

## Reserves as tools for alleviating impacts of marine disease

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**Table s1.** Permitted and restricted activities in two management zones surveyed in this study. Additional information available from [www.gbrmpa.gov.au](http://www.gbrmpa.gov.au)

Activity	Marine National Park (Reserves)	Habitat Protection (Non-reserves)
Line fishing	No	Yes
Boating, diving, photography	Yes	Yes
Crabbing (trapping)	No	Yes
Harvest fishing for aquarium fish, coral and beachworm	No	Permit
Harvest fishing for sea cucumber, trochus, rock lobster	No	Permit
Limited collecting	No	Yes
Limited impact research (non-extractive)	Yes	Yes
Limited spearfishing (snorkel only)	No	Yes
Bait netting	No	Yes
Netting (other than bait netting)	No	Yes
Research (other than non-extractive)	Permit	Permit
Shipping (other than a designated shipping area)	Permit	Permit
Tourism program	Permit	Permit
Traditional use of marine resources	Permit	Permit
Trawling	No	No
Trolling	No	Yes <sup>a</sup>

<sup>a</sup> No more than three lines per person and up to six hooks combined total per person

**Table S2.** Predictor variables, codes and units included in the linear distance-based multiple regression model.

Variable	Description and units	Palms		Keppels	
		Min	Max	Min	Max
<b>Environmental predictors</b>					
Temperature	°C	28	31	20	22
Depth	m	6	9	3	10
Distance from river mouth	km	19.3	33.8	27.3	40.4
Primary water exposure <sup>K</sup>	Exposure to primary water	0	0	2	4
Secondary water exposure <sup>K</sup>	Exposure to secondary water	0	0	14	18
Primary water exposure z-score	Difference in primary water exposure from long-term average (2006-2013)	0	0	0.02	1.1
Secondary water exposure z-score	Difference in secondary water exposure from long-term average (2006-2013)	0	0	-1.3	1.2
<b>Biological predictors</b>					
Fish abundance <sup>K,P</sup>	number per 200 m <sup>2</sup>	125	377	30.8	453.4
Fish species diversity	Shannon-Weiner diversity (H')	2.3	3.1	0.7	2.5
Fish functional groups	Number of functional groups represented	9	12	7	11
Detritivores <sup>*</sup>	Number per 200 m <sup>2</sup>	0	9	0	8.7
Algal croppers <sup>*</sup>	Number per 200 m <sup>2</sup>	0	47	0	6.7
Corallivores <sup>*</sup>	Number per 200 m <sup>2</sup>	0	25	0	32.7
Benthic carnivores <sup>*P</sup>	Number per 200 m <sup>2</sup>	3.7	32.7	58.7	219.3
Intermediate predators <sup>*</sup>	Number per 200 m <sup>2</sup>	12.3	125.7	0.7	170.6
Large predators <sup>*</sup>	Number per 200 m <sup>2</sup>	1.3	9.7	0.7	15.3
Omnivorous pomacentrids <sup>*P</sup>	Number per 200 m <sup>2</sup>	8.3	222	4.4	29.6
Planktivorous pomacentrids <sup>*</sup>	Number per 200 m <sup>2</sup>	0	33.7	0	394
Territorial pomacentrids <sup>*</sup>	Number per 200 m <sup>2</sup>	6	90.7	6.2	421.4
Excavating scarids <sup>*</sup>	Number per 200 m <sup>2</sup>	0	6.5	0	5.9
Scraping scarids <sup>*</sup>	Number per 200 m <sup>2</sup>	2	108.7	1.3	31.3
<b>Benthic predictors</b>					
Coral genera diversity <sup>K</sup>	Shannon-Weiner diversity (H')	0	2.1	0.01	1.6
Coral genera richness	Margalef richness index (d)	0	2.2	0.05	1.1
Coral cover	%	3.5	37.4	6.4	82.9
Coral density <sup>K,P</sup>	Number per 30m <sup>2</sup>	18.3	1259.3	42	688
<i>Acropora</i> cover <sup>K</sup>	%	0	5.2	0	82.8
Coral bleaching	% colonies affected	0	9.6	0	6.2
Coral physical injury	% colonies affected	0	8.9	0	9.6
Coral sediment necrosis	% colonies affected	0	5.8	0	6.2
Coral predation scars	% colonies affected	0	1.5	0	18.2
Site complexity index	Index combining slope and rugosity	3.8	10.8	2.9	7.9
Fishing line	Number per 30 m <sup>2</sup>	0	8	0	4
Macroalgae cover	%	0	12.4	0	38.6

\* See Table s3 for reef fish species placed in each functional group.

