

Toxic traces:

DNA metabarcoding detects ciguatoxin producing dinoflagellates within three coastal regions of the Great Barrier Reef, Australia

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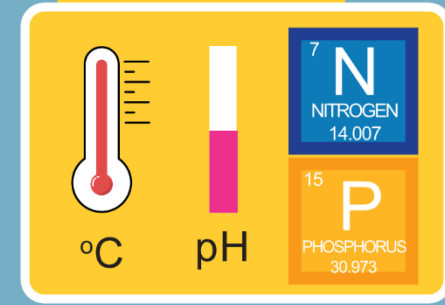
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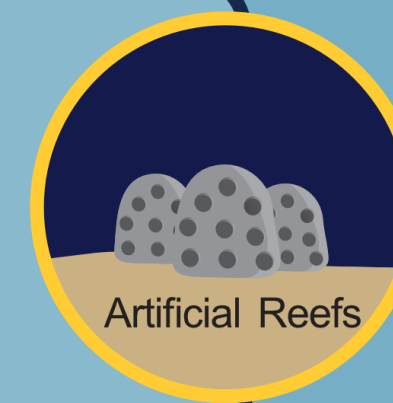


Ciguatoxin Trophic Transfer

Changes in:

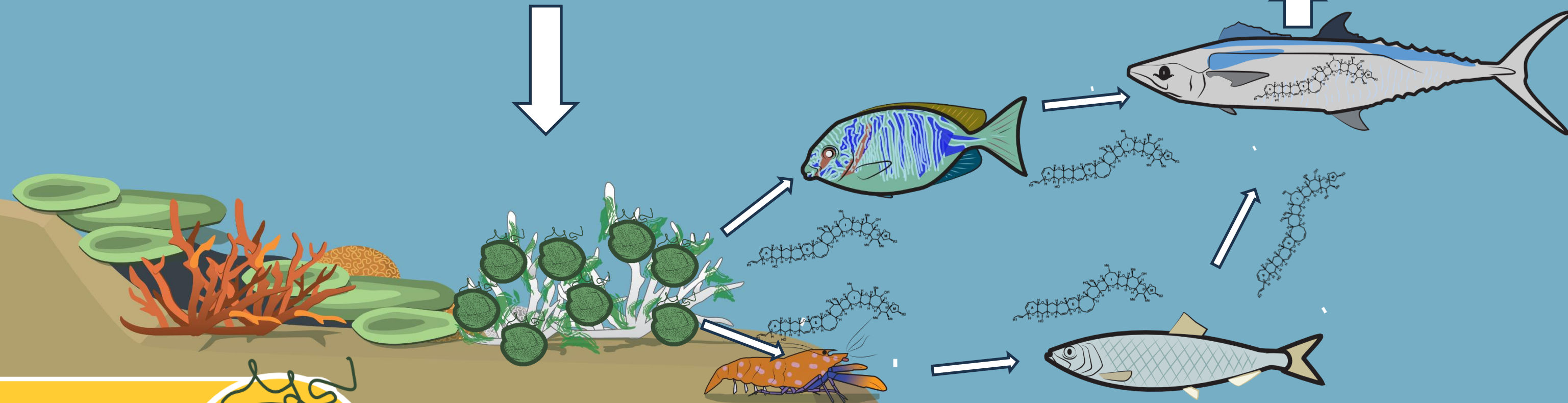


°C pH N
NITROGEN
14.007 P
PHOSPHORUS
30.973



Drivers for increased algae growth

IT BURNS PRECIOUS



Gambierdiscus spp. are benthic toxic dinoflagellates that attach to macro-algae and produce potent ciguatoxins



Ciguatera Poisoning



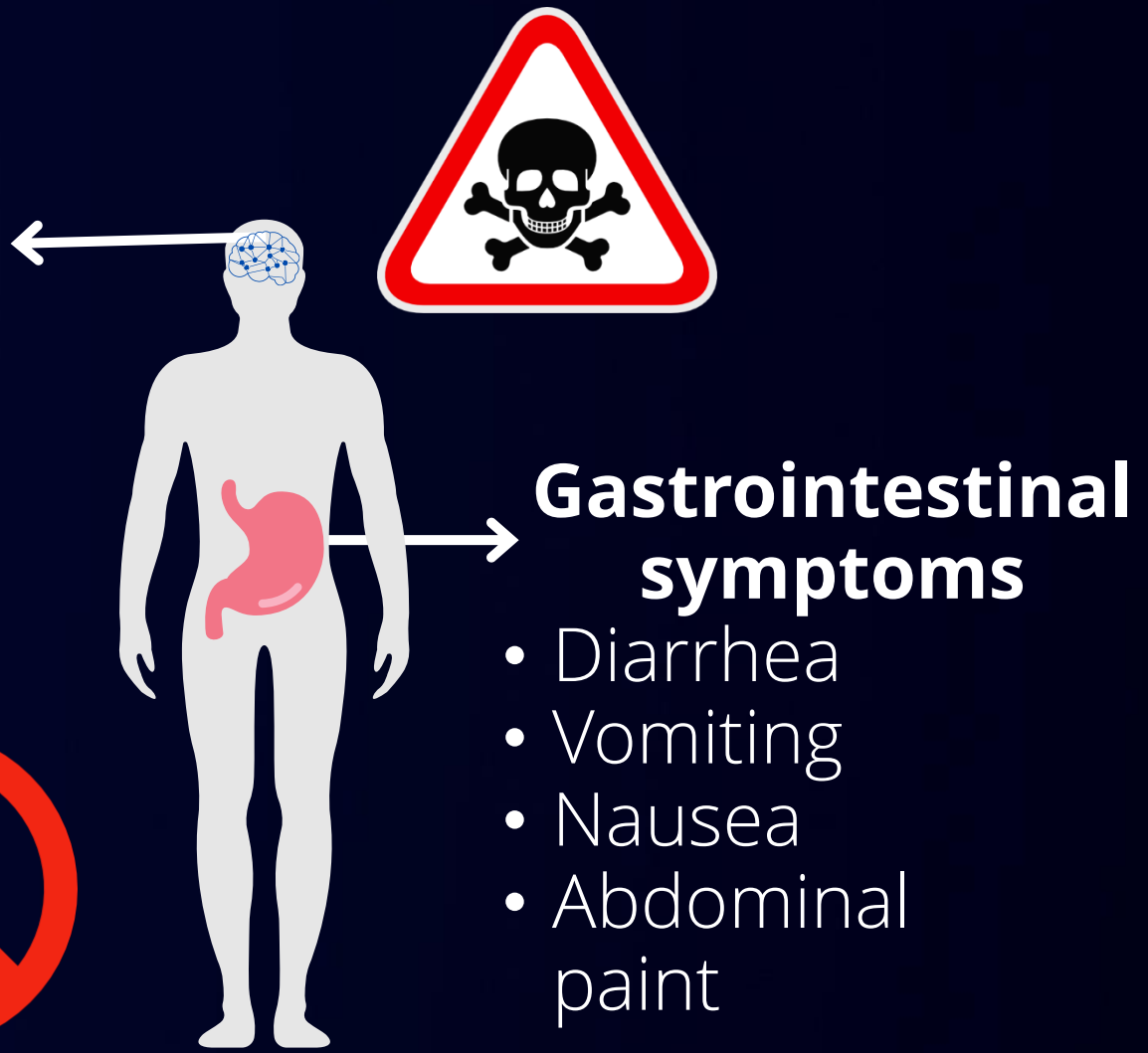
Ciguatera poisoning is the most common, non-infectious, seafood related illness globally with 10,000-500,000 human ciguatera cases annually



No commercial human or fish ciguatoxin test

Neurologic symptoms

- Headache
- Vertigo
- Chills
- Dysuria



Gastrointestinal symptoms

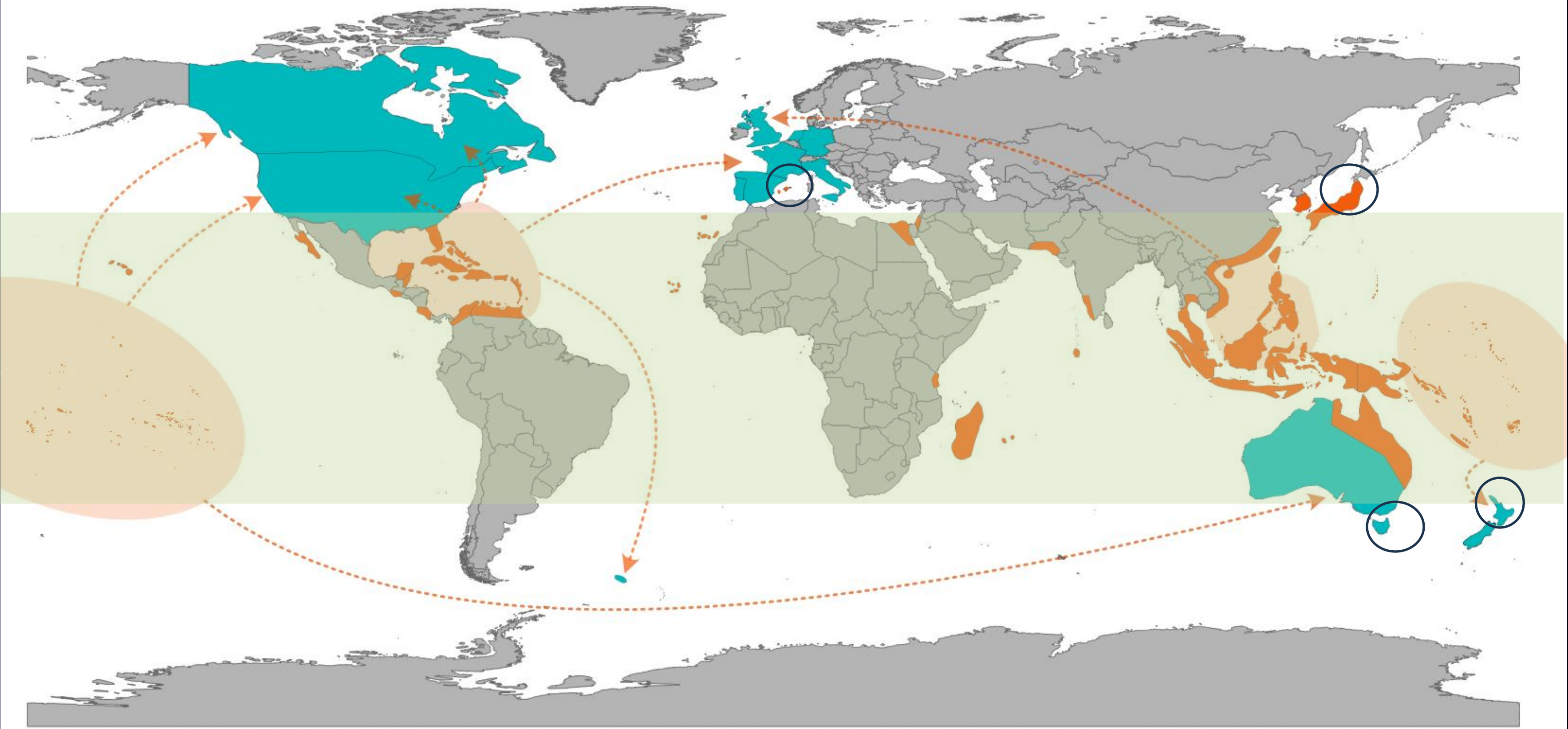
- Diarrhea
- Vomiting
- Nausea
- Abdominal pain



