoda Acteccina canaliculata Gastropoda Cerithium eburneum Gastropoda Cerithium muscarum Gastropoda Cerithium mascarum Gastropoda Cyrice antillensis Dinophyceae Amphidinium massartii yes Holonomentea Tetrastemma elegans vieval	
Hydrozoa Obelia bidentata Tentaculata Vallicula multiformis Holothuroidea Leptosynapta tenuis Holothuroidea Thyonella genmata Holothuroidea Thyonella genamata Holothuroidea Sclerodactyla briareus Ophiuroidea Amphipholis squamata Gnathostomula mediterranea Bivalvia Arcopisia adamsi Bivalvia Arcopisia adamsi Bivalvia Aneritella mitchelli Bivalvia Anomalocardia puella Bivalvia Anomalocardia puella Bivalvia Chione cancellata Gastropoda Philinopsis pusa Gastropoda Philinopsis pusa Gastropoda Acteocina canaliculata Gastropoda Crepidula convexa Gastropoda Crepidula convexa Gastropoda Cerithium eburneum Gastropoda Cerithium burneum Gastropoda Cerithium muscarum Gastropoda Cerithium mascarum Gastropoda Cerithium mascarum Gastropoda Cyindrobulla beauii Gastropoda Cyindrobulla modulus Gastropoda Cyindrobulla modulus Gastropoda Cyindrobulla modulus Gastropoda Cyindrobulla modulus Gastropoda Holonemertea Tetrastemma elegans Holonemertea Tetrastemma elegans	
Tentaculata Vallicula multiformis Holothuroidea Leptosynapta tenuis Holothuroidea Leptosynapta tenuis Holothuroidea Thyonella gemmata Holothuroidea Amphipholis squamata Carcodactyla briarens Gnathostomula mediterranea Bivalvia Arcopsis adamsi Bivalvia Arcopsis adamsi Bivalvia Arcopsis adamsi Bivalvia Crassostrea virginica Gastropoda Bulla arabica Gastropoda Acteocina canaliculata Gastropoda Acteocina canaliculata Gastropoda Crepidula convexa Gastropoda Cerithium eburneum Gastropoda Cerithium balani Gastropoda Cerithium balani Gastropoda Cerithium mascarum Gastropoda Cerithium mascarum Gastropoda Cerithium mascarum Gastropoda Cerithium mascarum Gastropoda Crepidala beauii Gastropoda Cerithium mascarum Gastropoda Cerithium mascarum Gastropoda Cerithium eburneum	bletoothed hydroid
Holothuroidea Leptosynapta tenuis Holothuroidea Thyonella gemmata Holothuroidea Sclerodactyla briareus Holothuroidea Sclerodactyla briareus Amphipholis squamata Gnathostomula mediterranea Bivalvia Arcopsis adamsi Bivalvia Ameritella mitchelli Bivalvia Brachidontes exustus Bivalvia Anomalocardia puella Bivalvia Crassostrea virginica Bivalvia Crassostrea puella Gastropoda Chione cancellata Gastropoda Crepidula convexa Gastropoda Crepidula convexa Gastropoda Cerithium eburneum Gastropoda Cerithium eburneum Gastropoda Cerithium muscarum Gastropoda Cerithium mascarum Gastropoda Cerithium mascarum Gastropoda Cylindrobulla beauii Holonemertea Tetrastemma elegans Tetrastemma elegans	
Holothuroidea Thyonella gemmata Holothuroidea Sclerodactyla briareus Ophiuroidea Graphopolis gauamata Graphopolia mitchelli Bivalvia Arcopsis adamsi Bivalvia Ameritella mitchelli Bivalvia Anomalocardia puella Bivalvia Chione cancellata Gastropoda Philinopsis pusa Gastropoda Acteccina canaliculata Gastropoda Crepidula convexa Gastropoda Learchis poica Gastropoda Cerithium eburneum Gastropoda Cerithium eburneum Gastropoda Cerithium muscarum Gastropoda Cerithium muscarum Gastropoda Cylindrobulla beauii Gastropoda Cylindrobulla elegans Hoolonemertea Tetrastemma wilegans	slender footless sea cucumber, holothurie grle
