Port Hedland RGP5 Dredge Monitoring: Resilience of coral communities to natural and dredging-related elevations in turbidity. Andrew Tennyson.

In 2009 BHP Billiton Iron Ore dredged almost 4Mm^3 in Port Hedland inner harbour to allow for insertion of two additional berths at Finucane Island. Dredge material was moved to an offshore spoil ground or one of three intertidal reclamation areas. Two of these areas (Areas B1 and B2) were embayments of Finucane Island within the harbour. The third area (Area A) was located on the mainland to the west of the existing BHP Billiton Iron Ore Finucane Island train line.

Dredging commenced in March 2009 using a grab dredge, followed by commencement of cutter suction dredge (CSD) operations on 13 May 2009, with dredging operations completed on 29 December 2009. Sources of increased turbidity during the project included dredging activity, dewatering from Area A and seepage from B1 and B2. Excess water in Area A was discharged into Salmon Creek, an estuary system to the west of the harbour.

Extensive desktop and field investigations were conducted to identify areas of benthic primary producer habitat (BPPH) that may be impacted. No significant subtidal benthic primary producer (BPP) biota was identified within the dredge footprint. The only subtidal BPP community identified within the predicted zone of elevated turbidity included a sparse community of corals off the northeast point of Finucane Island. At this location, small coral colonies growing on exposed hard substrate accounted for < 10% benthic cover, while the remaining habitat consisted largely of sand and mud. This site is approximately 1km from the harbour entrance and shipping channel and has been exposed to increased turbidity from shipping movement and previous dredge campaigns. Outside the predicted area of elevated turbidity, a reference site was established at Weerdee Island, representing the only known site with comparable biological and physical characteristics to the coral community at Finucane Island. Baseline water quality and coral health monitoring commenced at the reference site and impact site from June 2008 and August 2008, respectively. During the baseline period, median and maximum turbidity at the impact site were 6.0 and 71.5 NTU; at the reference site 2.7 and 89 NTU.

Regulatory authorities recommended that ANZECC guidelines be followed in the development of water quality trigger values, based on percentiles of background data relevant to the Level of Ecological Protection (LEP). In this case, 80th %iles were used as management trigger values in areas of High LEP, while 95th %iles were used as trigger values in areas of Moderate LEP. To allow for tidal and seasonal influence, impact site trigger values were calculated for four distinct tide-season combinations: spring and neap tides in both the dry and wet seasons. If triggers were reached as a result of dredging or placement activities, this event would trigger an immediate examination of the health of the coral community at Finucane Island.

Turbidity triggers based on percentiles proved to be overly conservative, since they were reached as a result of both natural (80th %ile triggers are expected to be reached 20% of the time naturally) and dredging-related impacts, but with no subsequent impacts to coral health. Despite turbidity at the impact site reaching 15 NTU for periods of up to six weeks and rarely falling below 5 NTU throughout the dredging program, there were no detectable impacts to coral health relative to the reference site. The coral communities at Finucane Island and elsewhere in the nearshore environment of Port Hedland appear to be adapted to extended periods of naturally elevated turbidity. Turbidity triggers based on 80th and 95th percentiles were also deemed inappropriate for management of a dredging program where it is already predicted that dredging will cause elevations in turbidity above background levels. In future, the demonstrated resilience of Pilbara coral communities to elevations in turbidity should be considered when developing water quality management triggers.

This study also highlights the importance of demonstrating the level of ecological significance and uniqueness of benthic communities that may be impacted, in order to decide on the level of monitoring and management that these communities should be afforded. Given the density and areal coverage of corals at the Finucane Island monitoring site, it is felt that the level of cost and effort expended in the monitoring program was disproportionate to the ecological significance of this habitat. There may be better environmental benefit alternatives to intensive and costly subtidal monitoring in situations where benthic communities are known to be naturally resilient and of low environmental significance.