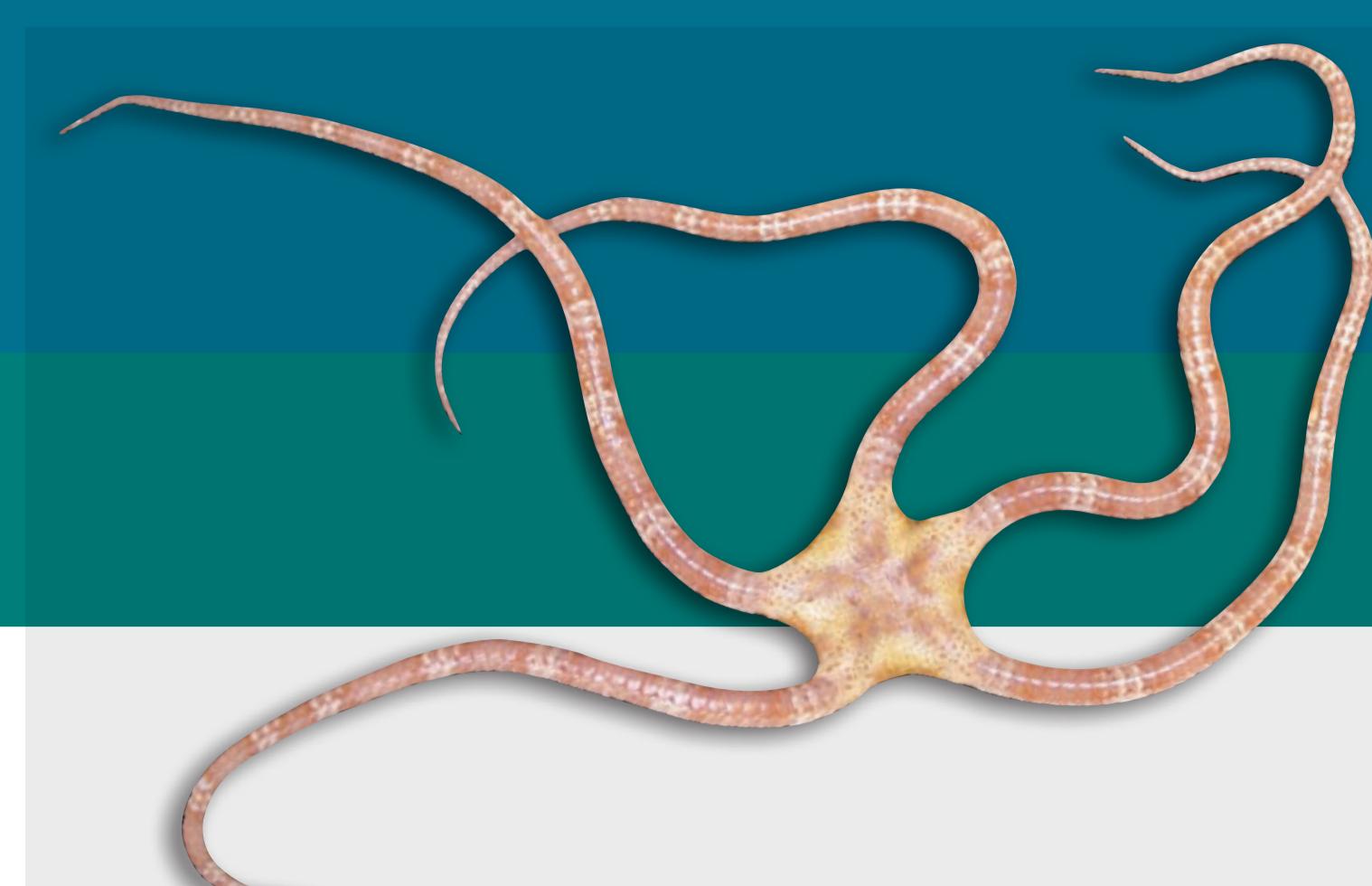


# The effects of sampling in marine surveys on biodiversity