Supplementary Material

Reliability of data collected by volunteers: a nine-year citizen science study in the Red Sea

Marta Meschini[1,2] †, Mariana Machado Toffolo[1] †, Chiara Marchini[1,2], Erik Caroselli[1,2], Fiorella Prada[1,2], Arianna Mancuso[1,2], Silvia Franzellitti[2,3], Laura Locci[1], Marco Davoli[1], Michele Trittoni[1], Enrico Nanetti[1], Mara Tittarelli[1], Riccardo Bentivogli[1], Simone Branchini[1], Patrizia Neri[1], Stefano Goffredo[1,2*]

[1] Marine Science Group, Department of Biological, Geological and Environmental Sciences, University of Bologna, Bologna, Italy

[2] Fano Marine Center, The Inter-Institute Center for Research on Marine Biodiversity, Resources and Biotechnologies, Fano, Italy

[3] Animal and Environmental Physiology Laboratory, Department of Biological, Geological and Environmental Sciences, University of Bologna, Ravenna, Italy

† These authors have contributed equally to this work

*** Correspondence:**
Corresponding Author
s.goffredo@unibo.it

Supplementary Figure 1. Section one of the STE project questionnaire with some suggestions for volunteers to reduce human impact on the environment and to promote a more sustainable behaviour increasing volunteer awareness.

Supplementary Figure 2. Section two of the project questionnaire with photos to be used by non-professional volunteers in taxa identification.

Please, send this questionnaire to: STE project, Marine Science Group - Department of Evolutionary and Experimental Biology, University of Bologna, Via F. Selmi 3, I-40126 Bologna Italy
www.STEproject.org

Surname	Name
Complete address	
E-mail	Dive Certification (level and training organization)
Dive site	Nearest town
Diving Center	
Dive date	Maximum depth (m)
Depth where yuo spent most of your dive (m)	Water temperature (°C)
Actual bottom time (minutes)	Dive starting time (0-24)

Environment where yuo spent most of your dive (choose one) ❒ coral reef ❒ sandy bottom ❒ other_____

Please select the organisms you have seen in the checklist below estimating the frequency of their occurrence. Your instructor can help you!

