

# **Reducing sediment loads to the Great Barrier Reef from the O’Connell River, Mackay Whitsunday**

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## **Key Points**

- Stability assessment identified a range of priority eroding inset floodplains
- A risk assessment model was developed which addressed the scale of protection required
- Report was used to engage landholders to implement bank stabilisation works using Australian Government Reef Programme funding

## **Keywords**

O’Connell River, Great Barrier Reef, Stability Assessment, Bank Stabilisation

## **Introduction**

Previous investigations have identified the O’Connell River as one of the largest sources of sediment to the Great Barrier Reef (GBR) (Brodie et al., 2003). A significant proportion of the sediment supply is understood to be derived from channel erosion (Simon et .al. 2012). Channel erosion also threatens agricultural land and public infrastructure. This study assessed the cause, location, extent and prognosis (trajectory) for channel erosion through the main stem of the O’Connell River. Based on the outputs of this investigation management strategies to reduce the impact of channel erosion on the GBR have been implemented by Reef Catchments.

## **O’Connell River Stability Assessment and Restoration**

The O’Connell River flows through a partly confined valley for most of its length which means the valley margins limit lateral migration of the channel. Within the valley, inset floodplains and terraces (floodplains formed during past flow regimes) are used for both grazing and sugar cane production.

Analysis of multi-temporal LiDAR data allowed assessment of channel change between 2010 and 2014. Hydraulic modelling and field assessments of riparian condition was used to assess the forces that both drive and resist channel change. The investigation identified highly resistant terrace features limited channel change even under high stream power conditions. Within the broader macrochannel, inset floodplains were highly susceptible to bank erosion when riparian condition was poor (Figure 1)

Using a stream stability assessment developed from the investigations, a range of priority eroding inset floodplain sites were selected for riparian restoration. A risk assessment approach was developed which assessed the scale of protection required to withstand the modelled shear stress, to give a reasonable likelihood of vegetation establishing on the upper bank without flood related damage occurring during the ten-year vegetation establishment period.

## **8ASM Short Communication/Technical Note**

*Dench et.al. – O'Connell River Stability Assessment and Restoration*

With funding from the Australian Governments Reef Programme Systems Repair, which aims to reduce pollutant loads from entering the Great Barrier Reef Lagoon, Reef Catchments utilised the stability assessment to engage with landholders, highlighting the losses over the four year period and to discuss and plan the implementation of stream bank stabilisation between 2014 - 2016.

The report was effective for communicating to landholders the type of remediation necessary to stabilise the banks over the ten year period until the vegetation had established. Areas of low stream power were identified from the report as lower risk and therefore ideal for straight revegetation or if needed reprofiling and revegetation. The adjoining landholders were then engaged to implement the remediation needed (Figure 2). In sections of higher stream power a range of options were identified and selected depending on likelihood of success and resources available. A number of hard engineered options were undertaken along the O'Connell River including rock toe protection and a pile fields project. (Figures 3, 4 and 5 on the following page)

