

Improving Knowledge of Bank Erosion Processes in Southland

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▶ How does bank erosion affect our environment?

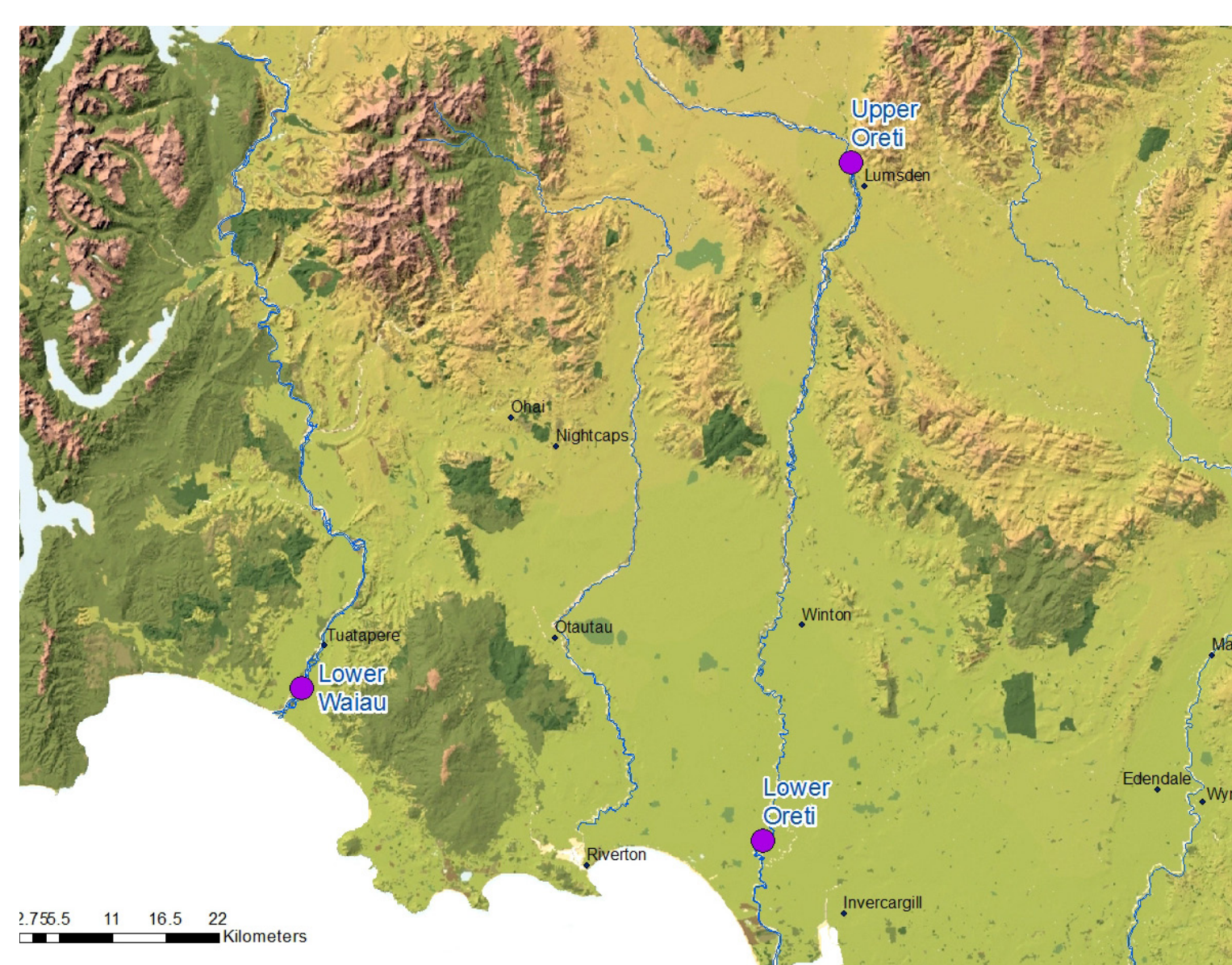
Bank erosion has been identified as a contributor to sediment fluxes in Southland.

Erosion can cause channel instability and impact on habitat for plant and biota through fine sediment distribution.

The objectives of this study were to improve our knowledge of bank erosion processes through using case studies to estimate bank migration.

▶ Field studies

Sites were chosen based on known historical erosion, ease of access and availability of aerial photography.



