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A comparison of coral composition on two artificial reef systems in Moreton Bay, southeast Queensland

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ABSTRACT

Artificial reefs are used for marine habitat rehabilitation in degraded ecosystems, and to help sustain local tourism activities such as the diving, snorkeling, and fishing. The artificial reefs of Amity Rockwall and Tangalooma Wrecks are widely used for recreational activities and have never been previously surveyed. These reefs are interesting because they are located between natural coral communities inside and outside Moreton Bay, and are intermediate in coral composition. A gradient in coral community composition has been previously reported with Faviidae dominating the coral communities inside Moreton Bay and Acroporidae more abundant at oceanic sites outside Moreton Bay. The study of these coral communities will help to understand the role of artificial reefs in Moreton Bay and how the coral communities change along a water quality gradient. □ *artificial reefs, corals, survey, distribution, habitat rehabilitation.*

The artificial reef of Tangalooma Wrecks is found on the western side of Moreton Island, 2 km north of the Tangalooma resort. The reef consists of 15 hulls scuttled along the shore for about 180 m from above the surface to about 8 m. The Department of Harbours and Marine commenced scuttling them to form a small craft anchorage in July 1963.

The artificial reef of Amity Rockwall was started during the 1970s and continues to be embellished to protect the township of Amity Point from erosion (Carter *et al.* 1994). The wall

extends down to about 8 m to the sandy bottom, which continues further into the channel. Both artificial reefs are on the eastern side of Moreton Bay, in the proximity of the two major ocean exchanges, the South and North Passages, and receive clear oceanic water (Steele & Kuhl 1993; EHMP 2004).

MATERIALS AND METHODS

These artificial reefs were surveyed for the first time in May 2005 for scleractinian coral cover and species presence. Three 20 m point



FIG. 1. Tangalooma Wrecks, Moreton Island, Moreton Bay



FIG. 2. A large plate of *Acropora* coral on the Tangalooma Wrecks. While the diversity is lower than at Amity, the colony size is larger.

intercept transects, recording coral presence/absence at 0.5 m intervals (Ohlhorst 1988), were carried out at Amity Rockwall and two transects at Tangalooma Wrecks. The transects were carried out on snorkel at 1–2 m depth. A list of coral species was also compiled while swimming haphazardly.

RESULTS AND DISCUSSION

At Amity Rockwall, 27 species belonging to five families and 12 genera were recorded, and 19 species belonging to five families and nine genera were recorded at Tangalooma Wrecks (Table 1). *Acropora millepora*, *A. sarmentosa*, *Montipora peltiformis*, *Favites russelli* and *Acanthastrea regularis* from



FIG. 3. Amity, Rockwall, North Stradbroke Island, Moreton Bay.

Amity Rockwall, and *Acropora samoensis*, *A. sarmentosa*, *Montipora faveolata*, *M. mollis*, *Leptoria* sp. and *Platygyra* sp. present at Tangalooma Wrecks were previously reported at Flinders Reef (Veron 1993), offshore to the north of Moreton Island, but have never been reported from the reefs inside Moreton Bay (Wells 1955; Lovell 1975, 1989; Harrison *et al.* 1991, 1995, 1998; Harrison & Veron 1993). These artificial reefs also create habitats for other marine creatures such as soft corals, and coral reef fish (pers. obs.).

The coral community of Amity Rockwall resembled the coral communities from the reefs inside and outside Moreton Bay with both Acroporidae and Faviidae almost equally represented. The coral community of Tangalooma Wrecks had fewer species and resembled the coral communities from outside Moreton Bay, where *Acropora* spp. were more abundant. The difference between in coral species present at the two artificial reefs may be due to their location: Amity Rockwall lies in the proximity of Peel and Goat Islands and may receive larval supply from there where Faviidae are more abundant, whereas Tangalooma Wrecks is relatively further away from the coral fringing coral reefs inside Moreton Bay and closer to Flinders Reef where Acroporidae are more common.

Tangalooma Wrecks had higher percentage coral cover (55.9 ± 10.71) than Amity Rockwall (23.57 ± 3.73). At Tangalooma Wrecks, some *Acropora* spp. colonies were over one meter in diameter, and minor damage was observed only on the corals growing on the external side of the wrecks. Coral colonies at Amity Rockwall were relatively smaller and extensive damage was observed caused by objects thrown to embellish the rockwall and by fishing lines. This suggests that Tangalooma Wrecks is less disturbed and corals growth is not impeded. Moreover, Tangalooma Wrecks is more strongly influenced by ocean water which is cooler in summer and warmer in winter (Lough 1994, EHMP 2004) allowing *Acropora* species colonies to grow relatively large.

Artificial reefs have been deployed in locations with different environmental conditions, from protected to open waters, and from clear to turbid waters (Rinkevich 2005; Shuhmaker 2002).

Two artificial reef systems in Moreton Bay

Table 1. List of scleractinian coral species observed during haphazard searches at the artificial reefs of Amity Rockwall (Am. Rk.) and Tangalooma Wrecks (Ta. Wr.) in Moreton Bay in May 2004.

Coral species	Am. Rk.	Ta. Wr.
ACROPORIDAE		
<i>Acropora digitifera</i>		
<i>A. divaricata</i>		
<i>A. gemmifera</i>		
<i>A. glauca</i>		
<i>A. hyacinthus</i>		
<i>A. latistella</i>		
<i>A. millepora</i>		
<i>A. nasuta</i>		
<i>A. samoensis</i>		
<i>A. sarmentosa</i>		
<i>A. solitaryensis</i>		
<i>A. valida</i>		
<i>A. verweyi</i>		
<i>Montipora</i> spp.		
<i>M. faveolata</i>		
<i>M. mollis</i>		
<i>M. peltiformis</i>		
DENDROPHYLLIDAE		
<i>Turbinaria frondens</i>		
<i>T. mesenterina</i>		
<i>T. peltata</i>		
<i>Barabattoia amicornum</i>		
<i>Cyphastrea serailia</i>		
<i>Favia matthai</i>		
<i>F. pallida</i>		
<i>F. rotumana</i>		
<i>F. speciosa/favus</i>		
<i>Favites halicora</i>		
<i>F. russelli</i>		
<i>Goniastrea aspera</i>		
<i>G. australensis</i>		
<i>Leptoria</i> sp.		
<i>Montastrea curta</i>		
<i>Platygyra</i> sp.		
MUSSIDAE		
<i>Acanthastrea echinata</i>		
<i>A. hemprichii</i>		
<i>A. regularis</i>		
POCILLOPORIDAE		
<i>Pocillopora damicornis</i>		
SIDERASTREIDAE		
<i>Psammocora superficialis</i>		

The information gathered during this survey suggests that protected, well-flushed and shallow areas on the eastern side of Moreton Bay are better suitable for the recruitment of sessile invertebrates in general, and for scleractinian corals in particular. Further studies on organisms other than scleractinian corals, and on other artificial reefs in Moreton Bay (e.g. Curtin Artificial Reef), will help to understand the role of artificial reefs in Moreton Bay in creating new environments that can be used as a refuge by some organisms.

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