	RARE	FREQUENT	VERY FREQUENT
SPONGES			
1 - tube sponge (*Siphonochalina* sp., Demospongiae)	❒ 1-2	❒ 3-10	❒ more than 10
Other sponges	❒ 1-2	❒ 3-10	❒ more than 10
COELENTERATES, CORALS			
2 - fire coral (*Millepora* sp., Milleporina, Hydrozoa)	❒ 1-10	❒ 11-100	❒ more than 100
3 - leather coral (*Sarcophyton* sp., Alcyonacea, Anthozoa)	❒ 1-5	❒ 6-15	❒ more than 15
4 - soft tree coral (*Dendronephthya* sp., Alcyonacea, Anthozoa)	❒ 1-10	❒ 11-100	❒ more than 100
5 - sea fan (*Subergorgia hicksoni*, Gorgonacea, Anthozoa)	❒ 1-3	❒ 4-10	❒ more than 10
6 - red sea fans (Melithaeidae, Gorgonacea, Anthozoa)	❒ 1-5	❒ 6-15	❒ more than 15
7 - sea whips (Ellisellidae, Gorgonacea, Anthozoa)	❒ 1-2	❒ 3-6	❒ more than 6
8 - sea carpet host anemones (Stichodactylidae, Actiniaria, Anthozoa)	❒ 1-3	❒ 4-10	❒ more than 10
9 - plating acropora (*Acropora* sp., Scleractinia, Anthozoa)	❒ 1-2	❒ 3-6	❒ more than 6
10 - porcupine coral (*Seriatopora hystrix*, Scleractinia, Anthozoa)	❒ 1-5	❒ 6-15	❒ more than 15
11 - bubble coral (*Plerogyra* sp., Scleractinia, Anthozoa)	❒ 1-5	❒ 6-15	❒ more than 15
12 - mushroom corals (Fungiidae, Scleractinia, Anthozoa)	❒ 1-5	❒ 6-15	❒ more than 15
13 - lettuce coral (*Turbinaria* sp., Scleractinia, Anthozoa)	❒ 1-5	❒ 6-15	❒ more than 15
14 - pineapple corals (Faviidae, Scleractinia, Anthozoa)	❒ 1-2	❒ 3-6	❒ more than 6
15 - black coral (*Antipathes* sp., Antipatharia, Anthozoa)	❒ 1-2	❒ 3-6	❒ more than 6
Other corals	❒ 1-5	❒ 6-25	❒ more than 25
ANELLIDA, SEDENTARY WORMS			
16 - Christmas tree worm (*Spirobranchus* sp., Polychaeta)	❒ 1-5	❒ 6-15	❒ more than 15
Other sedentary worms	❒ 1-5	❒ 6-15	❒ more than 15
MOLLUSCS, GASTROPODS (SEA SLUGS)			
17 - cowries (Cypraeidae, Prosobranchia)	❒ 1	❒ 2-3	❒ more than 3
18 - spanish dancer (*Hexabranchus sanguineus*, Opisthobranchia)	❒ 1	❒ 2-3	❒ more than 3
19 - coriacea (*Chromodoris quadricolor*, Opisthobranchia)	❒ 1-2	❒ 3-4	❒ more than 4
Other sea slugs	❒ 1	❒ 2-3	❒ more than 3
MOLLUSCS, BIVALVES			
20 - tridacnae (*Tridacna* sp.)	❒ 1-2	❒ 3-6	❒ more than 6
21 - wing oyster (*Pteria* sp.)	❒ 1-5	❒ 6-15	❒ more than 15
Other bivalves	❒ 1-4	❒ 5-10	❒ more than 10
MOLLUSCS, CEPHALOPODS			
22 - squids (Sepiidae)	❒ 1-2	❒ 3-4	❒ more than 4
23 - bigfin reef squid (*Sepioteuthis* sp.)	❒ 1	❒ 2-3	❒ more than 3
Other cephalopods	❒ 1-2	❒ 3-4	❒ more than 4
ARTHROPODS, CRUSTACEANS, DECAPODS			
24 - banded boxer shrimp (*Stenopus hispidus*)	❒ 1	❒ 2-3	❒ more than 3
25 - hermit crabs (Diogenidae)	❒ 1	❒ 2-3	❒ more than 3
Other decapods	❒ 1	❒ 2-3	❒ more than 3