Cooking or freezing does not kill the toxins

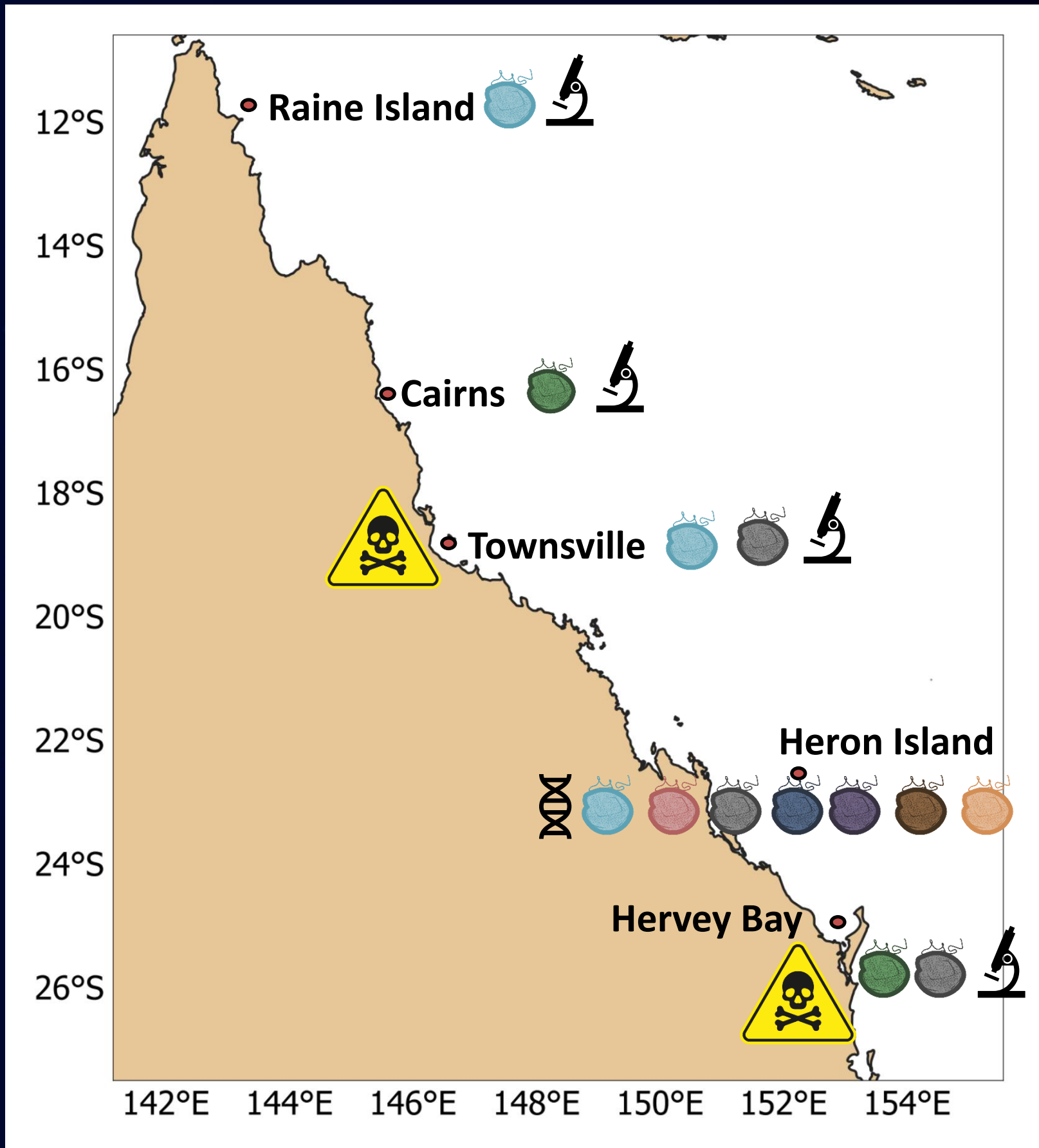
Ciguatera Poisoning

Endemic ciguatera cases Imported ciguatera cases



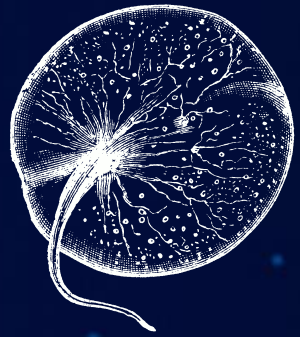
INTRODUCTION

Gambierdiscus distribution in Queensland, Australia

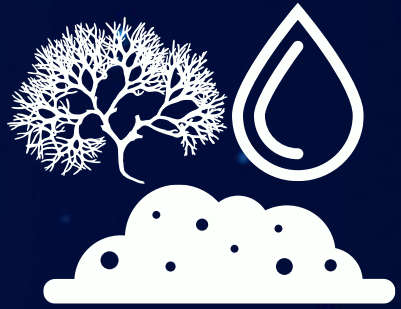


-  *G. toxicus* ?
-  *G. carpenteri*
-  *G. lapillus*
-  *G. belizeanus*
-  *G. honu*
-  *G. holmesii*
-  *G. lewisii*
-  *G. yasumtoi*

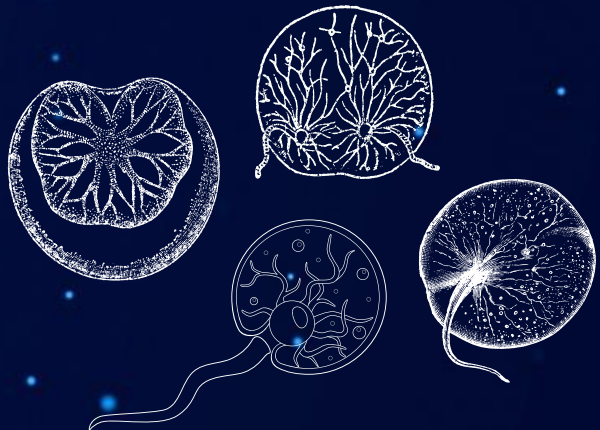
Aims of the study



Investigate the diversity of *Gambierdiscus* species in three coastal locations of the Great Barrier Reef