mata Holothuroidea Sclerodactyla briareus mata Ophiuroidea Amphipholis squamata omulida Garathostomula mediterranea Garathostomula mediterranea Bivalvia Arcopsis adamsii Bivalvia Ameritella mitchelli Bivalvia Crassostrea virginica Bivalvia Crassostrea virginica Bivalvia Chione cancellata Gastropoda Philinopsis pusa Gastropoda Acteocina canaliculata Gastropoda Acteocina canaliculata Gastropoda Acteocina canaliculata Gastropoda Crepidula convexa Gastropoda Cerrithium burneum Gastropoda Cerrithium burneum Gastropoda Cerrithium muscarum Gastropoda Cerrithium muscarum Gastropoda Cerrithium massartii Gastropoda Cyindrobulla beauii Gastropoda Cyerce antillensis Dinophyceae Amphidinium massartii Holonemertea Tetrastemma elegans Tetrastemma Letrastemma ulegans	
mata Ophiuroidea Amphipholis squamata Jenathostomula mediterranea Bivalvia Arcopsis adamsi Bivalvia Ameritella mitchelli Bivalvia Brachidontes exusus Bivalvia Crassostrea viginica Bivalvia Anomalocardia puella Gastropoda Philinopsis pusa Gastropoda Butla arabica Gastropoda Crepidula convexa Gastropoda Learchis poica Gastropoda Cerithium eburneum Gastropoda Cerithium eburneum Gastropoda Cerithium muscarum Gastropoda Cerithium muscarum Gastropoda Cerithium mascarum Gastropoda Cylindrobulla beauii Gastropoda Cylindrobulla beauii Gastropoda Cylindrobulla beauii Gastropoda Cylindrobulla seauii	hard-fingered sea cucumber, holothurie de Briare
Bivalvia Arcopsis adamsi Bivalvia Arcopsis adamsi Bivalvia Ameritella mitchelli Bivalvia Crassostrea virginica Bivalvia Anomalocardia puella Bivalvia Anomalocardiata Gastropoda Philinopsis pusa Gastropoda Acteocina canaliculata Gastropoda Crepidula convexa Gastropoda Crepidula convexa Gastropoda Cerithium eburneum Gastropoda Cerithium eburneum Gastropoda Cerithium beauii Gastropoda Cerithium beauii Gastropoda Cerithium beauii Gastropoda Cerithium beauii Gastropoda Cerithium muscarum Gastropoda Cerithium beauii Gastropoda Cylindrobulla beauii	rf brittle star
Bivalvia Arcopsis adamsi Bivalvia Ameritella mitchelli Bivalvia Brachidontes exustus Bivalvia Crassostrea virginica Bivalvia Chinne cancellata Gastropoda Philinopsis pusa Gastropoda Acteocina canaliculata Gastropoda Acteocina canaliculata Gastropoda Crepidula convexa Gastropoda Learchis poica Gastropoda Cerithium eburneum Gastropoda Cerithium muscarum Gastropoda Cerithium massaruii Gastropoda Cylindrobulla beauii	
Bivalvia Ameritella mitchelli bivalvia Brachidontes exustus Bivalvia Crassostrea virginica Bivalvia Crassostrea virginica Bivalvia Anomalocardia puella Bivalvia Chione cancellata Gastropoda Philinopsis pusa Gastropoda Acteocina canaliculata Gastropoda Crepidula convexa Gastropoda Learchis poica Gastropoda Dondice occidentalis Gastropoda Bittiolum varium Gastropoda Cerithium eburneum Gastropoda Cerithium buscarum Gastropoda Cerithium muscarum Gastropoda Cerithium muscarum Gastropoda Cerithium mascarum Gastropoda Cylindrobulla beauii Gastropoda Cylindrobulla beauii Gastropoda Cyerce antillensis Dinophyceae Amphidinium massartii Holonemertea Tetrastemma elegans Modulus massartii	