▶ Bank erosion study sites in Southland.



▶ Lower Waiau River – regulated by the Manapouri Power Scheme and heavily influenced by flooding.



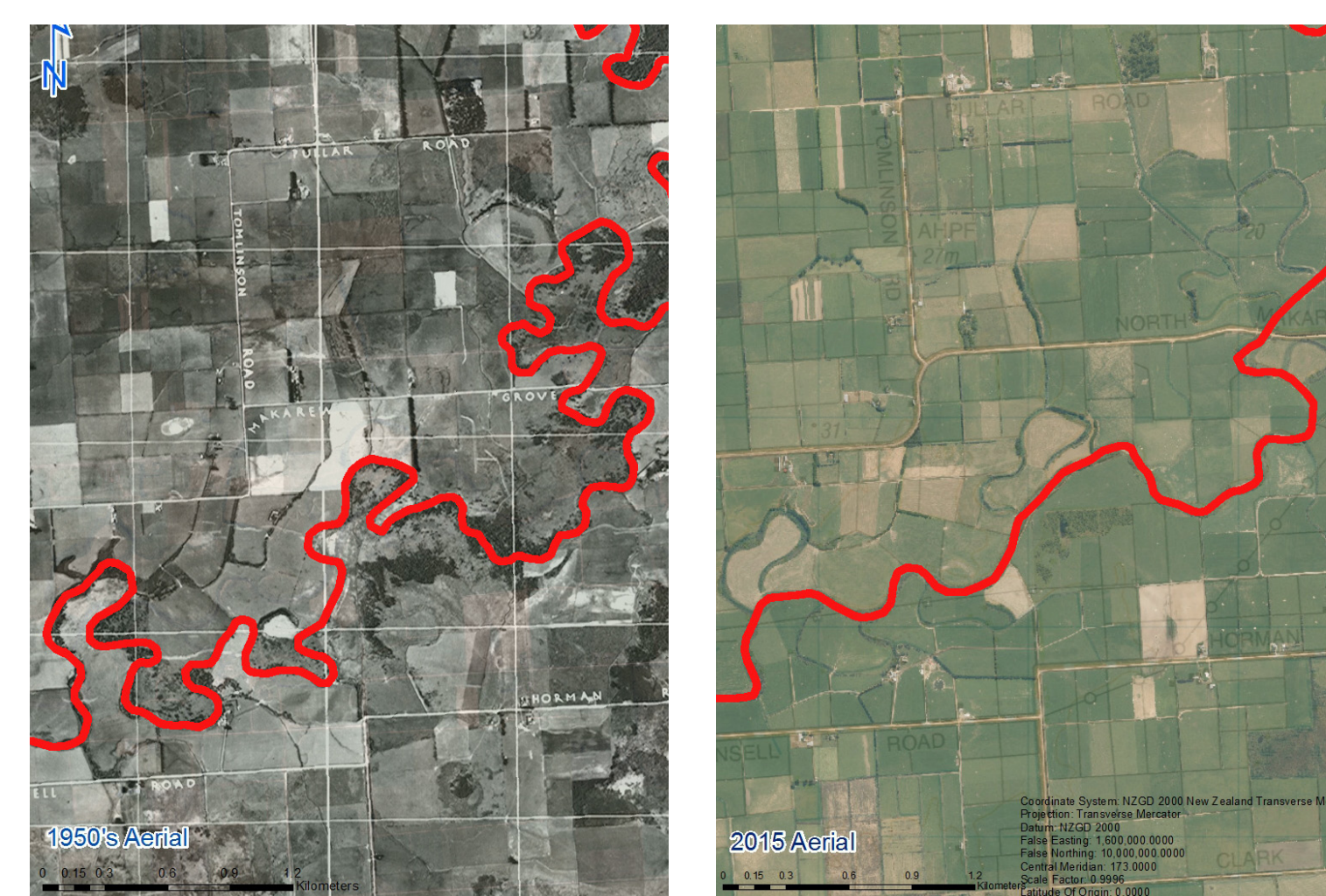
▶ Lower Oreti River – meandering lower reach, flowing into the New River Estuary which has been affected by modification.



▶ Upper Oreti River – bank erosion arrested by rock protection put in 2007 to protect the bridge abutment.