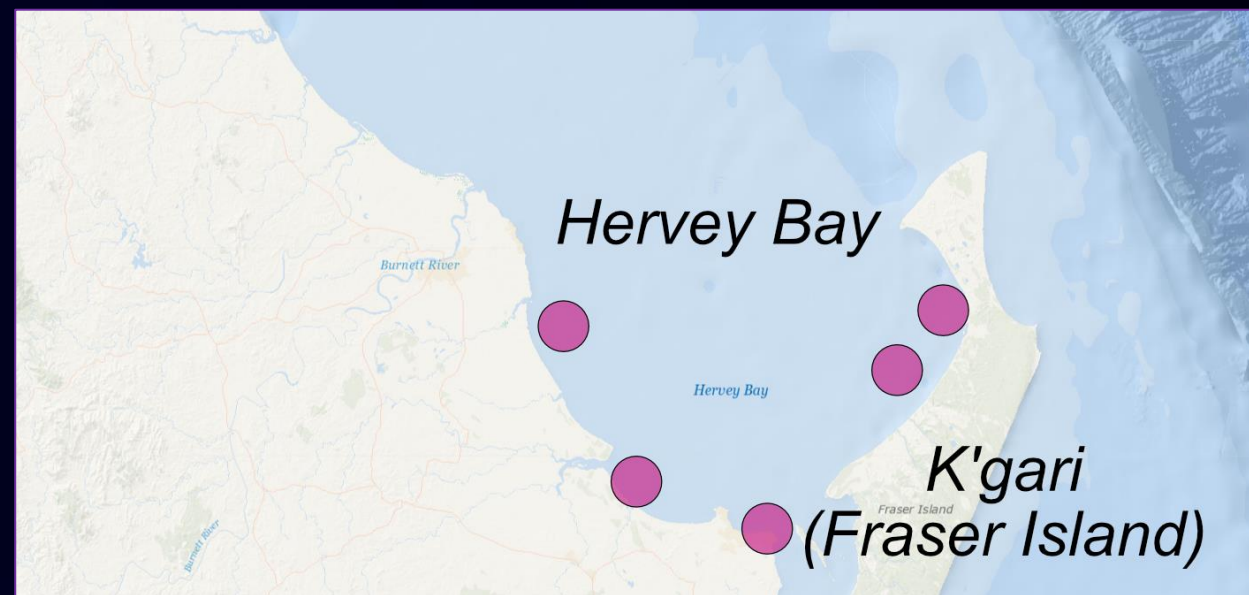
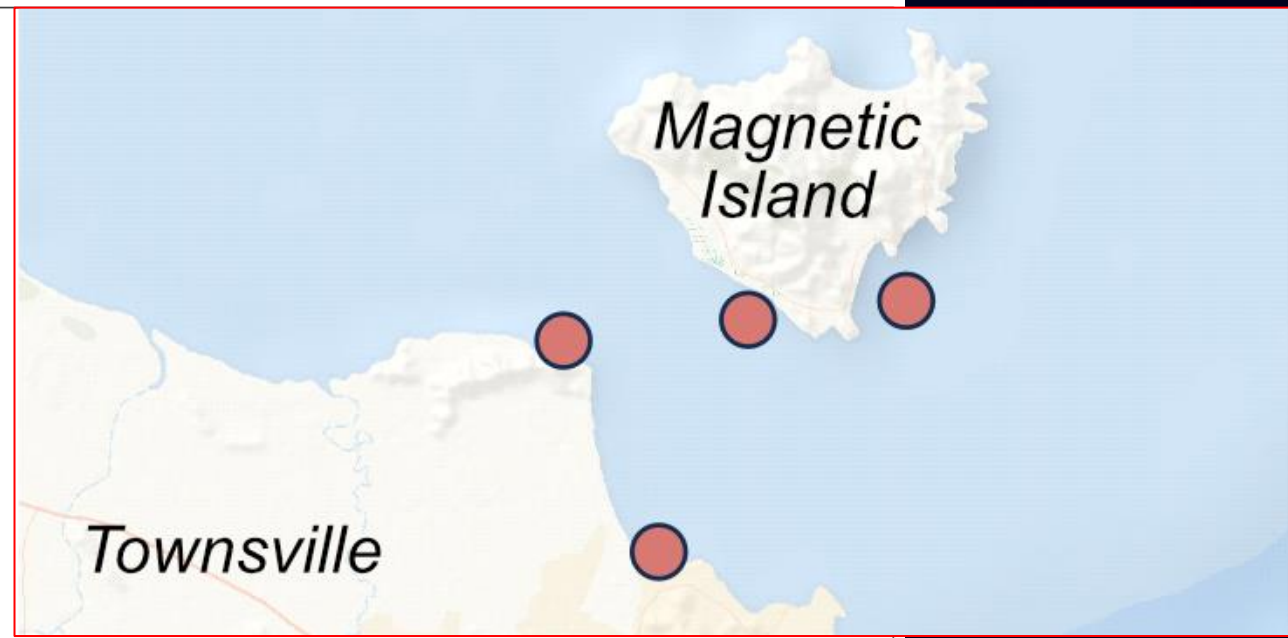
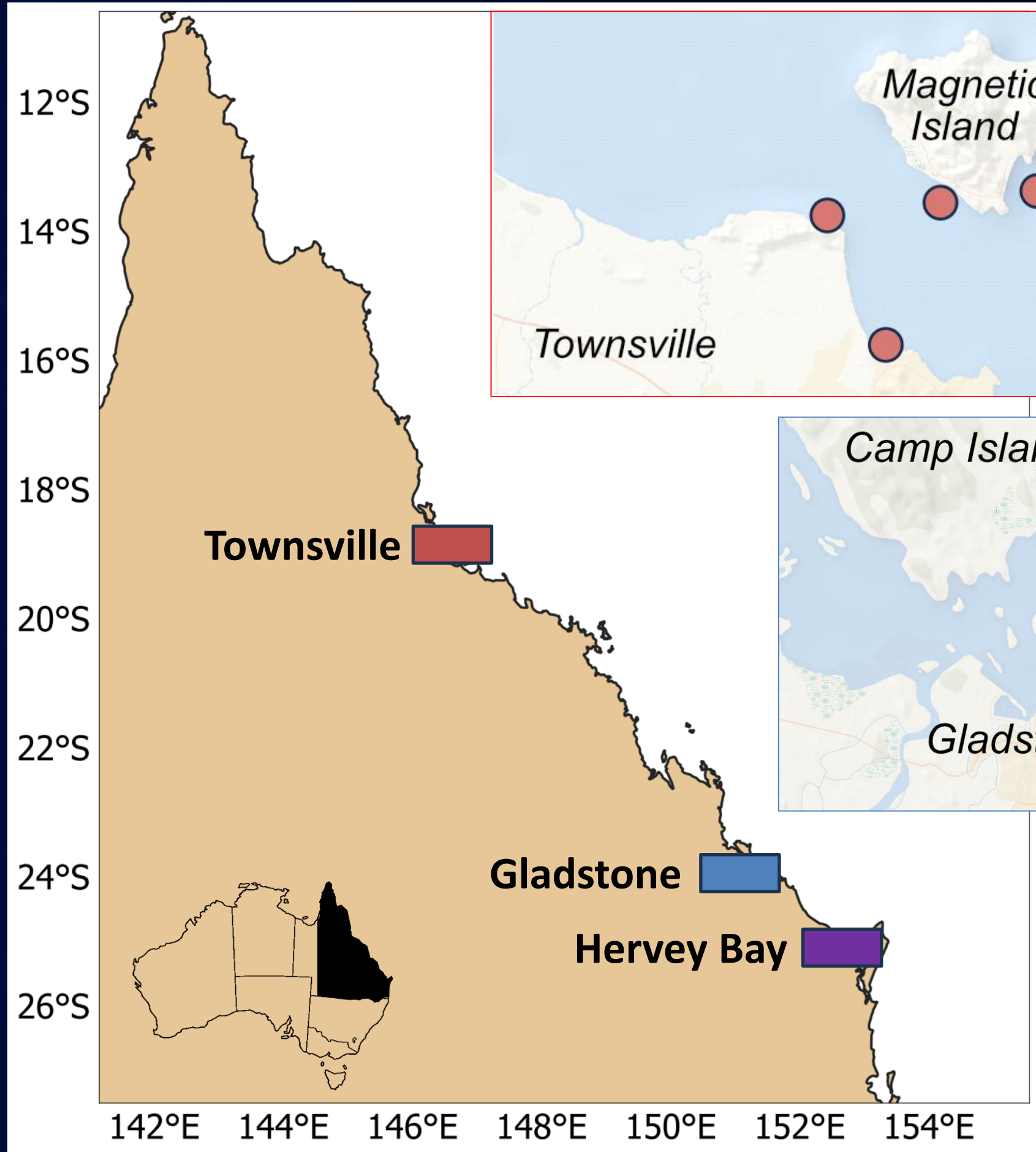


Identify any correlations between *Gambierdiscus*, host macroalgae and habitat



Insight into the community composition of benthic toxic dinoflagellates

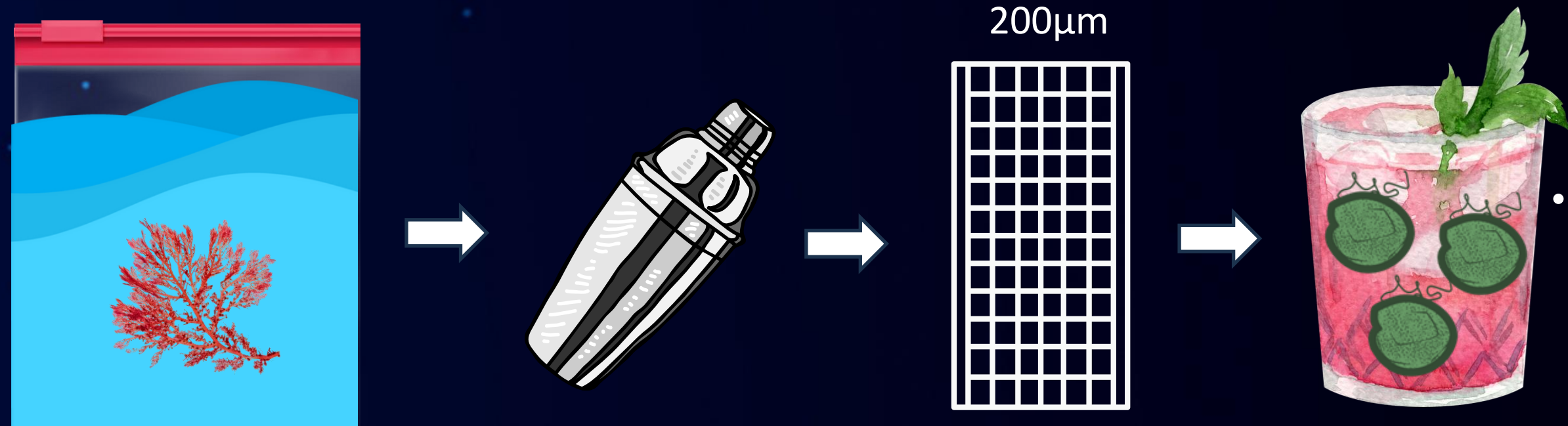
METHODS



3 locations
14 Sites
5 replicates & 1 control per site
Total samples = 84

METHODS

Sample collection



Dinocolada

Recipe

- 100ml Longmire
- 300ml Water/algae mix
 - Loads of dinoflagellates (hopefully)