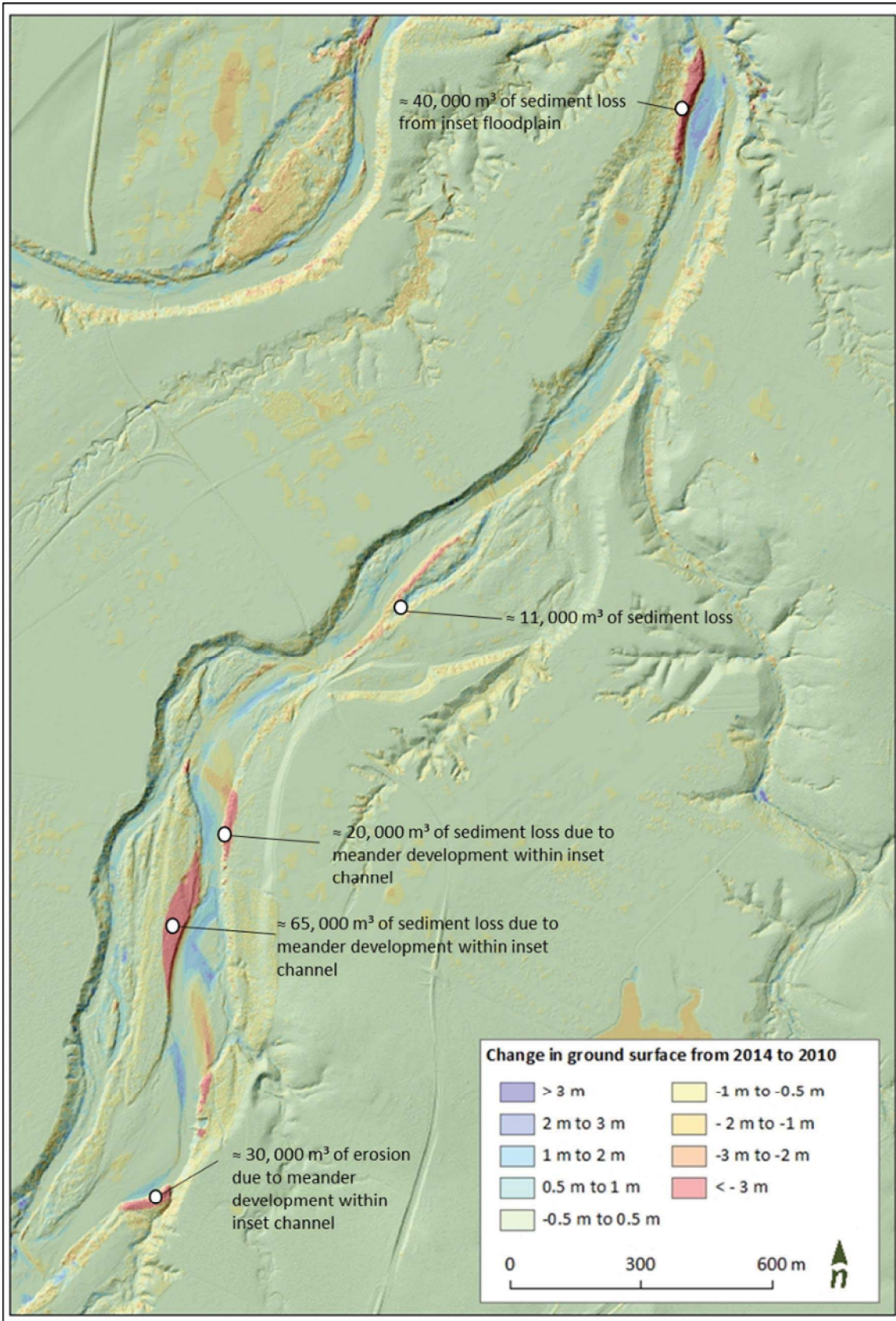


Figure 1. Changes in elevation between 2014 and 2010 included estimates of sediment loss in the O’Connell River upstream of the Andromache River confluence. Note all the sediment loss is from inset floodplains within the broader macro channel. Site above, which lost 65 000m<sup>3</sup>, is highlighted below as photo in figure 5 before and after



Figure 2. Areas of low stream power suitable for revegetation alone



Figure 3. Site B1 before (left) and after (right) where 9000 m<sup>3</sup> of sediment was lost between 2010 – 2014



Figure 4. Site B2 before (left) and after (right) where 10000 m<sup>3</sup> of sediment was lost between 2010 – 2014



Figure 5. Site A2 before (left) and after (right) where 65000 m<sup>3</sup> of sediment was lost between 2010 – 2014

## **Conclusions**

The stability assessment has been essential to inform the broader implementation of Reef Programme funded activities along the river, which has resulted in greater landholder participation and implementation of works to reduce sediment loads to the Great Barrier Reef. While it is too early to assess the effectiveness of the works, photo points have been established at all sites to monitor revegetation establishment. An initial survey has also been undertaken on three engineered banks stability projects with the inclusion of an additional forth paired site which has not had works undertaken. These sites will be surveyed again after each successive wet season to monitor erosion losses.

## **Acknowledgments**

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## **References**

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