▶ Methodology

Digital photos, tape measurements and field notes were taken at each site. ArcGIS was then used to compare 1950's aerial photos to 2014 aerial photos and calculate an estimated bank migration rate.



▶ Makarewa River at Counsell Rd – 1950s

▶ Makarewa River at Counsell Rd – 2015

At the lower Waiau River site a Real Time Kinematic (RTK) was used to measure erosion. The RTK is an extremely accurate device that aims to reduce and remove both vertical and horizontal positional errors. A Global Navigation Satellite System is connected to a handheld controller which increases the accuracy to tens of millimetres.



▶ A RTK measures bank erosion on the lower Waiau River site.

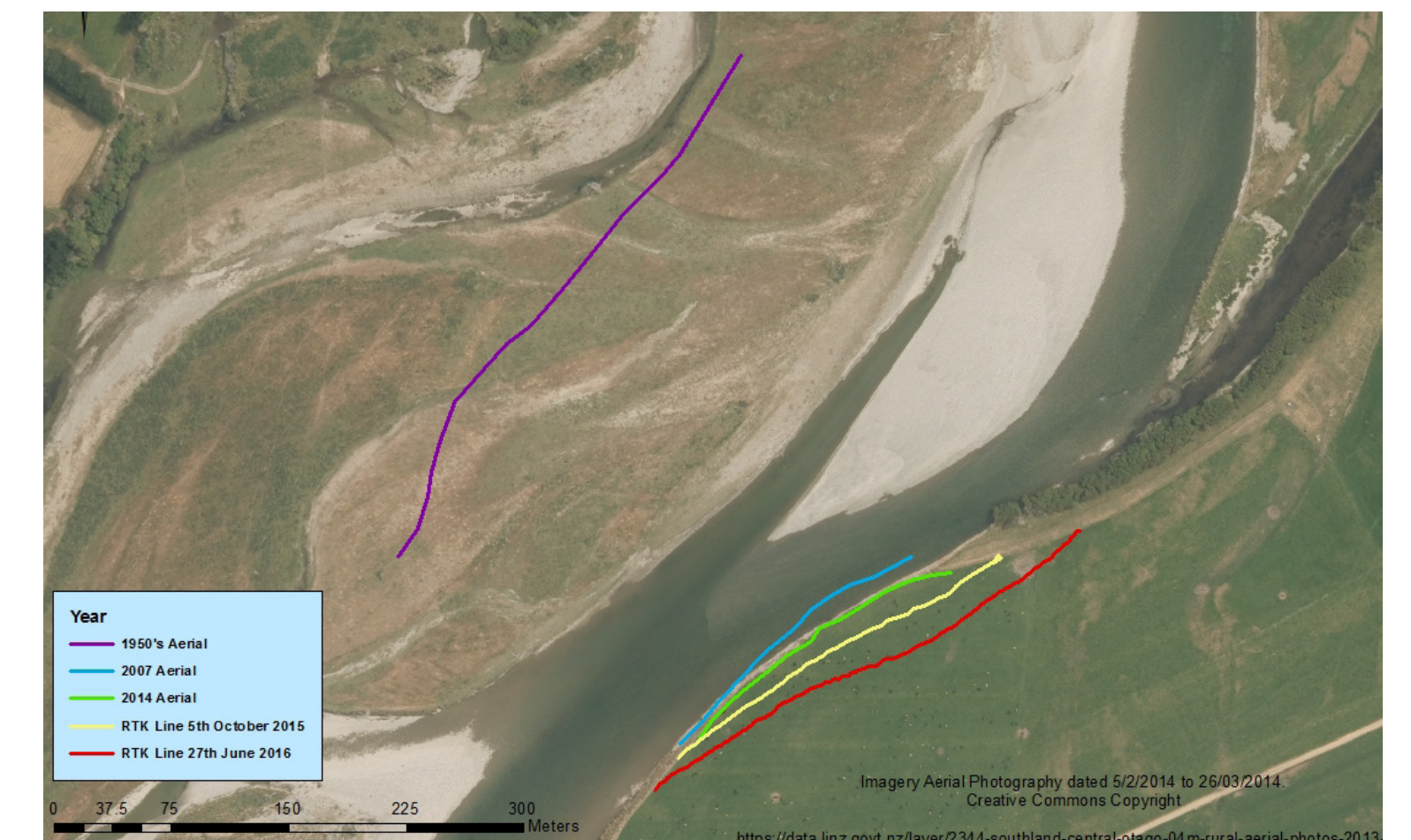
RTK GPS coordinates were taken at 2-3 metre intervals along the two metre high river bank where bank erosion was evident. The data was then transferred to ArcGIS to calculate an estimation of bank migration.