<sup>K</sup> Variable excluded from final model due to collinearity set at  $|r| > 0.8$  for the Keppel Island region.

<sup>P</sup> Variable excluded from final model due to collinearity set at  $|r| > 0.8$  for the Palm Island region.

**Table s3.** Fish species categorised into functional and taxonomic groups according to targeted fishery status in the Great Barrier Reef Marine Park.

Family	Species	Functional Group	Fishery status
<b>Acanthuridae</b>	<i>Acanthurus blochii</i>	Detritivore	Non-target
	<i>Acanthurus dussumieri</i>	Detritivore	Non-target
	<i>Acanthurus grammoptilus</i>	Detritivore	Non-target
	<i>Acanthurus lineatus</i>	Algal cropper	Non-target
	<i>Acanthurus nigricauda</i>	Detritivore	Non-target
	<i>Acanthurus nigrofuscus</i>	Algal cropper	Non-target
	<i>Acanthurus xanthopterus</i>	Detritivore	Non-target
	<i>Ctenochaetus binotatus</i>	Detritivore	Non-target
	<i>Ctenochaetus striatus</i>	Detritivore	Non-target
	<i>Naso annulatus</i>	Algal cropper	Non-target
	<i>Naso brevirostris</i>	Algal cropper	Non-target
	<i>Naso lituratus</i>	Algal cropper	Non-target
	<i>Naso tuberosus</i>	Algal cropper	Non-target
	<i>Naso unicornis</i>	Algal cropper	Non-target
	<i>Prionurus microlepidotus</i>	Algal cropper	Non-target
	<i>Zebrasoma scopas</i>	Algal cropper	Non-target
<i>Zebrasoma veliferum</i>	Algal cropper	Non-target	
<b>Chaetodontidae</b>	<i>Chaetodon aureofasciatus</i>	Corallivore	Non-target
	<i>Chaetodon auriga</i>	Corallivore	Non-target
	<i>Chaetodon baronessa</i>	Corallivore	Non-target
	<i>Chaetodon citrinellus</i>	Corallivore	Non-target
	<i>Chaetodon flavirostris</i>	Corallivore	Non-target
	<i>Chaetodon lineolatus</i>	Corallivore	Non-target
	<i>Chaetodon lunula</i>	Corallivore	Non-target
	<i>Chaetodon lunulatus</i>	Benthic carnivore	Non-target
	<i>Chaetodon melannotus</i>	Benthic carnivore	Non-target
	<i>Chaetodon ornatissimus</i>	Corallivore	Non-target
	<i>Chaetodon plebeius</i>	Corallivore	Non-target
	<i>Chaetodon rafflesi</i>	Corallivore	Non-target
	<i>Chaetodon rainfordi</i>	Corallivore	Non-target
	<i>Chaetodon speculum</i>	Corallivore	Non-target
	<i>Chaetodon trifascialis</i>	Corallivore	Non-target
	<i>Chaetodon ulietensis</i>	Benthic carnivore	Non-target
	<i>Chaetodon vagabundus</i>	Corallivore	Non-target
	<i>Chelmon rostratus</i>	Benthic carnivore	Non-target
	<i>Coradion altivelis</i>	Benthic carnivore	Non-target
	<i>Coradion chrysostomus</i>	Benthic carnivore	Non-target
<i>Heniochus acuminatus</i>	Benthic carnivore	Non-target	

