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SETTLEMENT OF FOULING ORGANISMS AT THE JTRE NORTH BARNARD ISLA--ETC(U)

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TECHNICAL NOTE

MRL-TN-450

SETTLEMENT OF FOULING ORGANISMS AT THE JTTR
NORTH BARNARD ISLAND RAFT SITE

John A. Lewis

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ABSTRACT

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16. ABSTRACT (if this is security classified, the announcement of this report will be similarly classified):

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* * *

SETTLEMENT OF FOULING ORGANISMS AT THE JTTRE
NORTH BARNARD ISLAND RAFT SITE

1. INTRODUCTION

The Standards Association of Australia specifies that the resistance of marine underwater paint systems to marine fouling be determined under temperate conditions [1]. Much of the Australian coastline lies within tropical latitudes, however, and protective coatings used by Navy must also perform effectively in these waters. To this end, the Joint Tropical Trials and Research Establishment (JTTRE) at Innisfail, Queensland operates a marine exposure raft at the North Barnard Islands (Fig. 1). A study was commenced in 1976 to document the composition, seasons of settlement and long-term development of the marine fouling community at this site. This technical note presents data on the settlement of fouling organisms to supplement previously published findings [2] from the ongoing study.

Navy is considering the possible registration of the North Barnard Island raft by the National Association of Testing Authorities (NATA) as a test site for underwater coatings. Such registration requires the raft to meet criteria specified by Australian Standard 1580, test-method 481.5 [1]. Fouling settlement data have therefore been presented in a format suitable for Navy submission to NATA.

2. METHODS

Rigid, black poly(vinyl chloride) panels (30 cm × 15 cm × 3 mm) have been immersed below the North Barnard Island raft for periods which range from one month to three years [2,3]. For this report, data from twelve panels immersed for successive periods of approximately one month, from 7.8.78 to 21.9.79, are presented. Only settlement on the front, or 'light' side of each panel is considered and settlement density is estimated for an area of 1 m² over a 30 day immersion period. Assessment methods have been detailed previously [2].

Salinity and temperature data from the raft site (Fig. 2) were supplied by R. Pettis of MRL [4].

3. RESULTS

Settlement counts for the six most numerous organisms are presented in the format prescribed by AS 1580, test-method 481.5 in Table 1. Algae were the dominant organisms during the study period. The majority of plants on the one-month panels were juvenile forms and could not be identified to species level. Results for the Corallinaceae and Rhodomelaceae therefore represent the combined settlement of several species. Analyses of panels immersed for longer periods have, however, shown one species to account for most of the settlement in each group; namely *Heteroderma* sp. in the Corallinaceae and *Laurencia obtusa* (Hudson) Lamouroux in the Rhodomelaceae.

Most panels were almost covered by a turf-like assemblage of organisms (Fig. 3) whose abundance could not be assessed by counts of the number of individuals. The principal organisms in this turf were the brown alga *Feldmannia indica* (Sonder) Womersley & Bailey, the hydroid *Campanularia delicatula* (Thornley) and the stoloniferous bryozoan *Aetea truncata* (Landsborough). The abundances of these species during the study period are illustrated in Fig. 3.

Seventy-one taxa of fouling organism were recorded on the panels. The majority of these were red algae with the remainder spread across nine phyla (Table 2). The only major group of fouling organism not represented were the solitary ascidians. However, these are known to settle at the raft site [3].

4. DISCUSSION

Settlement of fouling organisms occurs throughout the year at the North Barnard Island raft site (Table 1, Fig. 3). The site therefore meets the criterion of AS 1580, test-method 481.5, paragraph 2.5 in this regard [1]. Settlement counts are lower than those reported in the test-method for the Garden Island raft site in Sydney Harbour. However, several of the dominant fouling organisms at the North Barnard site (*Feldmannia indica*, *Campanularia delicatula*, *Aetea truncata*) could not be included in the required type of

assessment. When the area of panel covered by these organisms is considered (Fig. 3), fouling rates appear much higher than on the basis of settlement counts alone.

The major groups of fouling organisms referred to in the Standard (barnacles, bryozoans, tubeworms, hydroids and bivalve molluscs) are each represented by several taxa at the raft site (Table 2). Numerous algal taxa were also present. Overall, the intensity, duration and diversity of fouling settlement are adequate for the raft to function as a suitable site for tests on the resistance of underwater coatings to marine fouling.