estimation

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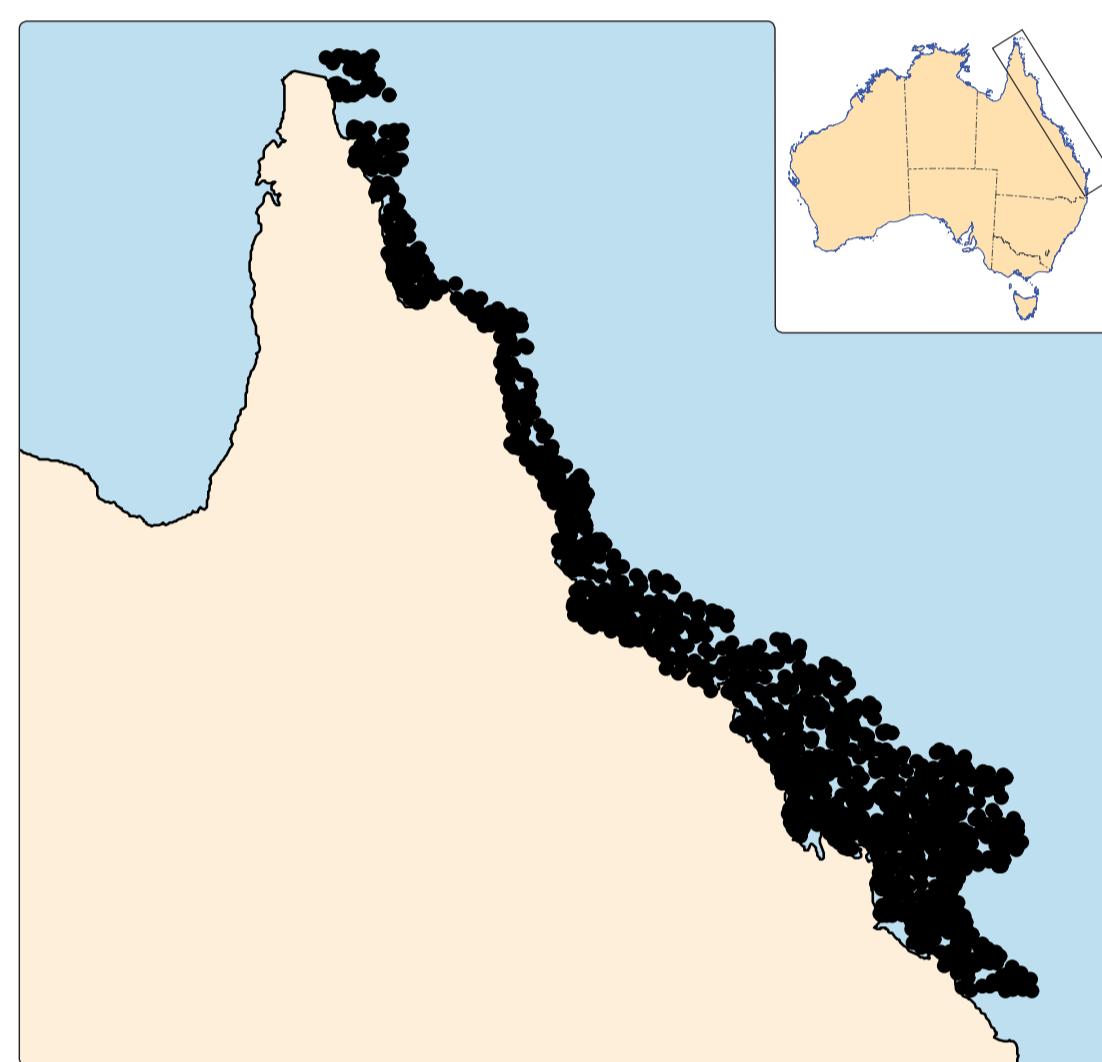