▶ Bank erosion in the lower Waiau River.

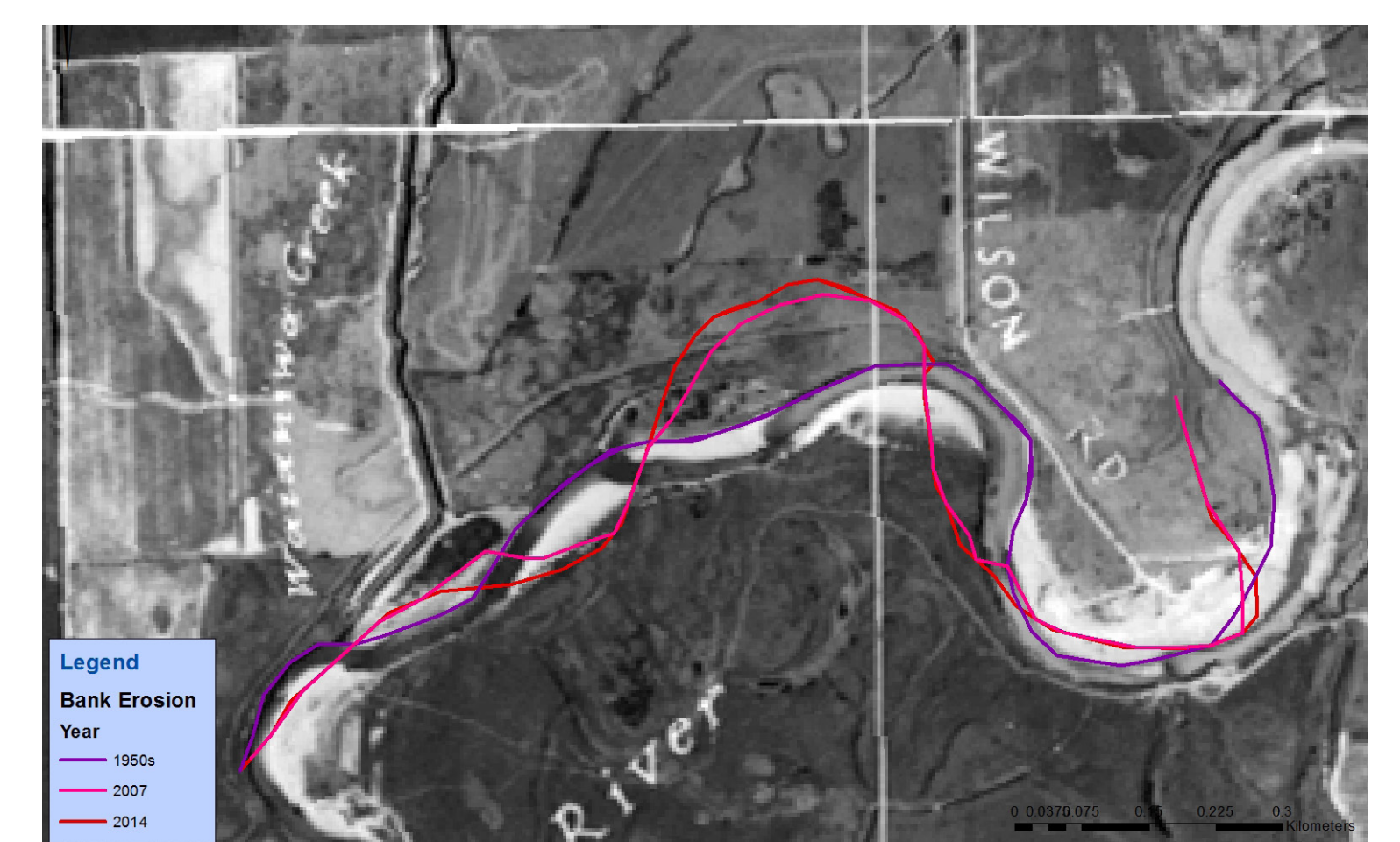
▶ Results

The Lower Waiau River case study estimated 2781m² of bank erosion had occurred, comparing RTK measurements from 20 October 2015 to aerial photography from 2014.