	<i>Heniochus monoceros</i>	Benthic carnivore	Non-target
	<i>Heniochus varius</i>	Benthic carnivore	Non-target
	<i>Parachaetodon ocellatus</i>	Benthic carnivore	Non-target
<b>Ephippidae</b>	<i>Platax orbicularis</i>	Benthic carnivore	Non-target
	<i>Platax teira</i>	Benthic carnivore	Non-target
	<i>Platax pinnatus</i>	Benthic carnivore	Non-target
	<i>Platax teira</i>	Benthic carnivore	Non-target
<b>Haemulidae</b>	<i>Diagramma pictum</i>	Large predator	Secondary Target
	<i>Plectorhinchus</i>	Large predator	Secondary Target
	<i>Plectorhinchus flavomaculatus</i>	Large predator	Secondary Target
	<i>Plectorhinchus gibbosus</i>	Large predator	Secondary Target
	<i>Plectorhinchus lessonii</i>	Large predator	Secondary Target
	<i>Plectorhinchus unicolor</i>	Large predator	Secondary Target
<b>Kyphosidae</b>	<i>Kyphosus spp.</i>	Algal cropper	Non-target
	<i>Microcanthus strigatus</i>	Benthic carnivore	Non-target
<b>Labridae</b>	<i>Anampses geographicus</i>	Benthic carnivore	Non-target
	<i>Anampses neoguinaicus</i>	Benthic carnivore	Non-target
	<i>Bodianus axillaris</i>	Benthic carnivore	Non-target
	<i>Bodianus loxozonus</i>	Benthic carnivore	Non-target
	<i>Bodianus mesothorax</i>	Benthic carnivore	Non-target
	<i>Cheilinus chlorurus</i>	Benthic carnivore	Non-target
	<i>Cheilinus fasciatus</i>	Benthic carnivore	Non-target
	<i>Cheilinus trilobatus</i>	Benthic carnivore	Non-target
	<i>Cheilinus undulatus</i>	Benthic carnivore	Non-target
	<i>Choerodon anchorago</i>	Benthic carnivore	Secondary target
	<i>Choerodon cyanodus</i>	Benthic carnivore	Secondary target
	<i>Choerodon fasciatus</i>	Benthic carnivore	Non-target
	<i>Choerodon graphicus</i>	Benthic carnivore	Secondary target
	<i>Choerodon monostigma</i>	Benthic carnivore	Secondary target
	<i>Choerodon schoenleinii</i>	Benthic carnivore	Secondary target
	<i>Choerodon vitta</i>	Benthic carnivore	Non-target
	<i>Epibulus insidiator</i>	Benthic carnivore	Non-target
	<i>Gomphosus varius</i>	Benthic carnivore	Non-target
	<i>Halichoeres melanurus</i>	Benthic carnivore	Non-target
	<i>Hemigymnus fasciatus</i>	Benthic carnivore	Non-target
	<i>Hemigymnus melapterus</i>	Benthic carnivore	Non-target
	<i>Labrichthys unilineatus</i>	Benthic carnivore	Non-target
	<i>Labroides bicolor</i>	Benthic carnivore	Non-target
	<i>Labroides dimidiatus</i>	Benthic carnivore	Non-target
	<i>Labropsis australis</i>	Benthic carnivore	Non-target

	<i>Oxycheilinus diagramma</i>	Benthic carnivore	Non-target
	<i>Psuedolabrus guentheri</i>	Benthic carnivore	Non-target
	<i>Stethojulis bandanensis</i>	Benthic carnivore	Non-target
	<i>Stethojulis strigiventer</i>	Benthic carnivore	Non-target
	<i>Thalassoma hardwicke</i>	Benthic carnivore	Non-target
	<i>Thalassoma janseni</i>	Benthic carnivore	Non-target
	<i>Thalassoma lunare</i>	Benthic carnivore	Non-target
	<i>Thalassoma lutescens</i>	Benthic carnivore	Non-target
<b>Lethrinidae</b>	<i>Gymnocranius spp.</i>	Intermediate predator	Secondary target
	<i>Lethrinus atkinsoni</i>	Intermediate predator	Secondary target
	<i>Lethrinus laticaudis</i>	Intermediate predator	Secondary target
	<i>Lethrinus lentjan</i>	Intermediate predator	Secondary target
	<i>Lethrinus miniatus</i>	Intermediate predator	Primary target
	<i>Lethrinus nebulosus</i>	Intermediate predator	Secondary target
	<i>Lethrinus obsoletus</i>	Intermediate predator	Secondary target
	<i>Lethrinus ornatus</i>	Intermediate predator	Secondary target
	<i>Monotaxis grandoculis.</i>	Intermediate predator	Secondary target
<b>Lutjanidae</b>	<i>Lutjanus argentimaculatus</i>	Large predator	Secondary target
	<i>Lutjanus carponotatus</i>	Intermediate predator	Secondary target
	<i>Lutjanus fulviflamma</i>	Intermediate predator	Secondary target
	<i>Lutjanus fulvus</i>	Intermediate predator	Secondary target
	<i>Lutjanus lemniscatus</i>	Intermediate predator	Secondary target
	<i>Lutjanus lutjanus</i>	Intermediate predator	Secondary target
	<i>Lutjanus monostigma</i>	Intermediate predator	Secondary target
	<i>Lutjanus quinquelineatus</i>	Intermediate predator	Secondary target
	<i>Lutjanus russelli</i>	Intermediate predator	Secondary target
	<i>Lutjanus sebae</i>	Intermediate predator	Primary target
	<i>Lutjanus vitta</i>	Intermediate predator	Secondary target
	<i>Symphorus nematophorus</i>	Large predator	Non-target
<b>Mullidae</b>	<i>Parupeneus barberinus</i>	Benthic carnivore	Non-target
	<i>Parupeneus bifasciatus</i>	Benthic carnivore	Non-target
	<i>Parupeneus ciliatus</i>	Benthic carnivore	Non-target
	<i>Parupeneus indicus</i>	Benthic carnivore	Non-target
<b>Muraenidae</b>	<i>Echidna nebulosa</i>	Intermediate predator	Non-target
	<i>Gymnothorax favagineus</i>	Intermediate predator	Non-target
	<i>Gymnothorax javanicus</i>	Intermediate predator	Non-target
	<i>Gymnothorax meleagris</i>	Intermediate predator	Non-target
	<i>Gymnothorax undulatus</i>	Intermediate predator	Non-target
	<i>Gymnothorax javanicus</i>	Intermediate predator	Non-target
	<i>Gymnothorax meleagris</i>	Intermediate predator	Non-target