DNA extraction and sequencing



Data processing and analysis





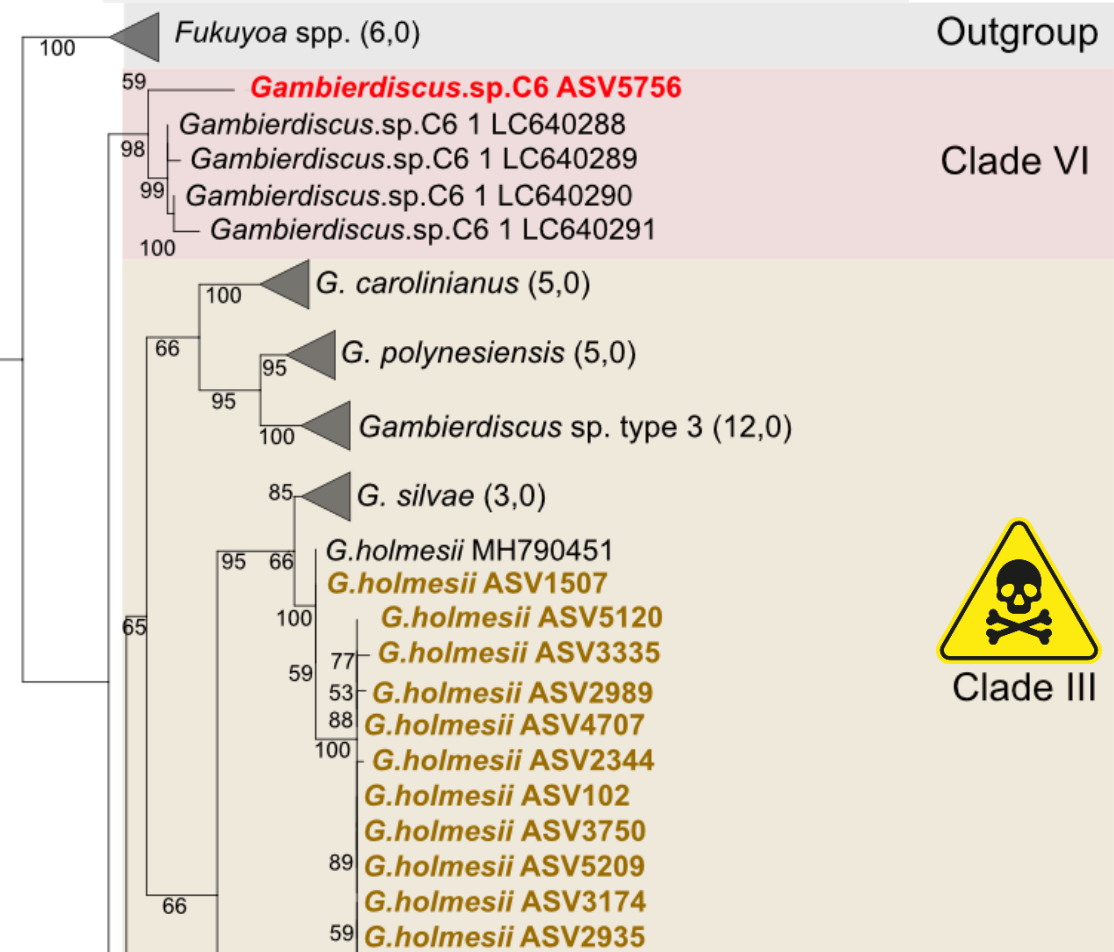
10 most abundant genera



RESULTS



Total *Gambierdiscus* ASVs: 186

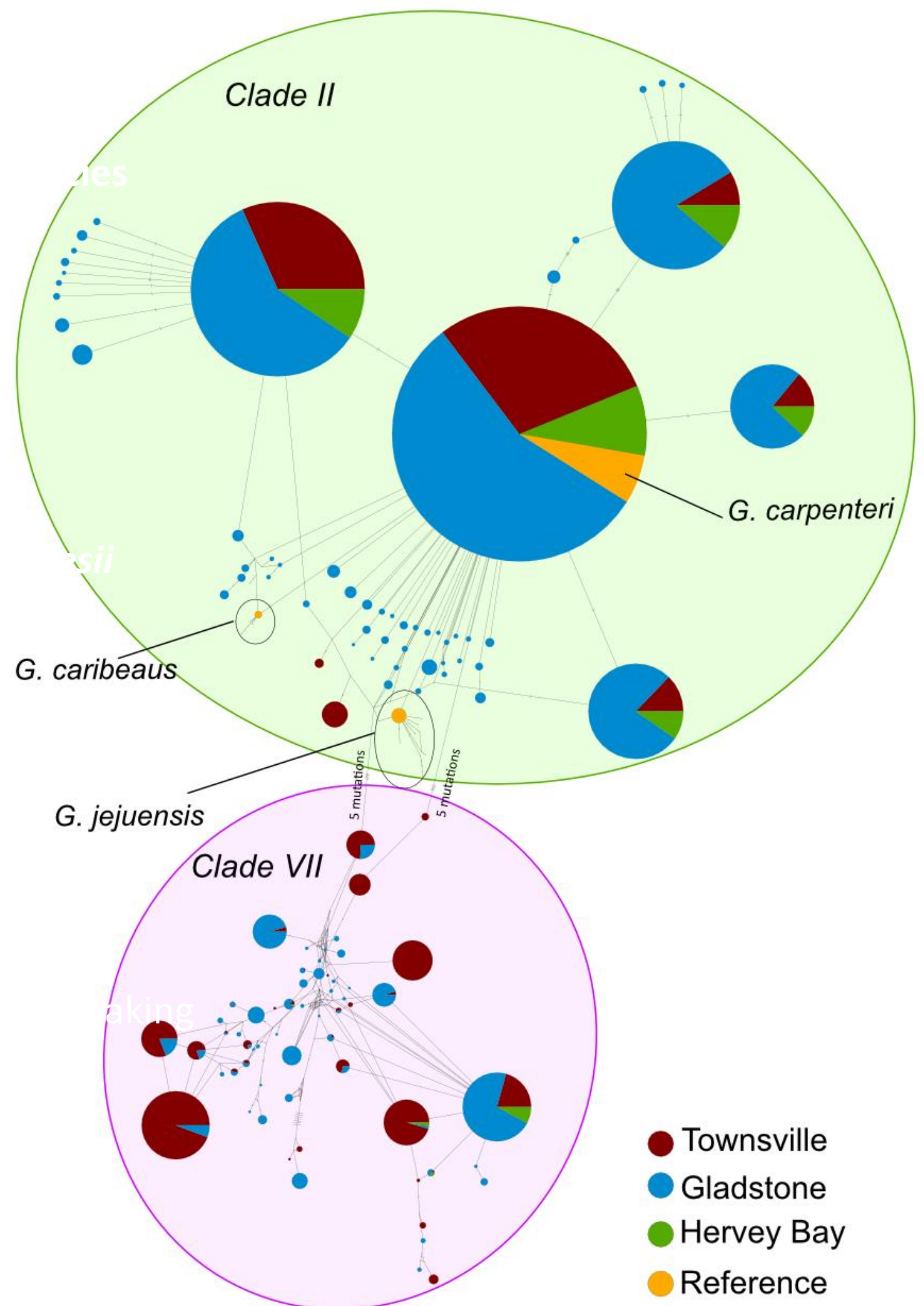
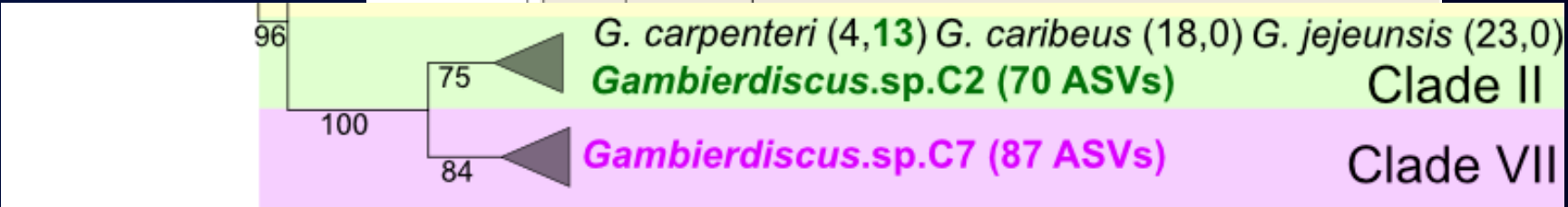