	RARE	FREQUENT	VERY FREQUENT
ECHINODERMS, CRINOIDS (SEA LILIES)			
26 - sea lilies (Crinoidea)	❒ 1-5	❒ 6-15	❒ more than 15
ECHINODERMS, HOLOTHURIANS (SEA CUCUMBERS)			
27 - sea cucumbers (Holothuroidea)	❒ 1-2	❒ 3-10	❒ more than 10
ECHINODERMS, ASTEROIDS (STARFISHES)			
28 - pearl red star (*Fromia* sp.)	❒ 1	❒ 2-3	❒ more than 3
29 - spiny starfish (*Acanthaster planci*)	❒ 1-2	❒ 3-6	❒ more than 6
Other starfishes	❒ 1-2	❒ 3-5	❒ more than 5
ECHINODERMS, ECHINOIDS (SEA URCHINS)			
30 - fire urchin (*Asthenosoma* sp.)	❒ 1-2	❒ 3-4	❒ more than 4
31 - pencil urchin (*Phyllacanthus* sp.)	❒ 1-3	❒ 4-10	❒ more than 10
Other sea urchins	❒ 1-3	❒ 4-7	❒ more than 7
VERTEBRATES, BONY FISHES			
32 - giant moray (*Gymnothorax javanicus*, Anguilliformes)	❒ 1	❒ 2-3	❒ more than 3
33 - needlefishes (Syngnathidae, Syngnathiformes)	❒ 1-2	❒ 3-4	❒ more than 4
34 - squirrelfish (*Sargocentron* sp., Beryciformes)	❒ 1-5	❒ 6-15	❒ more than 15
35 - groupers (Epinephelinae, Perciformes)	❒ 1-5	❒ 6-15	❒ more than 15
36 - blackspotted rubberlip (*Plectorhinchus gaterinus*, Perciformes)	❒ 1-3	❒ 4-10	❒ more than 10
37 - humpback batfish (*Platax* sp., Perciformes)	❒ 1-10	❒ 11-100	❒ more than 100
38 - red bass (*Lutjanus bohar*, Perciformes)	❒ 1-10	❒ 11-100	❒ more than 100
39 - glassfishes (Pempheridae, Perciformes)	❒ 1-100	❒ 101-1000	❒ more than 1000
40 - goatfishes (Mullidae, Perciformes)	❒ 1-10	❒ 11-100	❒ more than 100
41 - map angel (*Pomacanthus maculosus*, Perciformes)	❒ 1	❒ 2-3	❒ more than 3
42 - butterflyfishes (Chaetodontidae, Perciformes)	❒ 1-5	❒ 6-15	❒ more than 15
43 - longnose hawkfish (*Oxycirrhites typus*, Perciformes)	❒ 1	❒ 2-3	❒ more than 3
44 - Red Sea clownfish (*Amphiprion bicinctus*, Perciformes)	❒ 1-3	❒ 4-15	❒ more than 15
45 - humphead wrasse - Napoleon fish (*Cheilinus undulatus*, Perciformes)	❒ 1	❒ 2-3	❒ more than 3
46 - parrotfishes (Scaridae, Perciformes)	❒ 1-5	❒ 6-25	❒ more than 25
47 - barracuda (*Sphyraena* sp., Perciformes)	❒ 1-5	❒ 6-25	❒ more than 25
48 - Sohal surgeonfish (*Acanthurus sohal*, Perciformes)	❒ 1-5	❒ 6-15	❒ more than 15
49 - caranxes (Carangidae, Perciformes)	❒ 1-5	❒ 6-15	❒ more than 15
50 - lionfish (*Pterois* sp., Scorpaeniformes)	❒ 1-5	❒ 6-15	❒ more than 15
51 - spotted flatheads (Platycephalidae, Scorpaeniformes)	❒ 1-2	❒ 3-4	❒ more than 4
52 - titan triggerfish (*Balistoides viridescens*, Tetraodontiformes)	❒ 1-2	❒ 3-4	❒ more than 4
53 - boxfishes (Ostraciidae, Tetraodontiformes)	❒ 1-2	❒ 3-4	❒ more than 4
54 - blowfishes (Tetraodontidae, Tetraodontiformes)	❒ 1-3	❒ 4-10	❒ more than 10
55 - porcupinefishes (Diodontidae, Tetraodontiformes)	❒ 1	❒ 2-3	❒ more than 3
Other bony fishes	❒ 1-10	❒ 11-65	❒ more than 65
VERTEBRATES, CARTILAGE FISHES, SHARKS			
56 - sharks (Squaliformes)	❒ 1	❒ 2-3	❒ more than 3
VERTEBRATES, CARTILAGE FISHES, RAYS AND TORPEDOS			
57 - blue-spotted stingray (*Taeniura lymma*)	❒ 1-2	❒ 3-6	❒ more than 6
58 - manta (*Manta* sp.)	❒ 1	❒ 2-3	❒ more than 3
59 - torpedo (*Torpedo* sp.)	❒ 1	❒ 2	❒ more than 2
Other rays and torpedos	❒ 1	❒ 2-4	❒ more than 4
VERTEBRATES, REPTILES, TURTLES			
60 - turtles (Cheloniidae)	❒ 1	❒ 2-3	❒ more than 3
VERTEBRATES, MAMMALS, CETACEANS			
61 - dolphins (Delphinidae)	❒ 1-2	❒ 3-6	❒ more than 6

Attention: please indicate the possible presence of the following negative conditions

62 - PARTIALLY OR TOTALLY DEAD CORALS	❒ 1-10	❒ 11-100	❒ more than 100
63 - BLEACHED CORALS	❒ 1-10	❒ 11-100	❒ more than 100
• - BROKEN CORALS	❒ 1-10	❒ 11-100	❒ more than 100
• - SEDIMENT COVERED CORALS	❒ 1-10	❒ 11-100	❒ more than 100
• - LITTER	❒ 1	❒ 2-10	❒ more than 10

Attention: please give information about snorkelers and scuba divers behaviour

How many snorkelers and scuba divers were present on the dive site?	❒ 1-25	❒ 26-50	❒ more than 50
How many snorkelers and scuba divers contacts with the reef did you see during your dive? (both voluntary or involuntary contacts)	❒ 1-5	❒ 6-10	❒ more than 10

Supplementary Figure 3. Section three of the project questionnaire with the form for data collection.