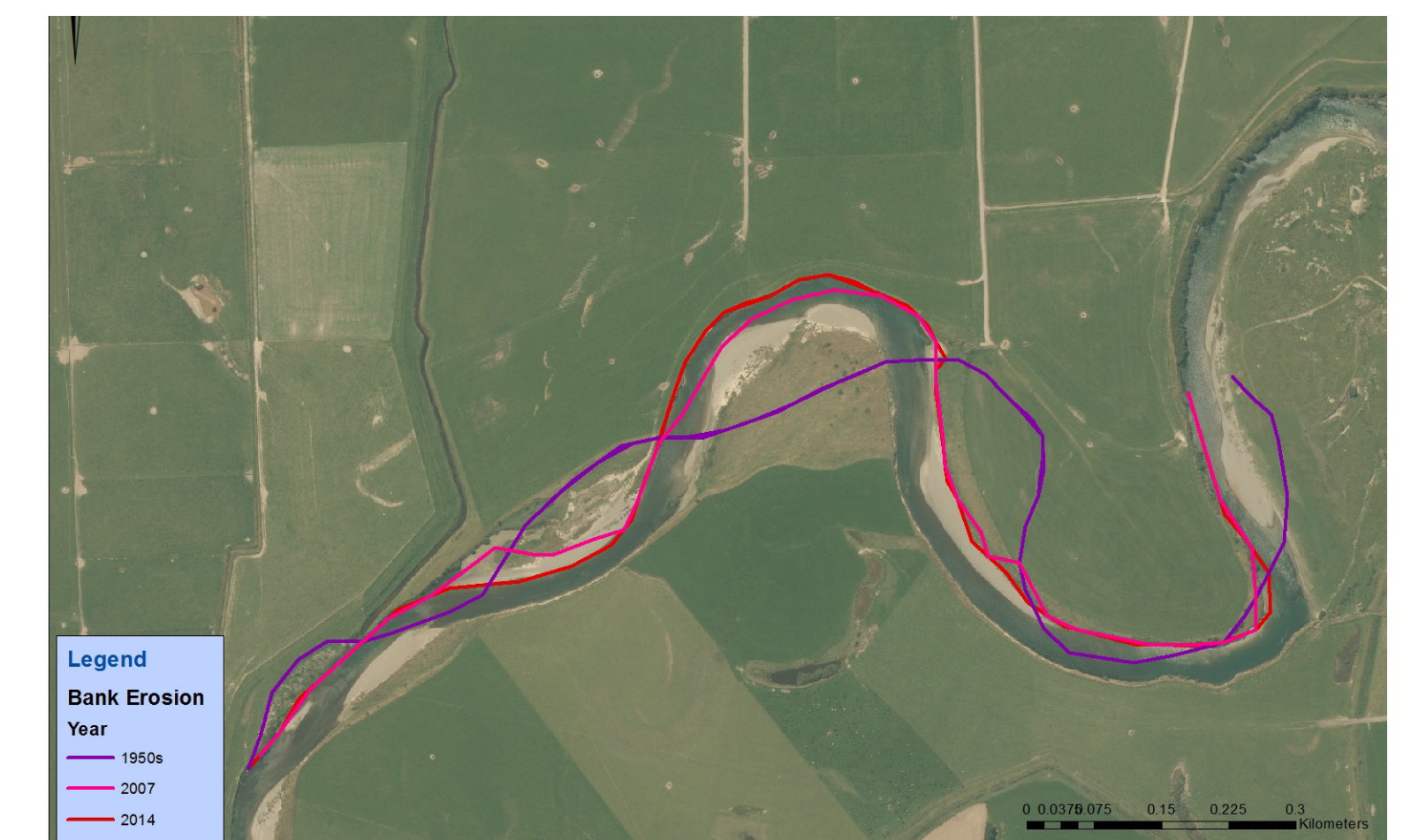


▶ Bank erosion in the lower Waiau River.

Estimates of change in the lower Oreti River ranged from 80 to 100 metres perpendicular to the river.