## Introduction

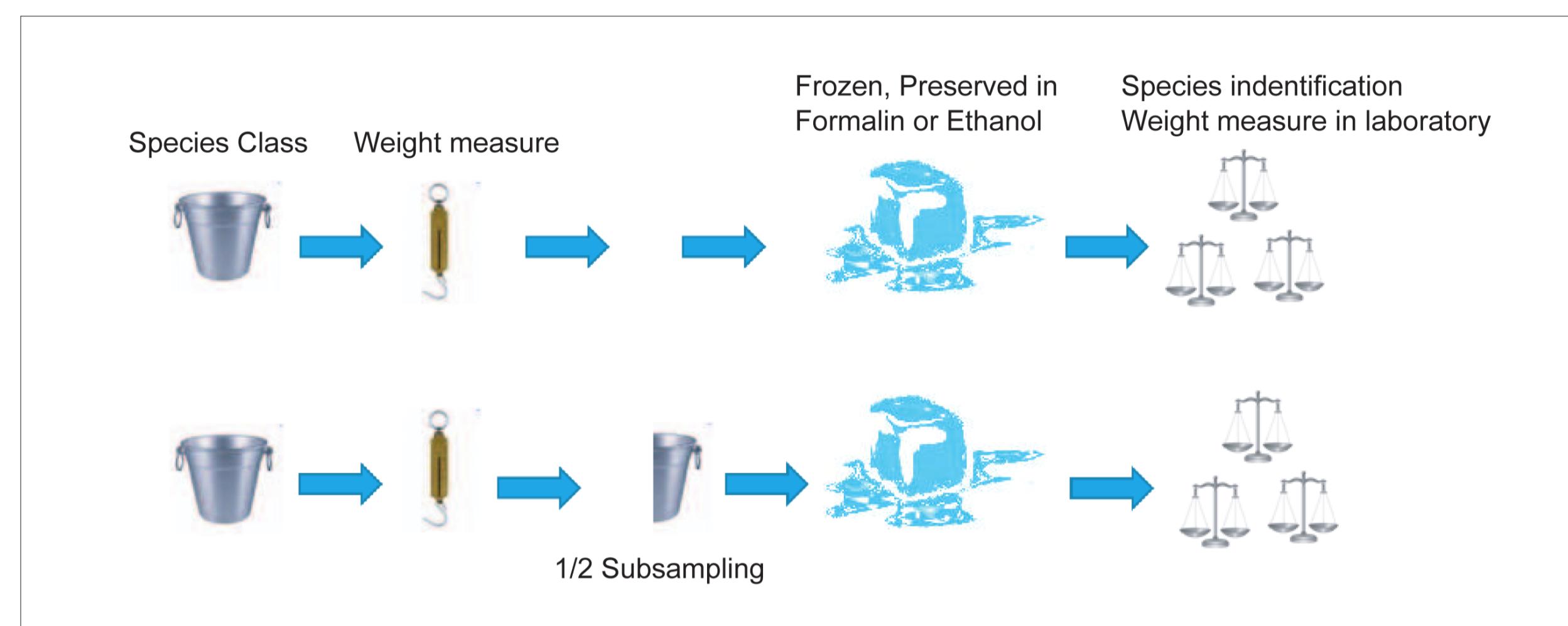
Scientific marine surveys are necessary tasks to understand biodiversity in marine science. Differences in the collection methods between locations and in the processing of species within a location increase the risk of bias in estimates of biodiversity. Repeat measurements under the exactly same conditions at a site are impractical. A simple conceptual model is proposed reflecting a commonly used sampling process in marine surveys. The analysis highlights the influence that sub-sampling has on the recording of presence of species.

## Great Barrier Reef data

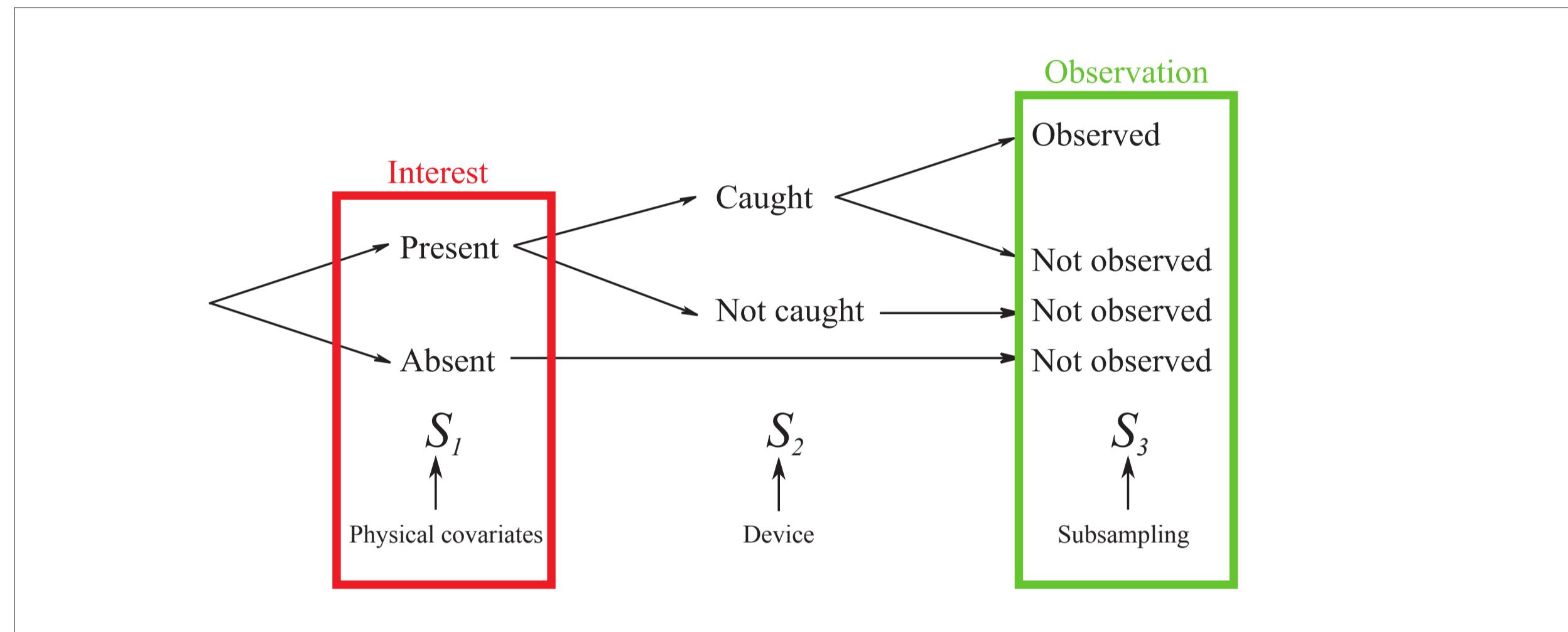
Data comprises of 1189 sites where biological and physical variables were measured (Pitcher et al, 2007). The biological outcome variables were presence/absence of a particular species in a benthic sled sample. The physical variables (depth, carbonate, %mud, salinity, moon phase etc) are also given for the sites.