The seasonal variation in surface water temperature at the raft site (Fig. 2) is not within the limits defined by the standard; namely '... above 15°C and below 25°C for not less than 8 months of the year' [1]. However, the performance of coatings intended for use in tropical areas cannot be predicted exclusively from tests conducted in temperate latitudes. Apart from physical and chemical considerations, such as the effects of temperature on the release rate of toxins from a coating [5], differences in fouling composition between tropical and temperate latitudes also warrant the use of a tropical site. The use of a complementary test program, whereby coatings are exposed at both tropical and temperate sites, would seem the most appropriate method to assess the performance capabilities of coating systems in Australian waters.

5. CONCLUSION

On the base of intensity, diversity and persistence of fouling settlement the North Barnard Island raft site meets the requirements of AS 1580, test-method 481.5 and is considered a suitable site to test the resistance of underwater coatings to marine fouling under tropical conditions.

6. ACKNOWLEDGEMENTS

The assistance of personnel at JTTRE in conduct of this exposure trial is gratefully acknowledged.

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3. Lewis, J.A.. Unpublished data.
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T A B L E 1

ABUNDANCE OF THE SIX MOST NUMEROUS FOULING ORGANISMS

Organism	Settlement Count (Individuals/m ²)* Period Ending (1978/79)											
	13/9	13/10	7/11	7/12	17/1	9/2	9/3	18/4	29/5	24/7	28/8	21/9
Corallinaceae spp. (Red algae)	1300	4000	4400	2800	17500	3400	2900	3700	1100	-	1500	28400
Rhodomelaceae spp. (Red algae)	2600	22300	21800	2200	5700	100	300	400	100	-	-	-
Cladophora spp. (Green algae)	3700	2700	1700	3300	4100	4200	2000	2600	2300	-	300	15500
Enteromorpha clathrata (Roth) Greville (Green algae)	2800	1300	4000	1700	200	3400	100	1700	400	-	-	5900
Spirorbinae sp. (Tubeworm)	-	500	2200	100	400	700	400	1700	2300	200	-	1000
Thalamoporella gothica (Busk) (Bryozoan)	100	400	100	+	700	800	300	400	100	-	100	100

* Counts estimated for 30 day period

T A B L E 2

NUMBER OF TAXA (n) OF EACH OF THE PRINCIPAL GROUPS
OF FOULING ORGANISMS IDENTIFIED ON ONE-MONTH
IMMERSION PANELS DURING THE STUDY PERIOD

Group	n	Group	n
Green algae	4	Tubeworms	4
Brown algae	3	Bivalve molluscs	6
Red algae	24	Barnacles	4
Sponges	2	Erect bryozoans	3
Hydroids	11	Encrusting bryozoans	5
Corals	1	Colonial ascidians	4