Bivalvia Brachidontes exustus Bivalvia Crassostrea virginica Bivalvia Crassostrea virginica Bivalvia Anomalocardia puella Gastropoda Crepidula convexa Gastropoda Crepidula convexa Gastropoda Learchis poica Gastropoda Crepidula convexa Gastropoda Cerithium eburneum Gastropoda Cerithium eburneum Gastropoda Cerithium muscarum Gastropoda Cerithium muscarum Gastropoda Cerithium mascarum Gastropoda Cerithium mascartii	
Bivalvia Crassostrea virginica Bivalvia Anomalocardia puella Bivalvia Anomalocardia puella Bivalvia Chione cancellata Gastropoda Philinopsis pusa Gastropoda Acteocina canaliculata Gastropoda Crepidula convexa Gastropoda Learchis poica Gastropoda Cerithium eburneum Gastropoda Cerithium eburneum Gastropoda Cerithium beauii Gastropoda Cerithium muscarum Gastropoda Cerithium muscarum Gastropoda Cerithium massartii Gastropoda Cylindrobulla beauii	
Bivalvia Anomalocardia puella Bivalvia Chione cancellata Gastropoda Philinopsis pusa Gastropoda Acteocina canaliculata Gastropoda Crepidula convexa Gastropoda Learchis poica Gastropoda Learchis poica Gastropoda Cerithium eburneum Gastropoda Cerithium eburneum Gastropoda Cerithium baunia Gastropoda Cerithium muscarum Gastropoda Cerithium muscarum Gastropoda Cerithium massartii Gastropoda Cylindrobulla beauii	eastern oyster, hutre creuse amricaine
Bivalvia Chione cancellata Gastropoda Philinopsis pusa Gastropoda Bulla arabica Gastropoda Acteocina canaliculata Gastropoda Crepidula convexa Gastropoda Learchis poica Gastropoda Dondice occidentalis Gastropoda Cerithium eburneum Gastropoda Cerithium eburneum Gastropoda Cerithium baunia Gastropoda Cerithium muscarum Gastropoda Cerithium muscarum Gastropoda Cylindrobulla beauii	
Gastropoda Philinopsis pusa Gastropoda Bulla arabica Gastropoda Acteocina canaliculata Gastropoda Crepidula convexa Gastropoda Learchis poica Gastropoda Dondice occidentalis Gastropoda Cerithium eburneum Gastropoda Cerithium burneum Gastropoda Cerithium muscarum Gastropoda Cerithium muscarum Gastropoda Cerithium mascarum Gastropoda Cylindrobulla beauii	ss-barred venus
Gastropoda Bulla arabica Gastropoda Acteocina canaliculata Gastropoda Crepidula convexa Gastropoda Learchis poica Gastropoda Dondice occidentalis Gastropoda Cerithium eburneum Gastropoda Cerithium muscarum Gastropoda Cerithium muscarum Gastropoda Cerithium mascarum Gastropoda Cylindrobulla beauii	
Gastropoda Acteocina canaliculata Gastropoda Crepidula convexa Gastropoda Learchis poica Gastropoda Dondice occidentalis Gastropoda Bittiolum varium Gastropoda Cerithium eburneum Gastropoda Cerithium muscarum Gastropoda Cerithium muscarum Gastropoda Cylindrobulla beauii	