## Sub-sampling process



## A conceptual model

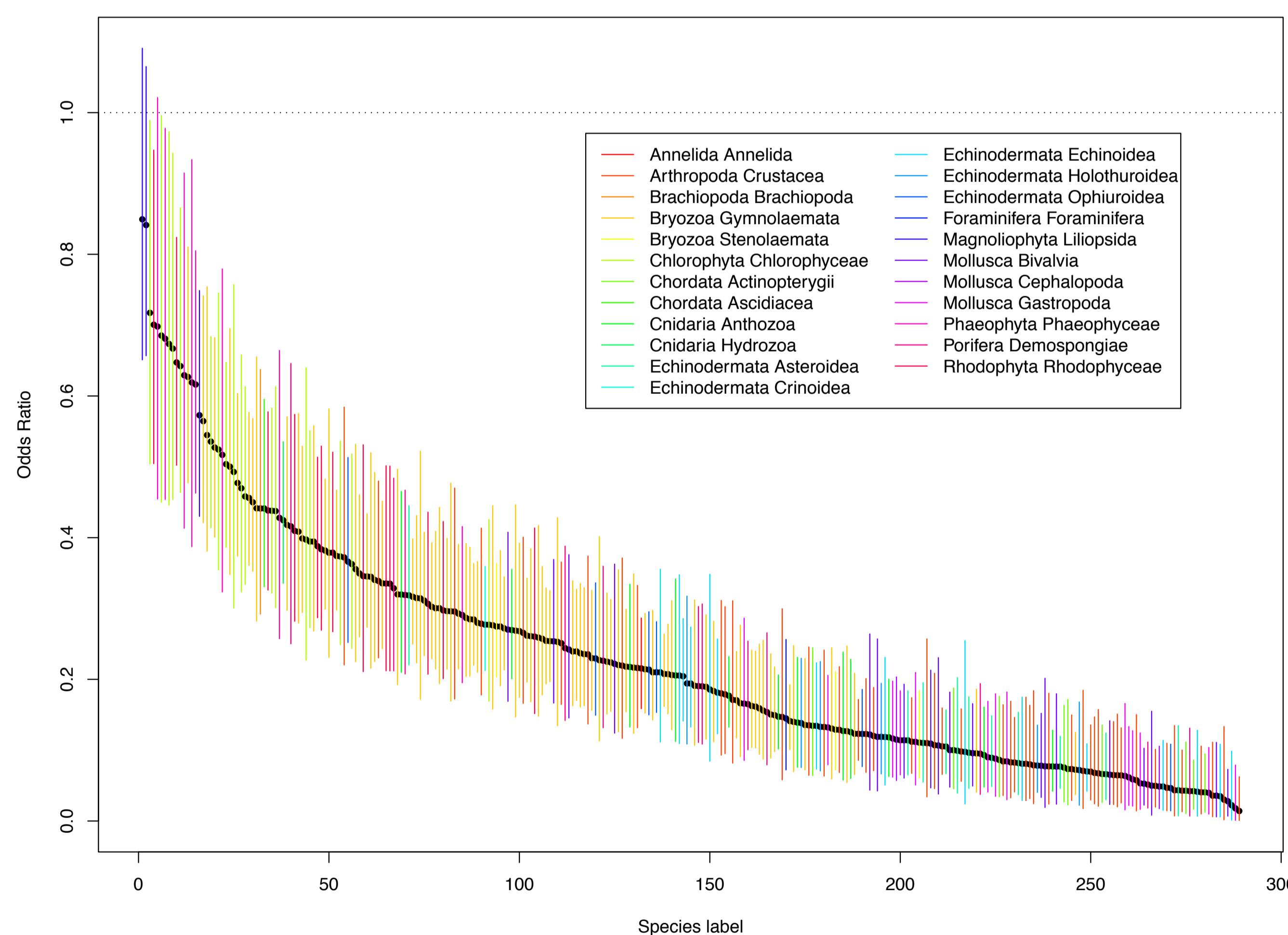


## Analysis and results

To assess the influence of subsampling on species presence/absence, the odds ratio and of each species was investigated between two site groups where sub-sample was taken or not. The nearest two sites taken from each group are matched in the physical space using Euclidian distance. This approach avoids the influences of physical environment on species presence/absence. The calculated odds ratio should be one if there is no influence of subsampling.

Odds Ratio	Species
0.849	Magnoliophyta Liliopsida Hydrocharitaceae Halophila ovalis
0.841	Magnoliophyta Liliopsida Hydrocharitaceae Halophila spinulosa
0.717	Chlorophyta Chlorophyceae Caulerpales Codiaceae Halimeda opuntia
0.701	Rhodophyta Rhodophyceae Rhodophyceae Rhodophyceae
0.698	Phaeophyta Phaeophyceae Fucales Sargassaceae Sargassum sp
0.685	Chlorophyta Chlorophyceae Caulerpales Caulerpaceae Caulerpa cymosa
0.681	Phaeophyta Phaeophyceae Sporochiales Sporochnaceae Sporochnus moorei
0.673	Chlorophyta Chlorophyceae Caulerpales Caulerpaceae Caulerpa sertularioides
0.667	Chlorophyta Chlorophyceae Caulerpales Caulerpaceae Caulerpa taxifolia
0.647	Rhodophyta Rhodophyceae Gigartinales Gracilariae Gracilaria
0.642	Chlorophyta Chlorophyceae Caulerpales Codiaceae Halimeda gigas
0.629	Phaeophyta Phaeophyceae Dictyotales Dictyotaceae Padina sp.
0.627	Bryozoa Gymnolaemata Cheilostomata Schizoporellidae Stylopoma spp
