APPENDIX K: MACROINVERTEBRATE SAMPLING PROGRESS REPORT (BIO-ANALYSIS, 2005)

DRAFT

HEXHAM SWAMP REHABILITATION PROJECT
BENTHIC MACROINVERTEBRATE MONITORING

4th PROGRESS REPORT

PREPARED FOR THE

HUNTER-CENTRAL RIVERS
CATCHMENT MANAGEMENT AUTHORITY

By

D. E. Roberts

February 2005

BIO-ANALYSIS

Marine, Estuarine & Freshwater Ecology

ABN: 20 250 386 936
7 Berrys Head Road, Narara NSW, 2250
Tel: 0243296030; Fax: 0243292940
Email: bbioana@bigpond.net.au

INTRODUCTION

Hexham Swamp is a large 3,800 ha wetland adjacent to the Hunter River, to the west of Newcastle. Ironbark Creek flows through the wetland, however in 1970 floodgates were installed to mitigate flooding of urban areas within the catchment of the creek. Since their installation, the floodgates have remained closed and tidal flushing into the wetland has been limited. This has led to reduced salinity and water quality and a change from what was once an estuarine wetland system to a freshwater system. As a result of the reduced tidal inundation, large areas of mangroves and saltmarsh were lost, whilst the common reed *Phragmites australis* now dominates the wetland vegetation as monospecific stands. The Hexham Swamp Rehabilitation Project, administered by the Hunter Catchment Management Trust, aims to restore tidal flushing to approximately 2000 hectares of wetland. The floodgates will be opened gradually with the aim of rehabilitating mangrove and saltmarsh communities and restoring ecological function.

Restoration of habitat, such as wetlands, is recognised as a way of reversing degraded systems and restoring ecological function (Chapman and Underwood, 2000). In NSW, approximately 50% of saltmarsh habitat has been lost due to urban development and poor catchment management practices (Saintilan and Williams, 2000). In some estuaries this loss has been quite severe, for example in Tuggerah Lakes, eighty five percent of the saltmarsh and fringing wetland vegetation has been lost and what is left is in very poor condition (Roberts and Chapman, 2003).

A pilot study was done to assess the suitability of sites within Hexham Swamp, Kooragang Island and Tomago Wetlands (Fig. 1). The pilot was aimed at gaining data on the general patterns of distribution in the structure of assemblages of macroinvertebrates at a variety of spatial scales (Roberts, 2002). In the second sampling time in January 2003, two additional control sites were investigated, however only one of these was considered useful (Roberts, 2003a) and included in the third and fourth time of sampling (Roberts, 2003b; Roberts, 2004). This report provides summary results and discussion on the fifth time of sampling benthic macroinvertebrates from the creeks within these wetlands during December 2005.

METHODS

The experimental design for the pilot study was targeted at identifying appropriate scales of variability required to detect change once the floodgates were opened (Roberts, 2002). The pilot study identified problems with using the control creeks in Hexham Swamp and it was recommended that Dead Mangrove Creek on Kooragang Island and Tomago West (a tributary off Dunnes Creek) be investigated as suitable controls. Both of these creeks were considered to be degraded and had limited tidal flushing due to floodgates. Since these control creeks were much smaller than Ironbark Creek and the reference creeks, only two locations were sampled (Table 1). Further sampling revealed that the creek in Tomago West was not a suitable habitat for macroinvertebrates so this creek was dropped from further sampling (see Roberts, 2003a). The control creek in Hexham Swamp (Dead Mangrove Creek) was retained and samples are now collected at two locations within this creek.

Table 1. Experimental design.

	Rehabilitated	Reference		Control
Creek	Ironbark Creek	Dunnes Creek	Moscheto Creek	Dead Mangrove Creek
Location	4	4	4	2
Sites	2	2	2	2
Replicate	3	3	3	3
n	24	24	24	12

Three benthic sediment cores (10 cm diameter and 10 cm deep) were collected at each site and the samples were washed through a 0.5 mm mesh sieve and placed into pre-labelled plastic bags. The samples were fixed with 7% buffered formalin/seawater (v/v). In the laboratory, each sample was rinsed to remove the formalin before sorting under a binocular microscope. All organisms were counted and identified to species where possible, using an ISSCO M400 stereomicroscope. Specimens were stored in 70% alcohol and a taxonomic voucher collection was prepared for the study.

Figure 1. Location of the three wetlands sampled adjacent to the Hunter River, Newcastle (source: www.ozestuaries.org)

RESULTS AND DISCUSSION

The assemblages of macrobenthic invertebrates in all four creeks (Ironbark Creek, Dunnes Creek, Moscheto Creek and Dead Mangrove Creek) consisted of a total of 250 individuals from several groups of common estuarine fauna, which included worms, molluscs and crustaceans. The crab *Heloecius cordiformis* was the most abundant animal, followed by polychaete worms from the families Capitellidae, Nephtyidae and Nereididae.