<b>Nemipteridae</b>	<i>Scolopsis bilineatus</i>	Intermediate predator	Non-target
	<i>Scolopsis margaritifer</i>	Intermediate predator	Non-target
	<i>Scolopsis monogramma</i>	Intermediate predator	Non-target
<b>Pomacanthidae</b>	<i>Centropyge bicolor</i>	Benthic carnivore	Non-target
	<i>Centropyge bispinosus</i>	Benthic carnivore	Non-target
	<i>Centropyge nox</i>	Benthic carnivore	Non-target
	<i>Centropyge tibicen</i>	Benthic carnivore	Non-target
	<i>Centropyge vrolikii</i>	Benthic carnivore	Non-target
	<i>Chaetodontoplus douboulayi</i>	Benthic carnivore	Non-target
	<i>Chaetodontoplus meredithi</i>	Benthic carnivore	Non-target
	<i>Pomacanthus imperator</i>	Benthic carnivore	Non-target
	<i>Pomacanthus semicirculatus</i>	Benthic carnivore	Non-target
	<i>Pomacanthus sexstriatus</i>	Benthic carnivore	Non-target
	<i>Pomacanthus xanthometapon</i>	Benthic carnivore	Non-target
<i>Pygoplites diacanthus</i>	Benthic carnivore	Non-target	
<b>Pomacentridae</b>	<i>Abudefduf bengalensis</i>	Omnivorous pomacentrid	Non-target
	<i>Abudefduf sexfasciatus</i>	Omnivorous pomacentrid	Non-target
	<i>Abudefduf vaigiensis</i>	Omnivorous pomacentrid	Non-target
	<i>Abudefduf whiteyi</i>	Omnivorous pomacentrid	Non-target
	<i>Abudefduf sexfasciatus</i>	Omnivorous pomacentrid	Non-target
	<i>Abudefduf vaigiensis</i>	Omnivorous pomacentrid	Non-target
	<i>Abudefduf whiteyi</i>	Omnivorous pomacentrid	Non-target
	<i>Acanthochromis polyacanthus</i>	Omnivorous pomacentrid	Non-target
	<i>Amblyglyphidodon aureus</i>	Omnivorous pomacentrid	Non-target
	<i>Amblyglyphidodon curacao</i>	Omnivorous pomacentrid	Non-target
	<i>Amblyglyphidodon</i>	Omnivorous pomacentrid	Non-target
	<i>Amphiprion akindynos</i>	Omnivorous pomacentrid	Non-target
	<i>Amphiprion chrysopterus</i>	Omnivorous pomacentrid	Non-target
	<i>Amphiprion clarkia</i>	Omnivorous pomacentrid	Non-target
	<i>Amphiprion melanopus</i>	Omnivorous pomacentrid	Non-target
	<i>Amphiprion perideraion</i>	Omnivorous pomacentrid	Non-target
	<i>Chromis amboinensis</i>	Planktivorous pomacentrid	Non-target
	<i>Chromis atripectoralis</i>	Planktivorous pomacentrid	Non-target
	<i>Chromis atripes</i>	Planktivorous pomacentrid	Non-target
	<i>Chromis nitida</i>	Planktivorous pomacentrid	Non-target
	<i>Chromis retrofasciatus</i>	Planktivorous pomacentrid	Non-target
	<i>Chromis ternatensis</i>	Planktivorous pomacentrid	Non-target
	<i>Chromis weberi</i>	Planktivorous pomacentrid	Non-target
	<i>Chrysiptera rex</i>	Omnivorous pomacentrid	Non-target
	<i>Chrysiptera rollandi</i>	Omnivorous pomacentrid	Non-target
	<i>Chrysiptera talboti</i>	Omnivorous pomacentrid	Non-target