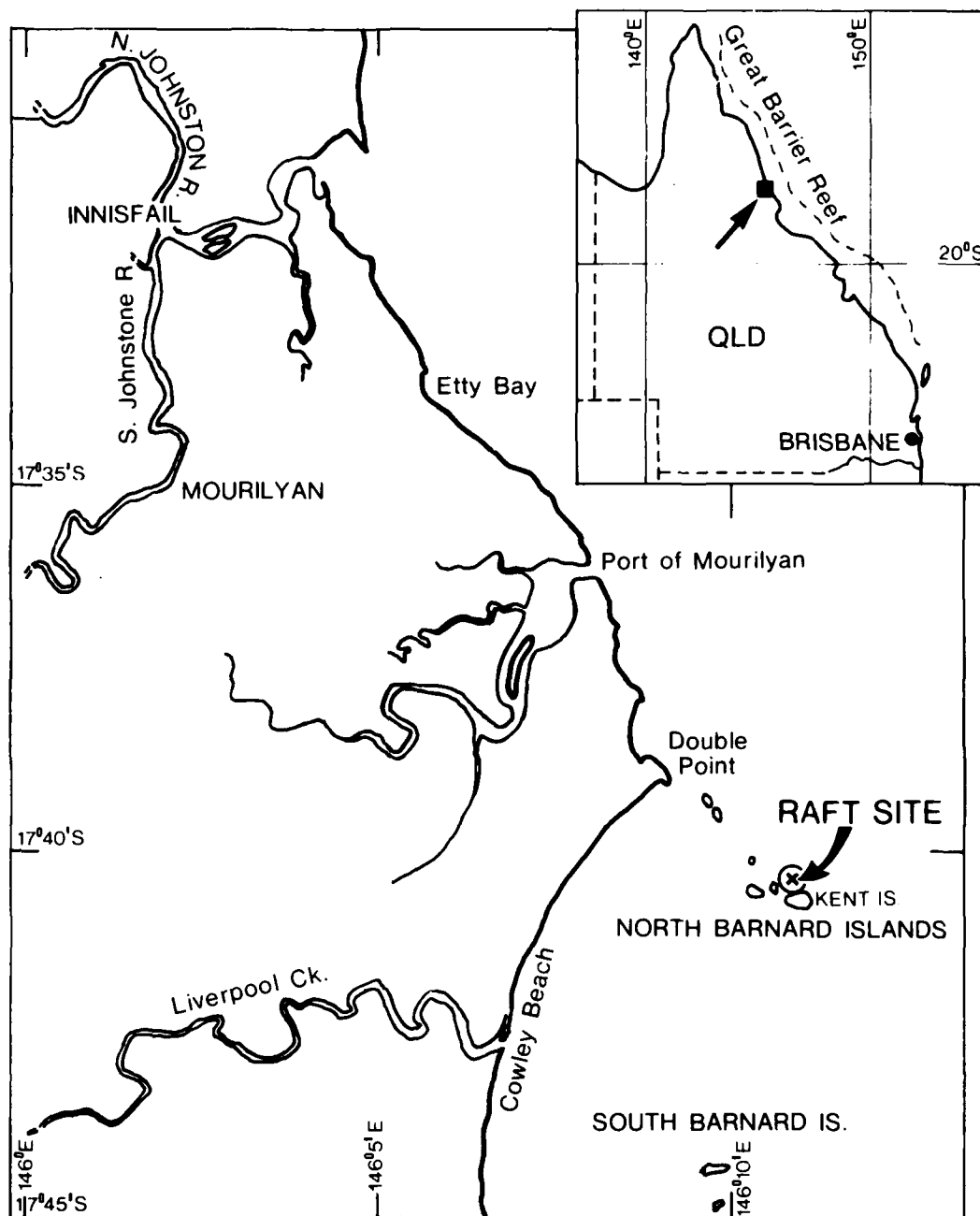


FIG. 1 - Site of the JTIRE marine immersion facility at the North Barnard Islands, Queensland.

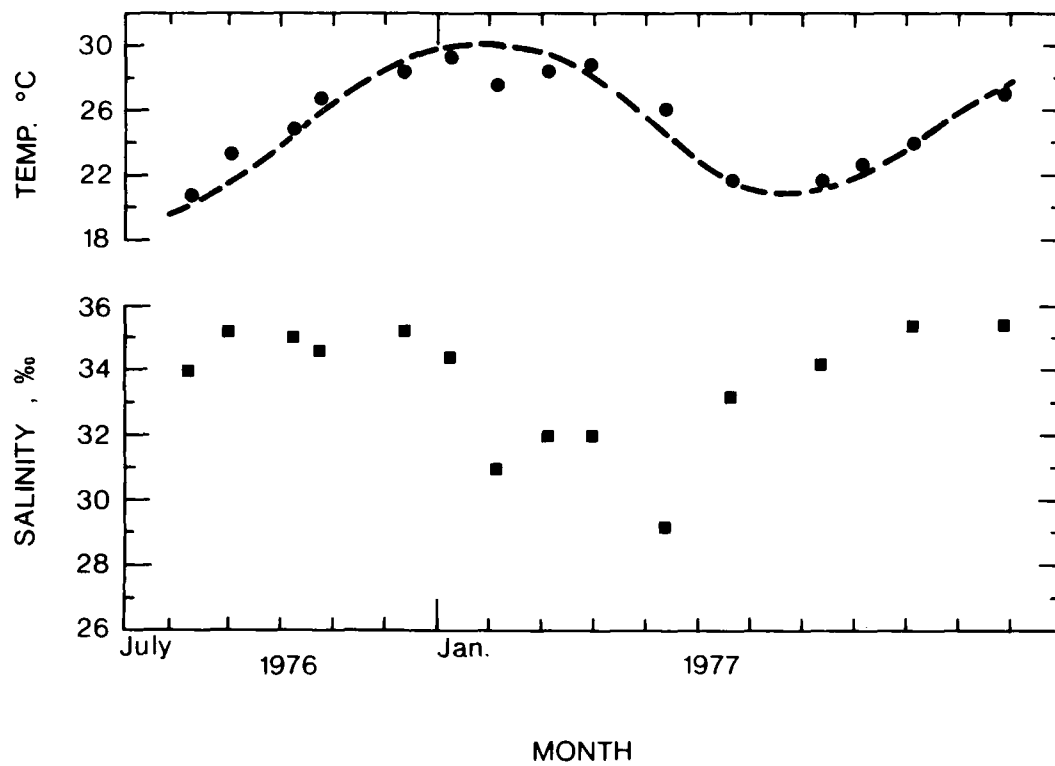


FIG. 2 - Variation in water temperature and salinity at the raft site.