There was a reduction in the number of taxa and their abundance at locations 1 and 2 in Ironbark Creek compared with the data collected in March 2004 (Fig. 2). The reference creeks had greater richness and abundance of macroinvertebrates compared to those in Ironbark Creek (Fig. 2). The upstream locations on Ironbark Creek also had greater abundances compared with those found in March 2004 (Fig. 2). This may be a consequence of the removal of the constriction across Ironbark Creek (Roberts, 2004) allowing greater flushing. The overall patterns in both richness and abundance had returned to similar patterns that were found before March 2004 (Fig. 2).

At this stage, it is unlikely that the floodgates will be opened in 2005. The next macroinvertebrate sampling run is scheduled to occur sometime between March and May 2005.

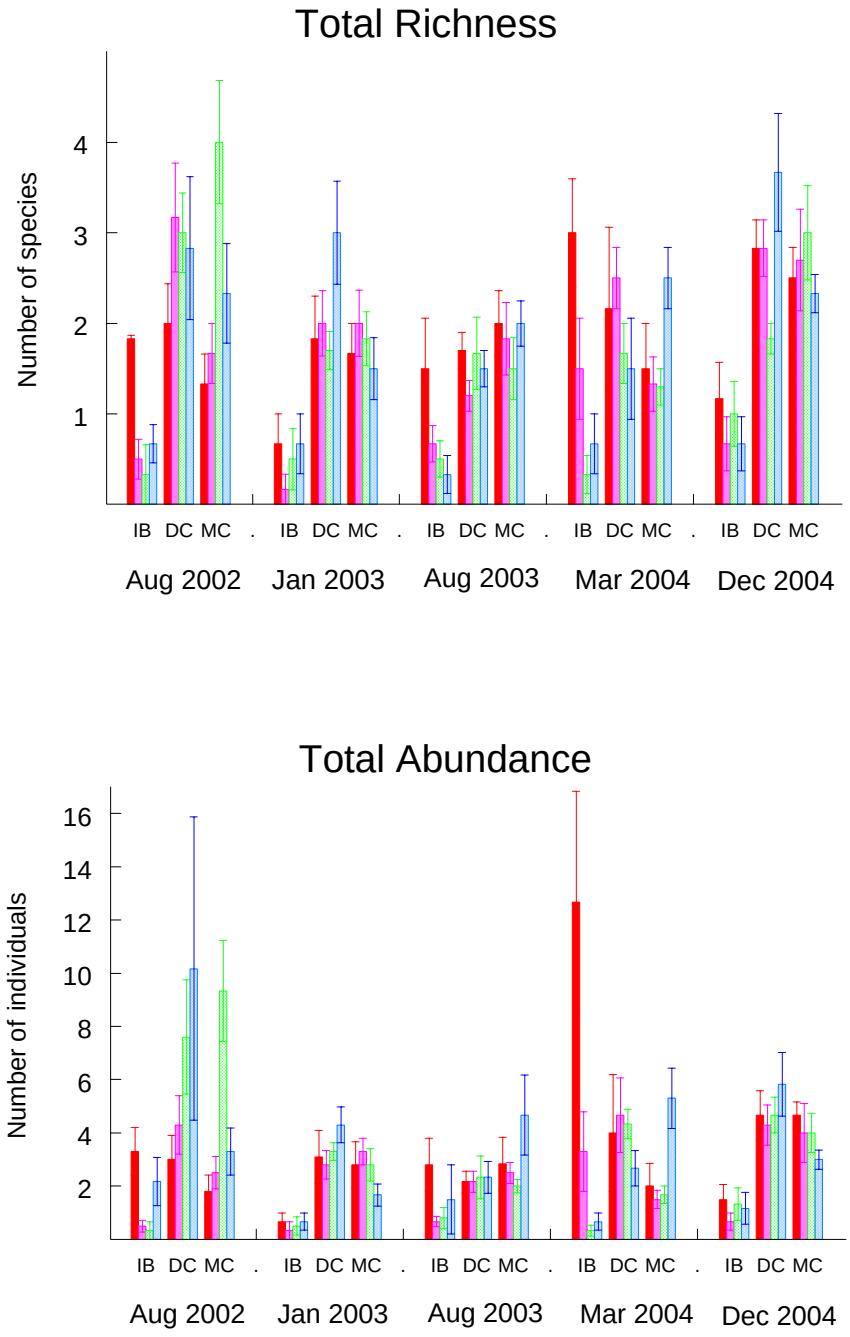

Figure 2. Mean (± SE) richness and abundance of macroinvertebrates within each of the three creeks (IB – Ironbark Creek, DC – Dunnes Creek, MC – Moscheto Creek) in August 2002, January 2003, August 2003, March 2004 and December 2004.

ACKNOWLEDGEMENTS

Shane Murray, Sharon Cummins, Nick Roberts and William Roberts are thanked for field and laboratory assistance. Sharon Vernon and Nick Staheyeff (H-CRCMA) are thanked for their advice and project support.

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