	<i>Dascyllus aruanus</i>	Omnivorous pomacentrid	Non-target
	<i>Dascyllus melanurus</i>	Omnivorous pomacentrid	Non-target
	<i>Dascyllus trimaculatus</i>	Omnivorous pomacentrid	Non-target
	<i>Dascyllus reticulatus</i>	Omnivorous pomacentrid	Non-target
	<i>Dischistodus melanotus</i>	Territorial pomacentrid	Non-target
	<i>Dischistodus perspicillatus</i>	Territorial pomacentrid	Non-target
	<i>Dischistodus prosopotaenia</i>	Territorial pomacentrid	Non-target
	<i>Dischistodus</i>	Territorial pomacentrid	Non-target
	<i>Hemiglyphidodon</i>	Territorial pomacentrid	Non-target
	<i>Neoglyphidodon melas</i>	Territorial pomacentrid	Non-target
	<i>Neoglyphidodon nigroris</i>	Territorial pomacentrid	Non-target
	<i>Plectroglyphidodon dickii</i>	Territorial pomacentrid	Non-target
	<i>Plectroglyphidodon</i>	Territorial pomacentrid	Non-target
	<i>Pomacentrus adelus</i>	Territorial pomacentrid	Non-target
	<i>Pomacentrus amboinensis</i>	Omnivorous pomacentrid	Non-target
	<i>Pomacentrus australis</i>	Omnivorous pomacentrid	Non-target
	<i>Pomacentrus bankanensis</i>	Territorial pomacentrid	Non-target
	<i>Pomacentrus brachialis</i>	Omnivorous pomacentrid	Non-target
	<i>Pomacentrus chrysurus</i>	Territorial pomacentrid	Non-target
	<i>Pomacentrus coelestis</i>	Omnivorous pomacentrid	Non-target
	<i>Pomacentrus lepidogenis</i>	Planktivorous pomacentrid	Non-target
	<i>Pomacentrus moluccensis</i>	Omnivorous pomacentrid	Non-target
	<i>Pomacentrus nagasakiensis</i>	Omnivorous pomacentrid	Non-target
	<i>Pomacentrus vaiuli</i>	Territorial pomacentrid	Non-target
	<i>Pomacentrus wardi</i>	Territorial pomacentrid	Non-target
	<i>Stegastes apicalis</i>	Territorial pomacentrid	Non-target
	<i>Stegastes fasciolatus</i>	Territorial pomacentrid	Non-target
<b>Scaridae</b>	<i>Bolbometapon muricatum</i>	Excavating grazer	Non-target
	<i>Cetoscarus bicolor</i>	Excavating grazer	Non-target
	<i>Chlorurus bleekeri</i>	Excavating grazer	Non-target
	<i>Chlorurus microrhinus</i>	Excavating grazer	Non-target
	<i>Chlorurus sordidus</i>	Excavating grazer	Non-target
	<i>Hipposcarus longiceps</i>	Excavating grazer	Non-target
	<i>Scarus altipinnis</i>	Scraping grazer	Non-target
	<i>Scarus chamaeleon</i>	Scraping grazer	Non-target
	<i>Scarus dimidiatus</i>	Scraping grazer	Non-target
	<i>Scarus flavipectoralis</i>	Scraping grazer	Non-target
	<i>Scarus frenatus</i>	Scraping grazer	Non-target
	<i>Scarus ghobban</i>	Scraping grazer	Non-target
	<i>Scarus globiceps</i>	Scraping grazer	Non-target
	<i>Scarus niger</i>	Scraping grazer	Non-target
	<i>Scarus psittacus</i>	Scraping grazer	Non-target
	<i>Scarus rivulatus</i>	Scraping grazer	Non-target

