Reassessing the Fluvial Geomorphology and Hydrology of Pipers River, including Rehabilitation Outcomes – Project Outcomes

My name is Matthew Tedford and I am a student at the University of Tasmania, based at the Newnham Campus. Over the past six months I have been researching Pipers River as part of the final subject of my undergraduate degree, Bachelor of Applied Science – Environmental Science. With help from Tamar NRM and the Christopher Strong Fellowship, I was able to complete this report, which will be featured in a scientific journal in the near future. The following is taken from the abstract of my report, “Reassessing the Fluvial Geomorphology and Hydrology of Pipers River, including Rehabilitation Outcomes”.

The benefits of healthy, well-operating rivers are often overlooked or taken for granted worldwide. Not only do rivers provide a broad range of ecosystem services, they provide water, which is required for human life. Understanding the way that a river changes by geomorphological and hydrological methods can help to determine the state of the health of the river, and whether rehabilitation is required.

Pipers River in Tasmania has a long history of anthropogenic pressure – predominately in the form of agricultural use. Land clearing for stock, and the introduction of invasive species has had a large impact on river health. Large amounts of intervention and rehabilitation measures have been carried out by landowners, including streambed clearing for flood mitigation, and extensive Willow removal in an attempt to return the river back to its healthy native state.

Previous studies including geomorphological and hydrological assessments were carried out in 2000 and 2016 at four representative sites along the river, including Underwood, Collins Rd, Colgraves Rd and Baxters Rd. This report concentrates on those four sites, using data from a variety of previous studies, along with some content from 2017. Research was conducted using historical and up-to-date photograph comparisons, satellite image comparisons over time, descriptive comparisons from previous studies carried out on the river,

bankfull cross-sectional area comparison, and hydrological equations which helped to determine changes in cross-sectional area, velocity, discharge, Reynolds Number and Froude Number. This information helped to determine what effect rehabilitation has had on the river.

Underwood, the most natural, biologically diverse and protected of the four sites, was stable with little change to its bankfull cross-sectional area, decreasing in velocity and discharge over time with a constant subcritical, laminar flow. Collins Rd, under anthropogenic pressures, gives a bankfull cross-sectional area that indicates river change as it deepens with losses of sediment from the riverbanks, although velocity and discharge have decreased more than that of Underwood, with a once subcritical turbulent flow downgraded to subcritical laminar flow. Colgraves Rd, also under anthropogenic pressure, has accreted sediment over time as seen by the bankfull cross-sectional area. Velocity and discharge have increased dramatically, maintaining a subcritical turbulent flow that is destined for future erosional problems. Baxters Rd, the site of heavy rehabilitation by Willow tree removal, has lost significant cross-sectional area where this has taken place. In saying that, velocity and discharge have decreased, but the laminar flow recorded in 2000 is now classified as turbulent flow as of 2016.

From the results found, it can be concluded that more research is required to determine the long-term effect of Willow removal on riverbank sediment loss. To prevent further loss and damage to erosion-prone areas, adequate fencing of riparian vegetation of up to ten metres behind the river line is recommended. This will prevent further damage to the river by means of excluding the presence of stock. By doing so, the riparian zone is able to acquire native vegetation naturally by means of hydrochory during times of high flow. For an increased recovery time, planting of native vegetation specific to the area can be effective, bringing the riparian zone back to the healthy state that it once was.

Underwood site looking upstream, 2000. Credit: East Tamar Landcare Group

Underwood Site looking upstream, 2016. Credit: Matthew Tedford

Collins Rd site looking downstream, 2000. Credit: East Tamar Landcare Group

Collins Rd site looking downstream, 2016. Credit: Matthew Tedford

Colgraves Rd looking downstream, 2000. Credit: East Tamar Landcare Group

Colgraves Rd site looking downstream, 2017. Credit: Matthew Tedford

Baxters Rd site, 2000. Credit: East Tamar Landcare Group.

Baxters Rd site looking upstream after rehabilitation, 2016. Credit: Matthew Tedford

Other photos of Pipers River from 2000, unknown sites.

Willow damage.

In-stream island created by willow infestation.