1 ASV Clade VI

15 ASVs *G. holmesii*

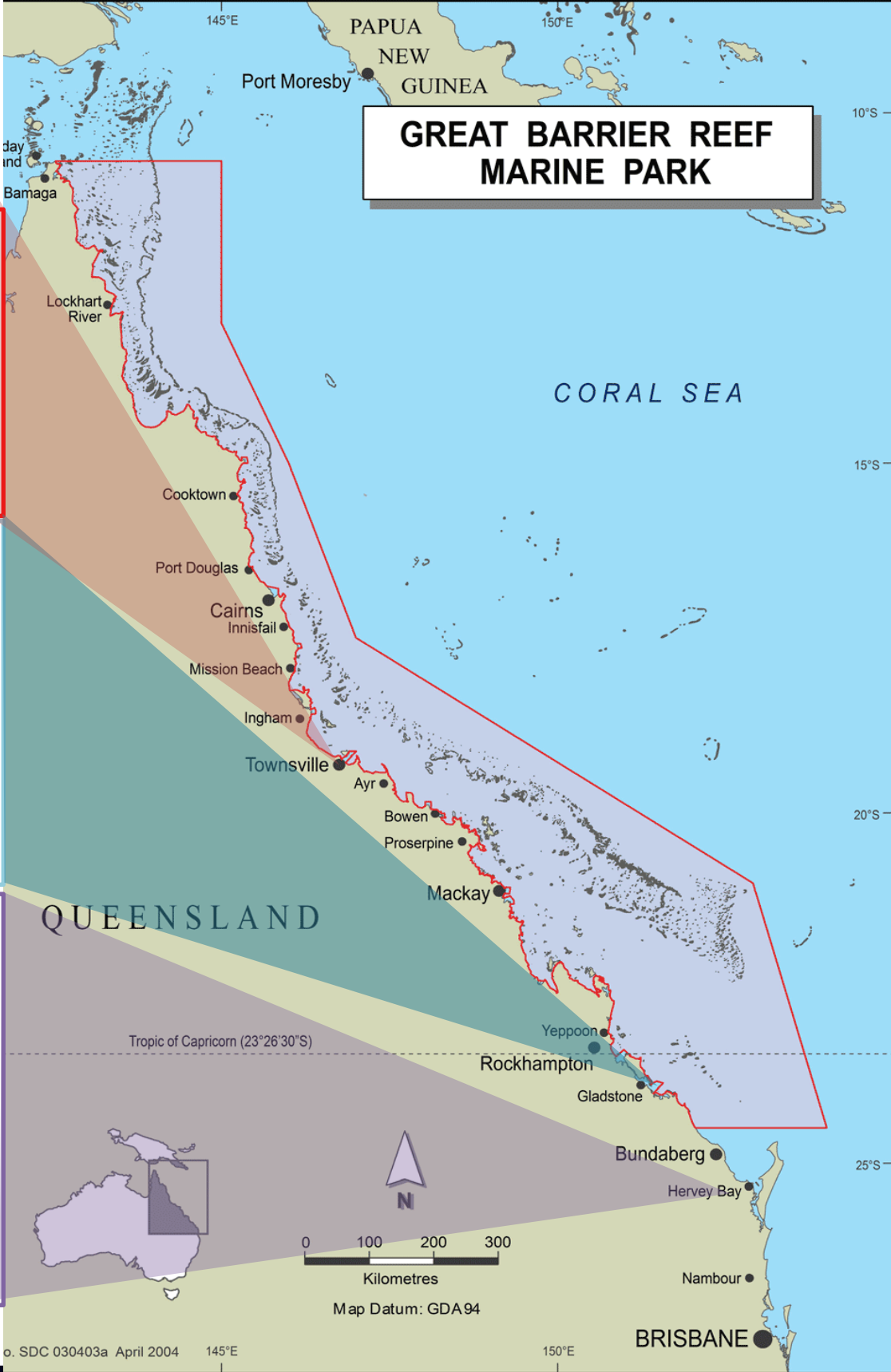
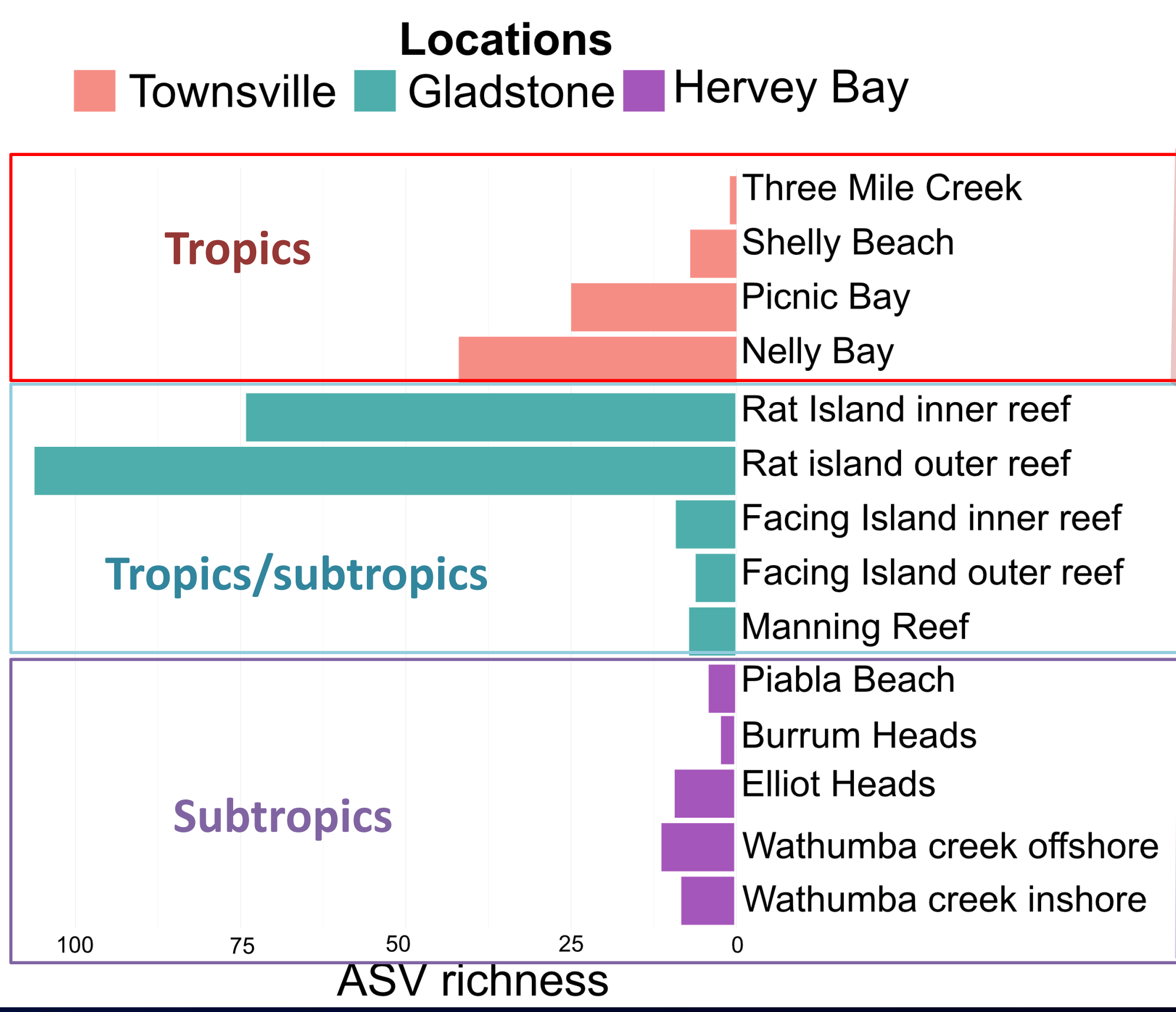
13 ASVs *G. carpenteri*
No mice were handled in this presentation

