Making Tracks:

Simulating Prehistoric Human Travel Networks.

Northland, New Zealand.

M.Sc. Dissertation

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ABSTRACT

The pattern of prehistoric human travel paths and the spatial relationship with archaeological sites in New Zealand is not well understood. Archaeological surveys have focused on individual sites mainly in coastal areas with less attention paid to large inland areas and corridors connecting settlements or culturally significant sites. The use of Geographic Information Systems (GIS) to model potential pedestrian travel routes has been limited to coarse national scale isotropic least cost path analysis between known obsidian resource locations.

This thesis uses a GIS to model natural travel corridors and paths across a 5,230 square kilometre area of the Northland region to form a prehistoric human travel path network. The modelled network is validated by testing the significance of the distribution of archaeological sites associated with human travel routes prior to European settlement. This research asks**,** are inland Pa sites positioned in close proximity to least cost overland travel paths*?* Supporting hypotheses state that Pa sites are unevenly distributed and strongly clustered in close proximity to least cost paths.

Existing GIS techniques for modelling regional least cost primary travel corridors and secondary branching paths were replicated and enhanced to create a complex network of paths originating from the edge of the study area, navigating through a simulated prehistoric travel friction surface. Using Pa site density grouped by travel cost intervals leading away from the path network, a Chi Squared test of significance strongly rejected the null hypothesis confirming that Pa sites are unevenly distributed. Although the Pa site distribution test produced a weak Gain statistic, travel time analysis shows that the majority of Pa sites are highly accessible from the least cost travel path network. This adapted method has not previously been used in New Zealand and the results provide an original contribution to the archaeological and geospatial science body of knowledge.

Future GIS research may refine this approach by developing a more realistic prehistoric land cover dataset and by addressing current limitations associated with GIS based representations of human travel speed and time. The performance of the model presented in this study has the potential to improve as new Pa sites are discovered. This research provides a method for narrowing down future archaeological site exploration and is an initial step towards gaining a greater understanding of prehistoric human travel networks within New Zealand.

Keywords: Geographic Information Systems (GIS), path distance, isotropic, anisotropic, least cost path, Pa site, Chi Squared test, Multinomial Goodness of Fit test, Gain Statistic.