Healthy Country

managing the land for healthy waterways

Sediment budgets and rehabilitation priorities

Authors: Jon Olley, Nina Saxton, Doug Ward, Tim Pietsch, Joe McMahon, Pat Laceby, Fiona Bengtsson, Amanda Bland, Brad Rickard, and Calvin Rose

Background

The Healthy Country proof of concept project is targeting the reduction of sediment loads entering waterways and receiving waters from the priority catchments of the Logan and Bremer Rivers and Lockyer Creek. SEQ Healthy Waterways Partnership is coordinating the science and planning tasks that underpin the catchment-scale waterway prioritisation process and Griffith University, in conjunction with the eWater CRC are developing local and regional scale decision support tools to inform the onground investment in waterway rehabilitation activities. This poster will summarise the key methods that were used in performing this task.

Figure 1: *Erosion Sources map for Knapps Creek*

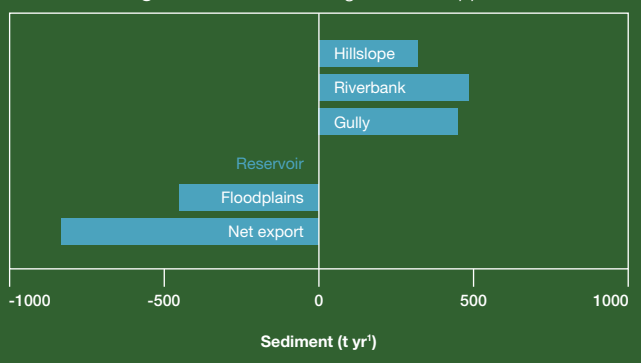
Identification of Primary Sediment Sources

SPOT 2.5m imagery was used to determine land cover classification in the three focal areas of Knapps Creek, Upper Bremer River and Blackfellow Creek. The four land cover classes defined for image classification were: i) terrestrial vegetation ii) riparian vegetation iii) channel bank/gully erosion and iv) hillslope erosion. An example of the erosion source maps is shown in *Figure 1*. These maps were used by the project partners SEQ Catchments and Queensland Primary Industries and Fisheries to target landowner engagement activities in the areas with significant erosion sources. Preliminary assessment of the maps indicated channel bank/gully and hillslope erosion sources were prevalent in Knapps Creek with a significant area of channel bank/gully erosion evident in the middle section of the catchment. Channel bank/gully erosion was the most prevalent erosion process in the Upper Bremer River and hillslope erosion processes dominated in the Black Fellow Creek subcatchment.

Development of Sediment Budgets

Primary sediment source maps indicate the location of current eroded bare surfaces but do not describe the extent of sediment delivery through the catchment. Sediment budgets assess sediment movement through the catchment by determining contribution and deposition processes. Sediment budgets were developed for all three catchments through the modification of the physically-based process model, SedNet. This existing model was improved by the inclusion of higher resolution datasets such as 25m land use, 2.5m topography, more detailed floodplain mapping and field survey based estimates of channel geometry. As an example, the sediment budget for the Upper Bremer River (*Figure 2*) shows channel bank/gully erosion processes dominate to give a net export of 850t/yr of fine sediment. In comparison, the Knapps Creek focal area has a net export of ~4635t/yr and Black Fellow Creek has a net export of 340t/yr of fine sediment.

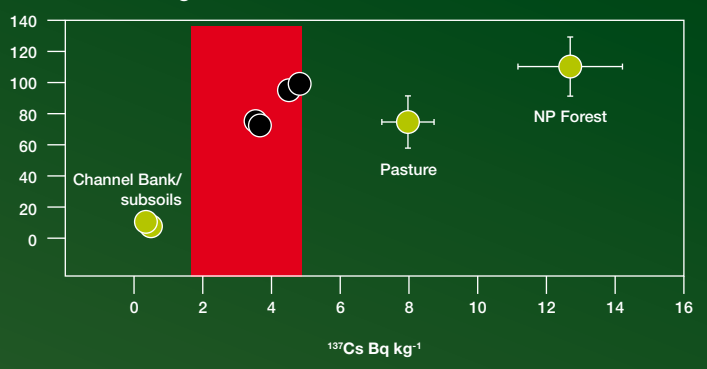
Figure 2: *Sediment budget for the Upper Bremer River*



Validation of Sediment Budgets

The sediment budgets for each focal area were validated by sediment tracing studies to determine the origin of fine sediments collected from the stream network. Fallout radionuclides Cs-137 and Pb-210 were used to determine the relative contribution of hillslope and channel bank/gully erosion as the radionuclides occur through the soil profile in a known distribution pattern. *Figure 3* illustrates the signature for given land uses and sediments taken from the Black Fellow Creek subcatchment. These data confirm the dominant process contributing sediment to the stream is through hillslope erosion.

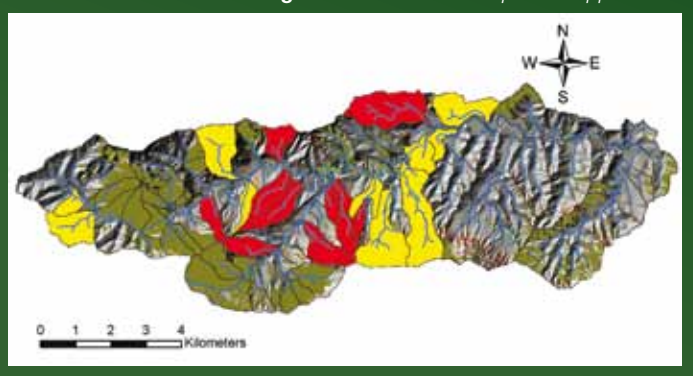
Figure 3: *Fallout radionuclide data for Black Fellow Creek*



Subcatchment Prioritisation Process

Results from the existing primary erosion sources and sediment budgets for each catchment were used to derive prioritisation maps for each focal area. *Figure 4* shows the top ten highest yielding (red) and the next ten highest yielding (yellow) subcatchments in Knapps Creek. The sediment budget for this focal area suggests the top ten subcatchments cover ~10% of the focal area and contribute ~54% of the sediment load. The next ten highest yielding subcatchments cover an additional 13% of the focal area and contribute a further 22% of the sediment supply. Similar results were found for the Upper Bremer and Blackfellow Creek catchments.

Figure 4: *Prioritisation map for Knapps Creek*



These local-scale decision support tools can be effectively used to prioritise on ground works for stream rehabilitation in order to reduce sediment loads to waterways and deliver a science-based approach to maximise investment for these activities.

SEQ Catchments

Healthy Waterways — Because we're all in the same boat

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