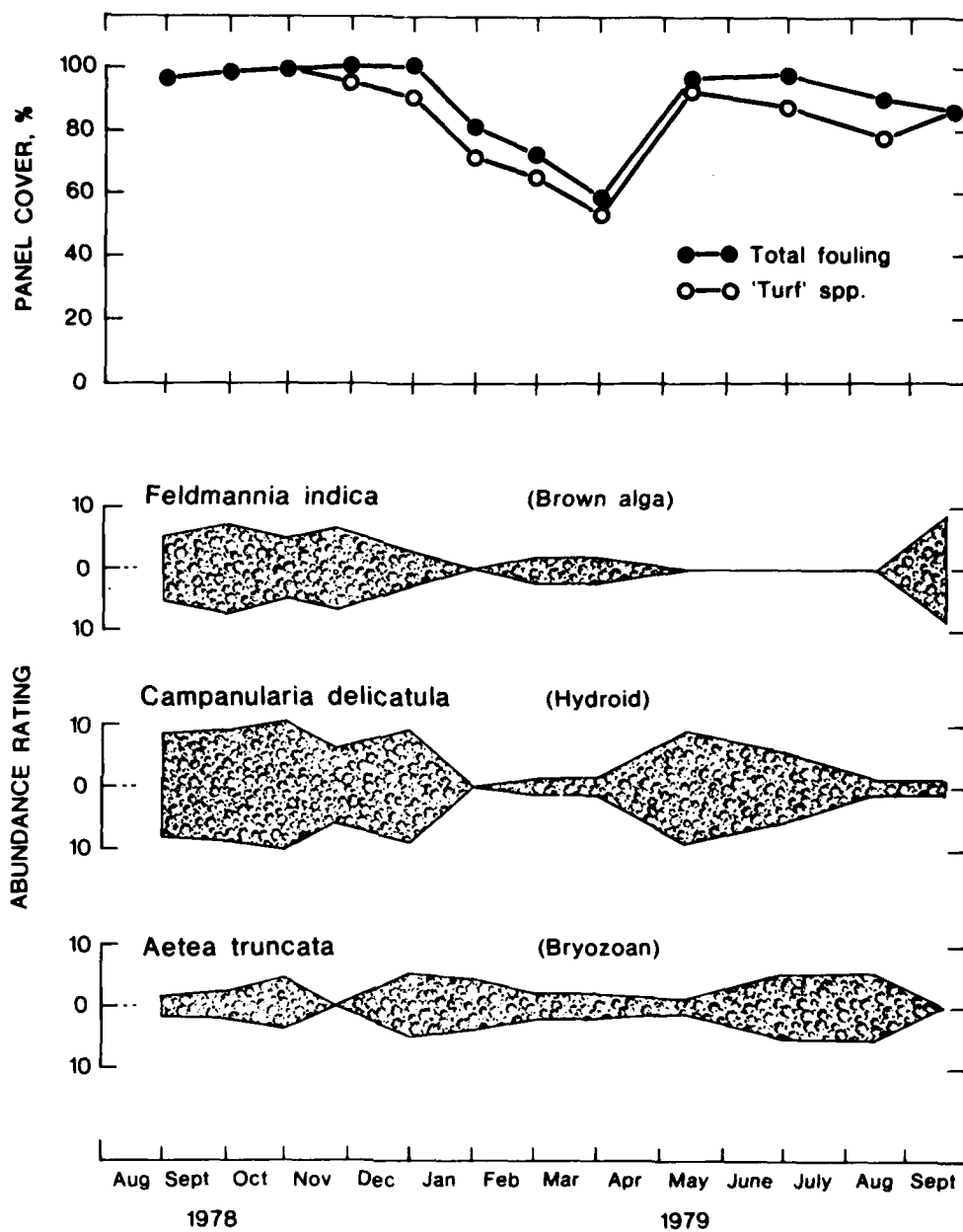


FIG. 3 - Abundance of 'turf-like' fouling growth and its principal components. (Species rated on a 0-10 scale of increasing abundance [2]).

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