Gastropoda Crepidula convexa Gastropoda Learchis poica Gastropoda Dondice occidentalis Gastropoda Bittiolum varium Gastropoda Cerithium eburneum Gastropoda Cerithium muscarum Gastropoda Cerithium muscarum Gastropoda Cylindrobulla beauii	channeled barrel-bubble, bulle cannele
Gastropoda Learchis poica Gastropoda Dondice occidentalis Gastropoda Bittiolum varium Gastropoda Cerithium eburneum Gastropoda Cerithium muscarum Gastropoda Cerithium muscarum Gastropoda Cylindrobulla beauii Gastropoda Cylindrobulla beauii Gastropoda Cylindrobulla beauii Hoplonemertea Tetrastemma wilegaiis Hoplonemertea Tetrastemma wilegaiis	vex slippersnail
Gastropoda Dondice occidentalis yes Gastropoda Bittiolum varium Gastropoda Cerithium eburneum Gastropoda Cerithium muscarum Gastropoda Cylindrobulla beauii Gastropoda Cylindrobulla beauii Gastropoda Cyerce antillensis Dinophyceae Amphidinium massartii Hoplonemertea Tetrastemma wilegaiis	
Gastropoda Bittiolum varium Gastropoda Cerithium eburneum Gastropoda Cerithium muscarum Gastropoda Modulus modulus Gastropoda Cylindrobulla beauii Gastropoda Cyerce antillensis Dinophyceae Amphidinium massartii Hoplonemertea Tetrastemma elegans Hoplonemertea Tetrastemma elegans	
Gastropoda Cerithium eburneum Gastropoda Cerithium muscarum Gastropoda Modulus Gastropoda Cylindrobulla beauii Gastropoda Cyerce antillensis Dinophyceae Amphidinium massartii Hoplonemertea Tetrastemma elegans Hoplonemertea Tetrastemma elegans	ss cerith
Gastropoda Cerithium muscarum Gastropoda Modulus modulus Gastropoda Cylindrobulla beauii Gastropoda Cyerce antillensis Dinophyceae Amphidinium massartii Hoplonemertea Tetrastemma elegans	y cerith
Gastropoda Modulus modulus Gastropoda Cylindrobulla beauii Gastropoda Cyerce antillensis Dinophyceae Amphidinium massartii Hoplonemertea Tetrastemma elegans	oeck cerith
Gastropoda Cylindrobulla beauii Gastropoda Cyerce antillensis Dinophyceae Amphidinium massartii Hoplonemertea Tetrastemma elegans yes	intic modulus
Gastropoda Cyerce antillensis yes Dinophyceae Amphidinium massartii yes Hoplonemertea Tetrastemma elegans yes Honlonemertea Tetrastemma wilconi	
Dinophyceae Amphidinium massartii yes Hoplonemertea Tetrastemma elegans yes Honlonemertea Tetrastemma wilconi	
Hoplonemertea Tetrastemma elegans yes	
Honlonemertes Tetrastemms willsoni	-eyed nemertean
a Tubulanus riceae	

phylum	class	species	group	category n	category new vernacular
Porifera	Demospongiae	Callyspongia (Cladochalina) aculeata		Š	yes
Porifera	Demospongiae	Callyspongia (Cladochalina) diffusa		Š	χ
Porifera	Demospongiae	Cladocroce burapha		Š	yes
Porifera	Demospongiae	Haliclona (Halichoclona) vansoesti		Š	yes
Porifera	Demospongiae	Gelliodes wilsoni		Š	yes
Porifera	Demospongiae	Pachychalina tenera		Š	yes
Porifera	Demospongiae	Mycale (Carmia) fibrexilis		Š	yes yellow flabby-sponge
Porifera	Demospongiae	Tedania (Tedania) ignis			
Porifera	Demospongiae	Amorphinopsis fenestrata		Š	yes
Porifera	Demospongiae	Halichondria (Halichondria) melanadocia		Š	yes
Porifera	Demospongiae	Geodia neptuni		Š	yes
Porifera	Demospongiae	Poecillastra laminaris		Š	yes
Rhodophyta	Florideophyceae	Acanthosiphonia echinata		y	yes