87 ASVs Clade VII



- Townsville
- Gladstone
- Hervey Bay
- Reference

- Subtropics
- Global & temperate
- Potential new clade

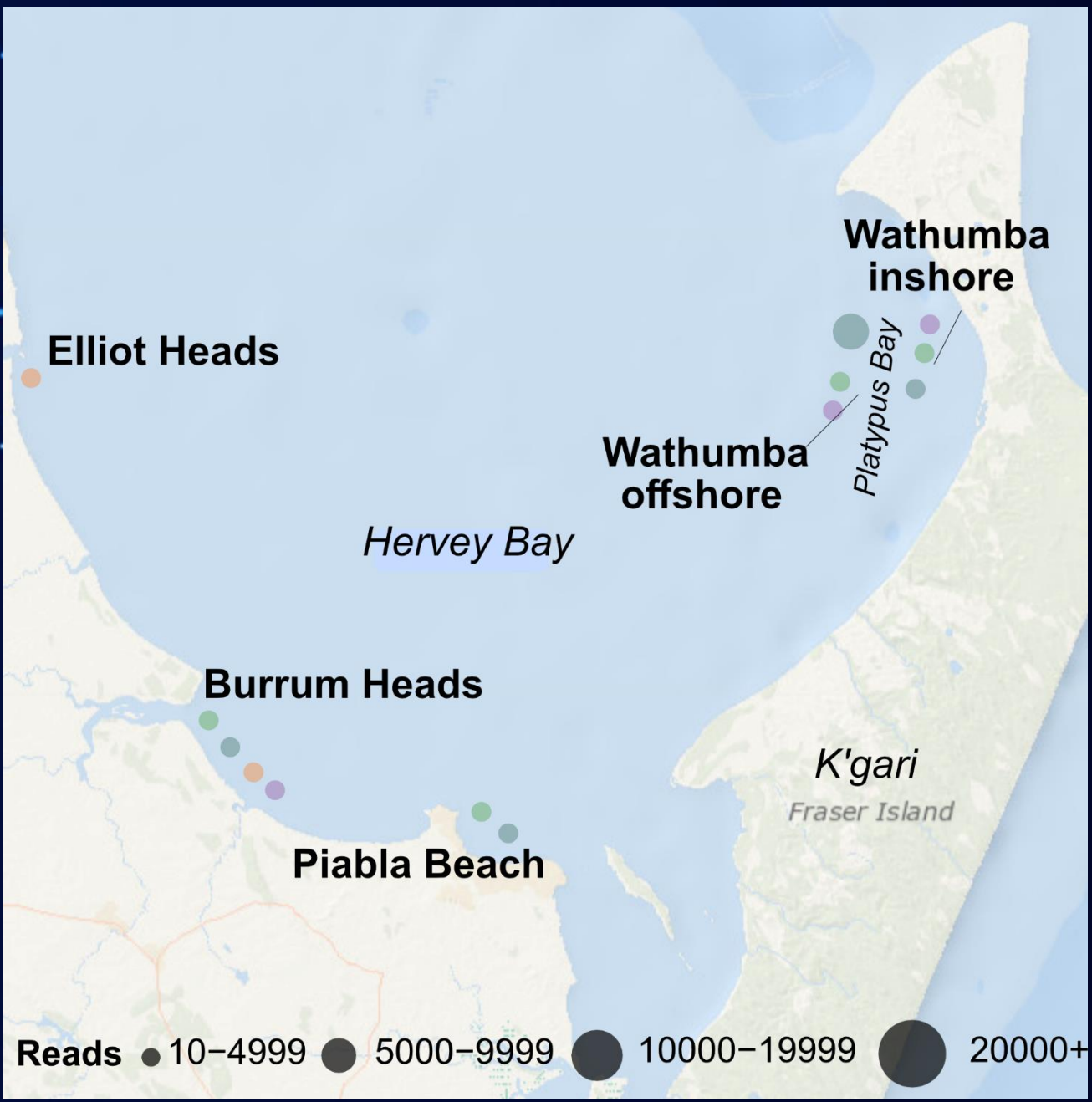




RESULTS

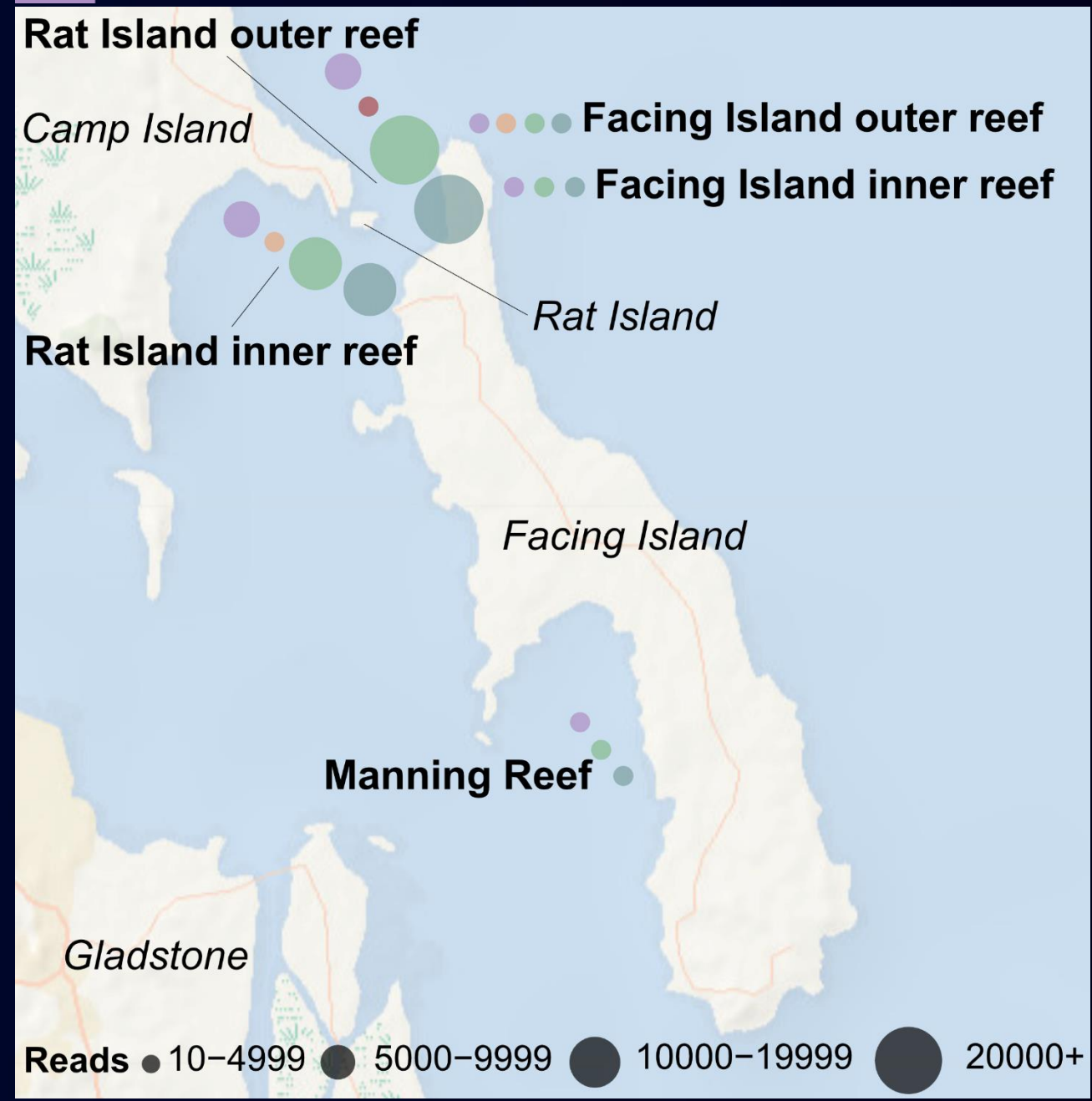
Hervey Bay

- Gambierdiscus carpenteri*
- Gambierdiscus* sp. Clade II
- Gambierdiscus holmesii*
- Gambierdiscus* sp. Clade VII



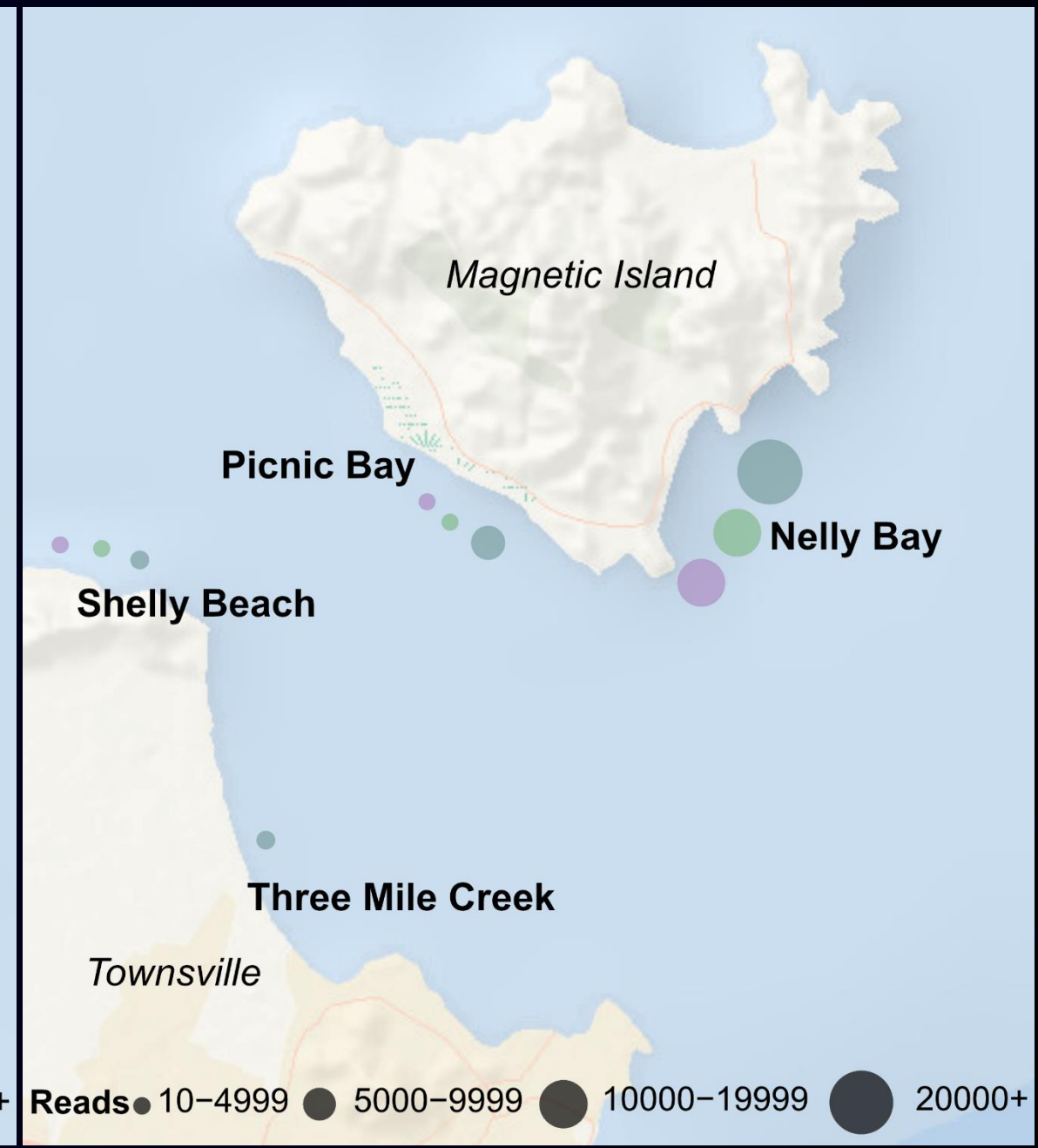
Gladstone

- Gambierdiscus carpenteri*
- Gambierdiscus* sp. Clade II
- Gambierdiscus holmesii*
- Gambierdiscus* sp. Clade VI
- Gambierdiscus* sp. Clade VII