0.619	Phaeophyta Phaeophyceae Dictyotales Dictyotaceae Dictyota
0.616	Phaeophyta Phaeophyceae Dictyotales Dictyotaceae Lobophora variegata

Odds Ratio	Species
0.043	Chordata Actinopterygii Tetraodontiformes Monacanthidae Paramonacanthus otisensis
0.042	Porifera Demospongiae Hadromerida Tethyidae Xenospongia patelliformis
0.042	Chordata Actinopterygii Pleuronectiformes Bothidae Engyprosopon grandisquamum
0.041	Echinodermata Echinoidea Clypeasteroida Laganidae Peronella lesueuri
0.041	Arthropoda Crustacea Decapoda Portunidae Portunus granulatus
0.041	Chordata Actinopterygii Perciformes Pomacentridae Pristotis obtusirostris
0.040	Mollusca Gastropoda Sorbeoconcha Buccinidae Phos senticosus
0.036	Arthropoda Crustacea Decapoda Majidae Phalangipus filiformis
0.036	Mollusca Bivalvia Arcoida Limopsidae Lomopsis
0.035	Echinodermata Echinoidea Temnopleuroidea Temnopleuridae Temnopleuridae
0.030	Arthropoda Crustacea Decapoda Calappidae Calappa
0.028	Mollusca Bivalvia Arcoida Glycymerididae Melaxinæa vitrea
0.022	Echinodermata Echinoidea Clypeasteroida Laganidae Laganidae
0.018	Mollusca Gastropoda Sorbeoconcha Nassariidae Nassarius conoidalis cf
0.014	Arthropoda Crustacea Decapoda Xanthidae Actumnus squamosus



## References

Pitcher R. et al. (2007) Seabed Biodiversity on the Continental Shelf of the Great Barrier Reef World Heritage Area. CSIRO Marine and Atmospheric Research.

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