	<i>Scarus rubroviolaceus</i>	Scraping grazer	Non-target
	<i>Scarus schlegeli</i>	Scraping scarid	Non-target
	<i>Scarus spinus</i>	Scraping grazer	Non-target
	<i>Scarus tricolor</i>	Scraping grazer	Non-target
<b>Serranidae</b>	<i>Aethaloperca rogga</i>	Intermediate predator	Secondary target
	<i>Anyperodon leucogrammicus</i>	Large predator	Secondary target
	<i>Cephalopholis boenak</i>	Intermediate predator	Non-target
	<i>Cephalopholis cyanostigma</i>	Intermediate predator	Secondary target
	<i>Cephalopholis microprion</i>	Intermediate predator	Non-target
	<i>Cromileptes altivelis</i>	Large predator	Primary target
	<i>Diploprion bifasciatus</i>	Intermediate predator	Non-target
	<i>Epinephelus caerulopunctatus</i>	Large predator	Secondary target
	<i>Epinephelus fasciatus</i>	Intermediate predator	Secondary target
	<i>Epinephelus fuscoguttatus</i>	Large predator	Secondary target
	<i>Epinephelus lanceolatus</i>	Large predator	Non-target
	<i>Epinephelus merra</i>	Intermediate predator	Secondary target
	<i>Epinephelus ongus</i>	Intermediate predator	Secondary target
	<i>Epinephelus quoyanus</i>	Intermediate predator	Secondary target
	<i>Plectropomus laevis</i>	Large predator	Primary target
	<i>Plectropomus leopardus</i>	Large predator	Primary target
	<i>Plectropomus maculatus</i>	Large predator	Primary target
<b>Siganidae</b>	<i>Siganus argenteus</i>	Algal cropper	Non-target
	<i>Siganus corallinus</i>	Algal cropper	Non-target
	<i>Siganus doliatus</i>	Algal cropper	Non-target
	<i>Siganus fuscescens</i>	Algal cropper	Non-target
	<i>Siganus javus</i>	Algal cropper	Non-target
	<i>Siganus lineatus</i>	Algal cropper	Non-target
	<i>Siganus puellus</i>	Algal cropper	Non-target
	<i>Siganus punctatus</i>	Algal cropper	Non-target
	<i>Siganus spinus</i>	Algal cropper	Non-target
	<i>Siganus vulpinus</i>	Algal cropper	Non-target
<b>Zanclidae</b>	<i>Zanclus cornutus</i>	Benthic carnivore	Non-target



**Table s4.** Mean prevalence<sup>a</sup> of coral disease and results (z-values) of generalized linear mixed-effects models (GLMM) comparing disease prevalence between reserves and non-reserves.

Region	Variable	Reserve	Non-Reserve	GLMM
		Mean ± SE prevalence	Mean ± SE prevalence	Reserve status
Palms	<b>Total disease</b>	0.98 ± 0.29	7.35 ± 0.94	-878.5(***)
	Skeletal eroding band	0.59 ± 0.26	3.47 ± 0.79	-8.3(***)
	Brown band	0.07 ± 0.04	0.52 ± 0.17	-4.2(***)
	Black band	0.36 ± 0.15	1.61 ± 0.27	-4.5(***)
	White syndrome	0.13 ± 0.05	1.40 ± 0.47	-4.2(***)
	Growth anomalies	0.06 ± 0.06	0.10 ± 0.05	-1.3(ns)
	Atramentous necrosis	0	0	-
Keppels	<b>Total disease</b>	1.41 ± 0.43	3.37 ± 0.86	-2.3(*)
	Skeletal eroding band	0.35 ± 0.18	0.83 ± 0.10	-1.4(ns)
	Brown band	0.55 ± 0.06	0.92 ± 0.17	-0.4(ns)
	Black band	0	0	-
	White syndrome	0.51 ± 0.18	1.58 ± 0.27	0.4(**)
	Growth anomalies <sup>b</sup>	0	0.04 ± 0.03	
	Atramentous necrosis	0	0	-

<sup>a</sup> Mean prevalence calculated as the percentage of colonies with disease for each disease type or as a percentage of the total number of diseased corals per transect. Analyses performed on binomial data. \*\*\*:  $P < 0.001$ ; \*\*:  $P < 0.01$ ; \*:  $P < 0.05$ ; ns: not significant

<sup>b</sup> Only two cases of disease recorded, model could not be performed.