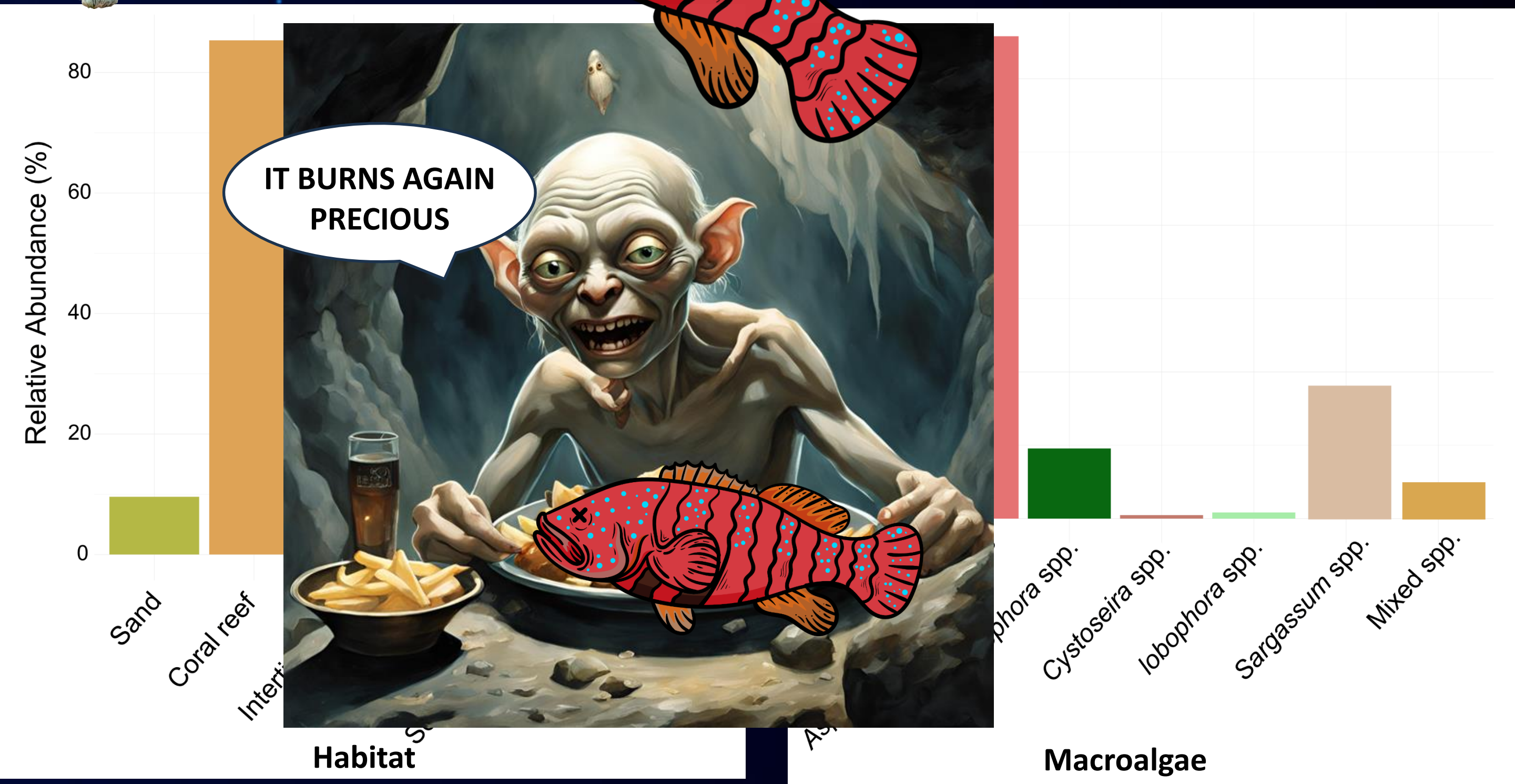
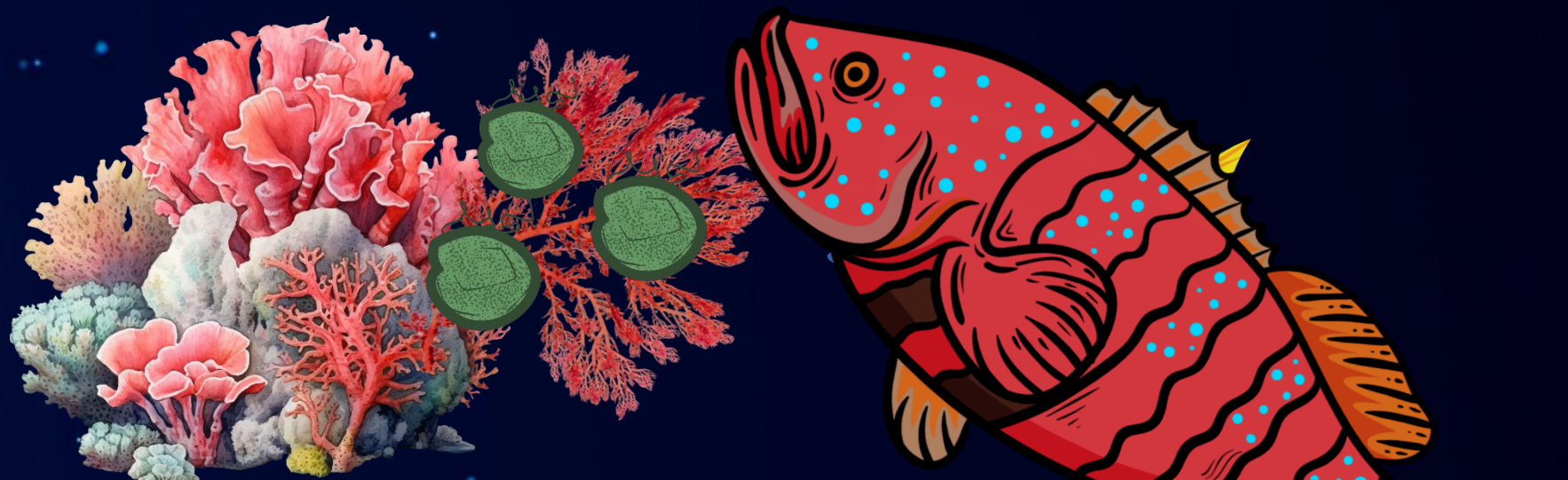


Townsville

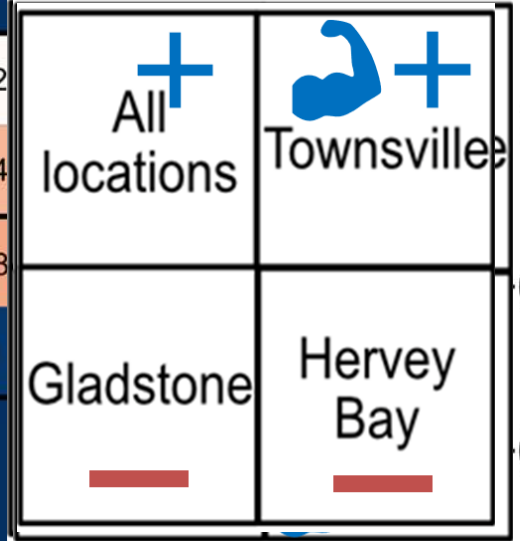
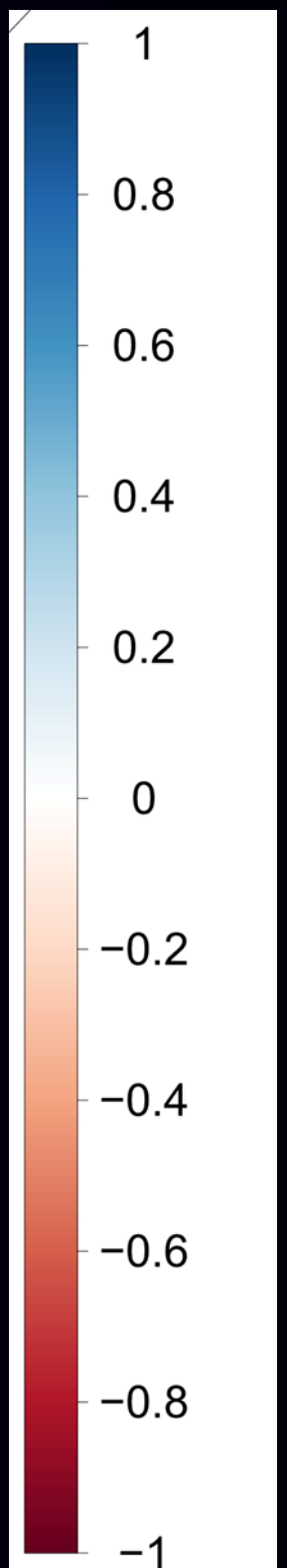
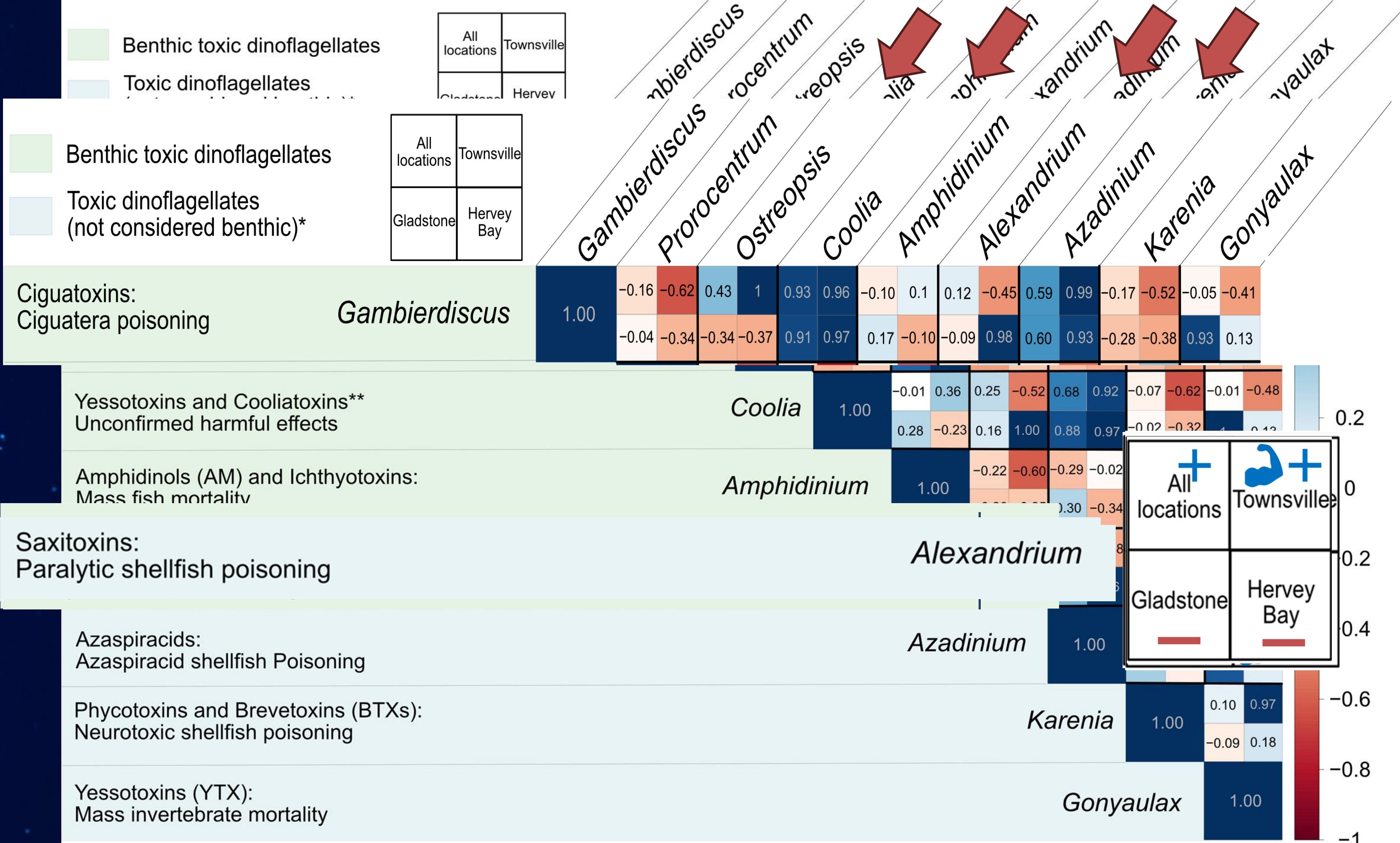
- Gambierdiscus carpenteri*
- Gambierdiscus* sp. Clade II
- Gambierdiscus* sp. Clade VII