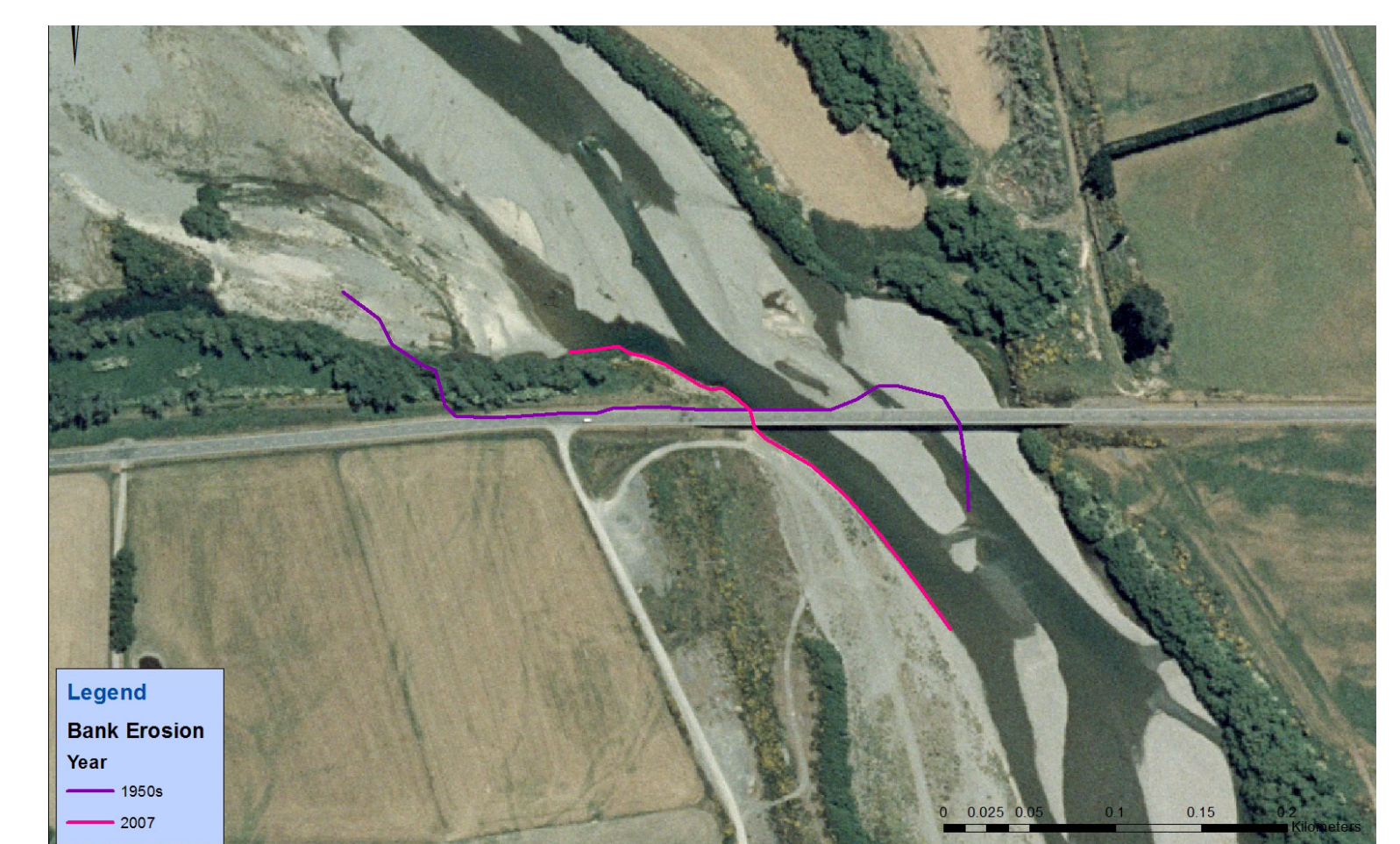


▶ Geomorphic change in the lower Oreti River.



▶ Geomorphic change in the lower Oreti River.

Estimates of change in the upper Oreti River River ranged from 40 to 80 metres perpendicular to the river.



▶ Geomorphic change in the upper Oreti River.

▶ Acknowledgements

Dr Andrew Hughes (NIWA), Andrew Lord (Waiau landowner), Ministry for the Environment and Environment Southland science and catchment management teams.

▶ Next steps/recommendations

- Consider future case study sites.
- Expand understanding of fine sediment transfer in Southland.
- Establish a bank migration rate for an entire river.