**Table s5.** Results of stepwise parameter selection using Bayesian Information Criteria (BIC).

Region	Variable	BIC	Pseudo-F	P	Cumulative R <sup>2</sup>	Residual df
Palms	Coral physical damage	10.873	9.8575	0.0004	0.29115	24
	Fishing line	10.571	3.3745	0.0183	0.38184	23
	Macroalgae	10.361	3.1392	0.0255	0.45903	22
Keppels	Fishing line	-5.6626	10.040	0.0006	0.34573	19
	Fish Functional Groups	-7.0655	4.2458	0.0102	0.47060	18
	Secondary water exposure	-7.7571	3.3102	0.0272	0.55689	17

**Table s6.** Results of distance-based multivariate linear model for coral disease prevalence showing the proportion of variation explained by environmental and biological variables.

Region	Axis	Percentage variation explained by individual axes			
		% explained variation out of fitted model		% explained variation out of total variation	
		Individual	Cumulative	Individual	Cumulative
Palms	Coral physical damage	86.68	86.68	39.79	39.79
	Fishing line	11.73	98.41	5.39	45.18
	Macroalgae	1.59	100	0.73	45.9
Keppels	Fishing line	86.24	86.24	48.03	48.03
	Fish Functional Groups	13.22	99.46	7.36	55.39
	Secondary water exposure	0.54	100	0.3	55.69

**Table s7.** Relationships between dbRDA coordinate axes and orthonormal predictor variables (multiple partial correlations). Results of Welch's two-sample t-tests (t-statistic) and exact Poisson tests (rate ratio) comparing reserve and non-reserve predictor variables.

Region	Predictor variable	RDA1	RDA2	Mean ± SE		t-statistic	rate ratio
				Reserve	Non-reserve		
Palms	Coral damage	-0.902	0.395	1.1 ± 0.4	3.8 ± 0.7	3.6 (**)	-
	Fishing line <sup>a</sup>	-0.396	-0.602	0.6 ± 0.2	1.7 ± 0.7	-	1.5 (*)
	Macroalgae	0.17	0.694	1.1 ± 0.5	1.9 ± 1.0	0.6 (ns)	-
Keppels	Fishing line <sup>a</sup>	-0.756	-0.149	0	1.5 ± 0.4	-	3.7 (**)
	Fish Functional Groups	-0.563	-0.35	9.0 ± 0.4	8.9 ± 0.3	0.2 (ns)	-
	Secondary water	-0.335	0.925	0.7 ± 0.2	0.8 ± 0.2	0.6 (ns)	-

\*\*\*:  $P < 0.001$ ; \*\*:  $P < 0.01$ ; \*:  $P < 0.05$ ; ns: not significant

**Table s8.** Results of multiple pairwise comparisons of mean white syndrome prevalence using general linear hypothesis tests for sites grouped by protection status (reserve and non-reserve) and exposure to secondary water quality (z-scores) either above or below the long-term average (2006-2013) in the Keppel Island region.

Pairwise Comparisons					z-value
Non-Reserve	Below average exposure	-	Non-Reserve	Above average exposure	-1.170 (ns)
Reserve	Below average exposure	-	Non-Reserve	Above average exposure	-1.461 (***)
Reserve	Above average exposure	-	Non-Reserve	Above average exposure	-4.723 (ns)
Reserve	Above average exposure	-	Non-Reserve	Below average exposure	-0.324 (ns)
Reserve	Below average exposure	-	Non-Reserve	Below average exposure	-3.829 (***)
Reserve	Below average exposure	-	Reserve	Above average exposure	-3.504 (**)

Adjusted P-values reported with Bonferroni correction. Analyses performed on binomial data.

\*\*\*:  $P < 0.001$ ; \*\*:  $P < 0.01$ ; \*:  $P < 0.05$ ; ns: not significant