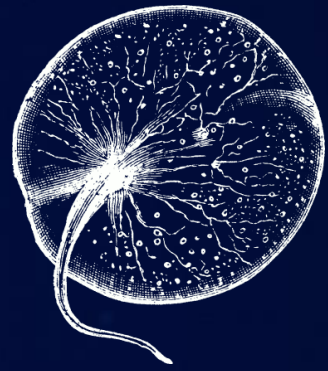
RESULTS



RESULTS



TAKE HOME MESSAGES



Revealed the distribution and diversity of *Gambierdiscus* across three locations in the GBR region. Including a potential new clade



Insights into ciguatoxin food web pathway by correlating *Gambierdiscus* presence with host macroalgae and habitat associations



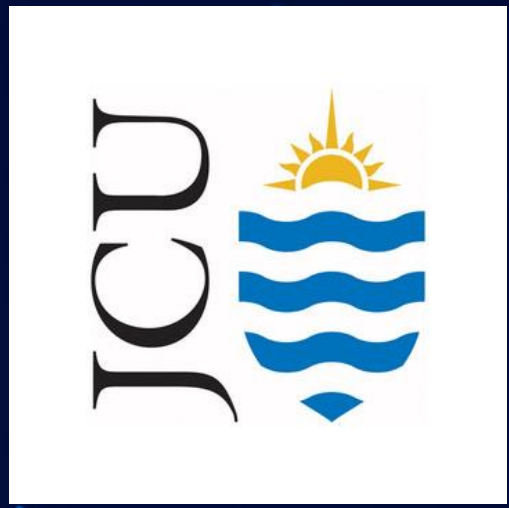
Co-occurrence of toxic genera could indicate certain locations are more prominent risks of harbouring toxin related illnesses

Helps us understand the risks of ciguatera and seafood safety



ACKNOWLEDGMENTS

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Sally Lau

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Matt Quinn

Shannon Kjeldsen

Natale Snape



Ciguatera poisoning: A review of the ecology and detection methods for *Gambierdiscus* and *Fukuyoa* species

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^a Centre for Sustainable Tropical Fisheries and Aquaculture, James Cook University, Townsville 4811, Qld, Australia

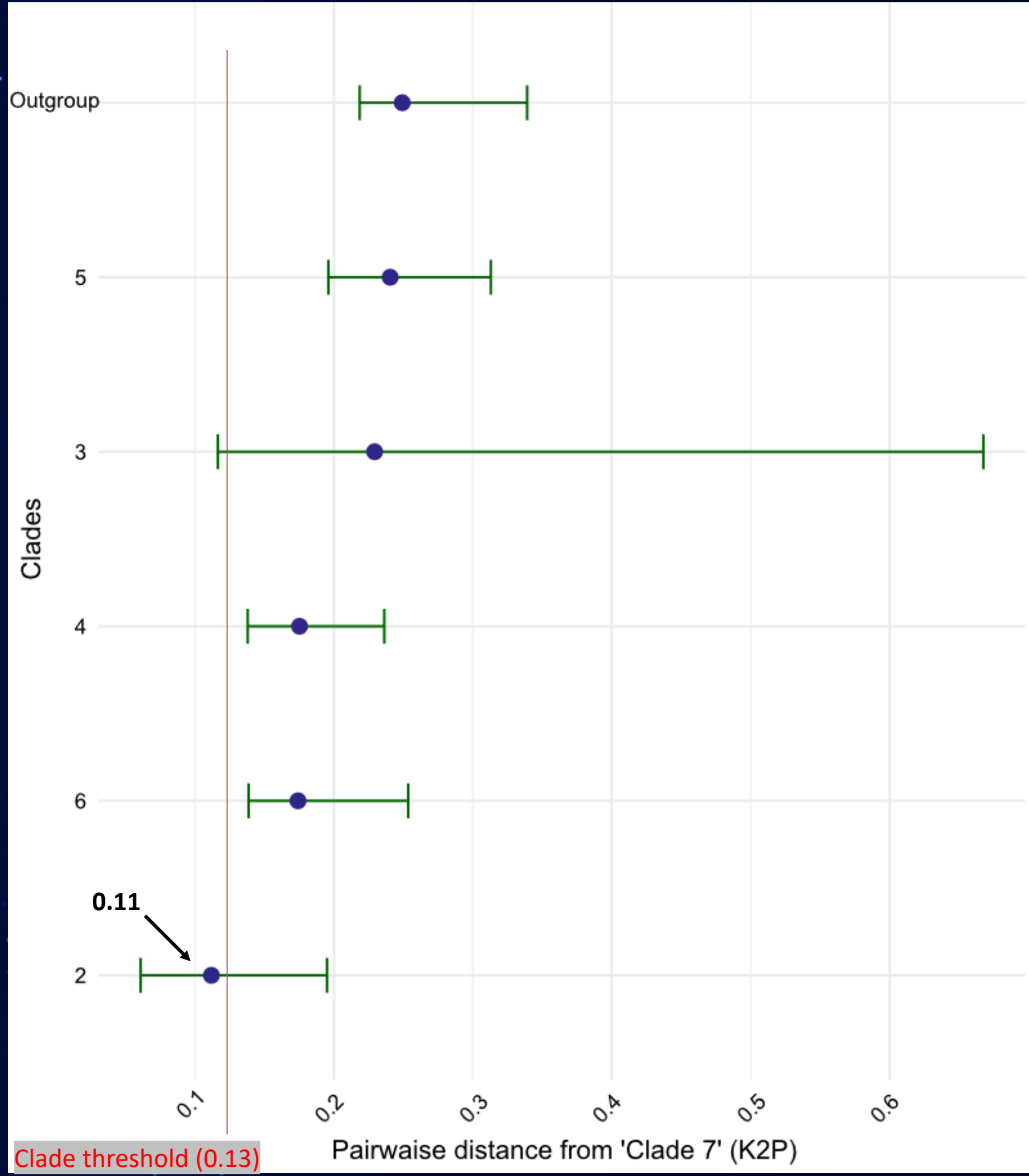
^b College of Science and Engineering, James Cook University, Townsville 4811, Qld, Australia



Assessment of dinoflagellate diversity using DNA metabarcoding reveals toxic dinoflagellate species in Australian coastal waters

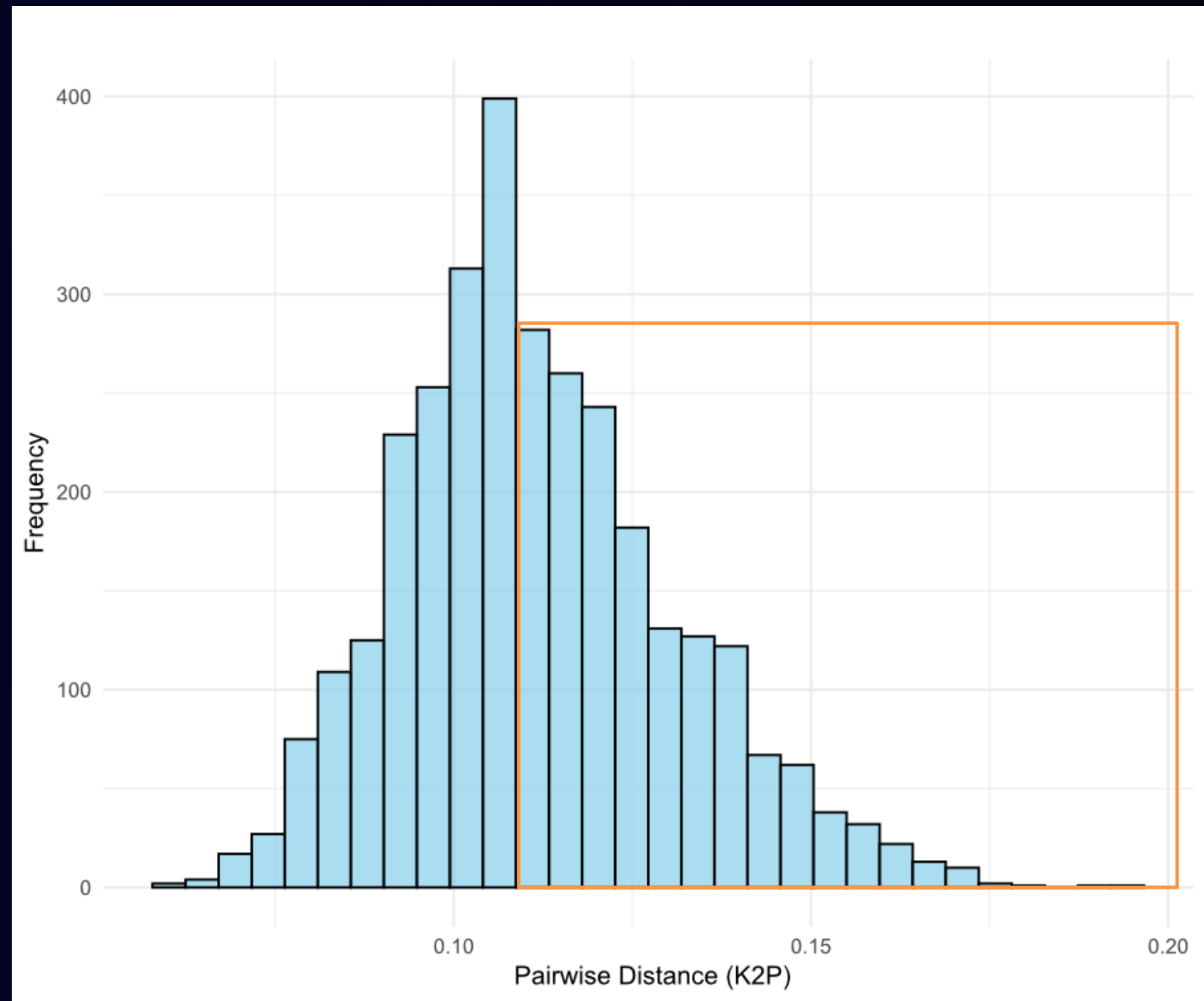
Joseph C. Perkins^{a,b,*}, Kyall R. Zenger^a, Shannon R. Kjeldsen^{c,d}, Yang Liu^b, Jan M. Strugnell^{a,b}





Clade threshold (0.13)

Genetic Distance between Clade 2 and 7





0.11

