Journal of Archaeological Science: Reports 20 (2018) 192–199

Contents lists available at ScienceDirect

Journal of Archaeological Science: Reports

journal homepage: www.elsevier.com/locate/jasrep

Some problems with modelling the positions of prehistoric hunter-gatherer settlements on the basis of landscape topography

Ole Grøn

ABSTRACT

This paper discusses a couple of basic methodological problems inherent in predictive modelling as used today in mapping the location of Stone Age settlements based solely on landscape topography/bathymetry. It argues that the modelling approach employed is based on elements adopted from a type of landscape ecology that was abandoned more than 20 years ago, because it was unable to produce reasonable results, and that it can be difficult to develop prediction methodology based on the present understanding of landscape ecology as being extremely complex and dynamic. Furthermore, it maintains that the modelling approach currently employed in Stone Age archaeology is based on assumptions about prehistoric resource-strategic behaviour that are simplistic and out of tune with what we now know. It therefore questions whether it is possible to develop a precise and efficient predictive procedure for modelling the locations of Stone Age sites.

1. Introduction

Tthe use of topographical/bathymetric predictive modelling for mapping prehistoric, i.e. Stone Age, hunter-gatherer settlements on land and under water is seeing increasing application in both Cultural Heritage management and research (Benjamin, 2010; Chang-Martínez et al., 2015; Fischer, 2004; Fitch et al., 2007; Kamermans et al., 2009). This is being undertaken in ways that prompt concern, because they often focus exclusively on the topography/bathymetry of the prehistoric landscape surface, while ignoring the importance of the spatial configuration of the prehistoric vegetation. In landscape ecology, it is a well-established fact that the vegetation on land, as well as in marine areas, tends to form dynamic mosaics that influence small-scale animal and human behaviour and thereby lead to significant variation in the cultural spatial behaviour over time (Bjørnstad et al., 1999; Bode & Possingham, 2005; Grøn, 2012; Odum & Barrett, 2005, 246–255; Turner & Gardner, 2015; Vandermeer, 2006; Levin et al., 1993, 50–60, 70–89, 277–304; Mustamäki et al., 2015; Lewis et al., 2013; Warden et al., 2017) (Fig. 1). A further problem is that this type of modelling is often based on simplistic and general assumptions about how hunter-gatherers place their settlements in the landscape. These ignore both archaeological and ethnoarchaeological evidence, which reveals significant deviations from some of these assumptions and demonstrates that different hunter-gatherer cultures can behave differently in similar landscapes, and that even individual groups can display significant behavioural differences (Vandermeer, 2006; Gross et al., 2018).

The incorporation of landscape ecology and realistic hunter-gatherer behavioural variation into archaeological predictive modelling of settlement distribution in the landscape renders the discipline more complicated, both theoretically and practically. On the other hand, it introduces a realistic relationship to the real world. One can only guess why archaeology has been allowed to pick the simple and easy-to-handle modelling principles, while ignoring the more difficult ones, in its attempts to develop fast and cheap 'desktop' approaches to the mapping of Stone Age settlements. The aim of this paper is to demonstrate how poorly the hitherto applied type of modelling fits with the variations evident in hunter-gatherer settlement behaviour, thereby underpinning the importance of developing new methodologies for either better predictive modelling or, alternatively, direct physical detection of Stone Age settlements.

2. The landscape concept in hunter-gatherer archaeology

In archaeological circles, the characteristics of the landscapes lived in and used by prehistoric hunter-gatherers are generally conceived as congruent with a landscape concept that was abandoned by landscape ecology in the mid-1990s (Hansson et al., 1995):

> *A marked change has occurred recently within the science of ecology. Previously, ecological processes commonly were assumed to proceed within homogeneous environments, and usually within populations of randomly distributed individuals. Recently it has been widely recognized that environments are not homogeneous, and organisms are usually clumped into patchy populations, and that this heterogeneity has significant effects on ecological processes.*

This means that landscapes should basically be understood as

E-mail addresses: olegron111@gmail.com, og@ign.ku.dk.

https://doi.org/10.1016/j.jasrep.2018.04.034
Received 24 January 2018; Received in revised form 24 April 2018; Accepted 30 April 2018

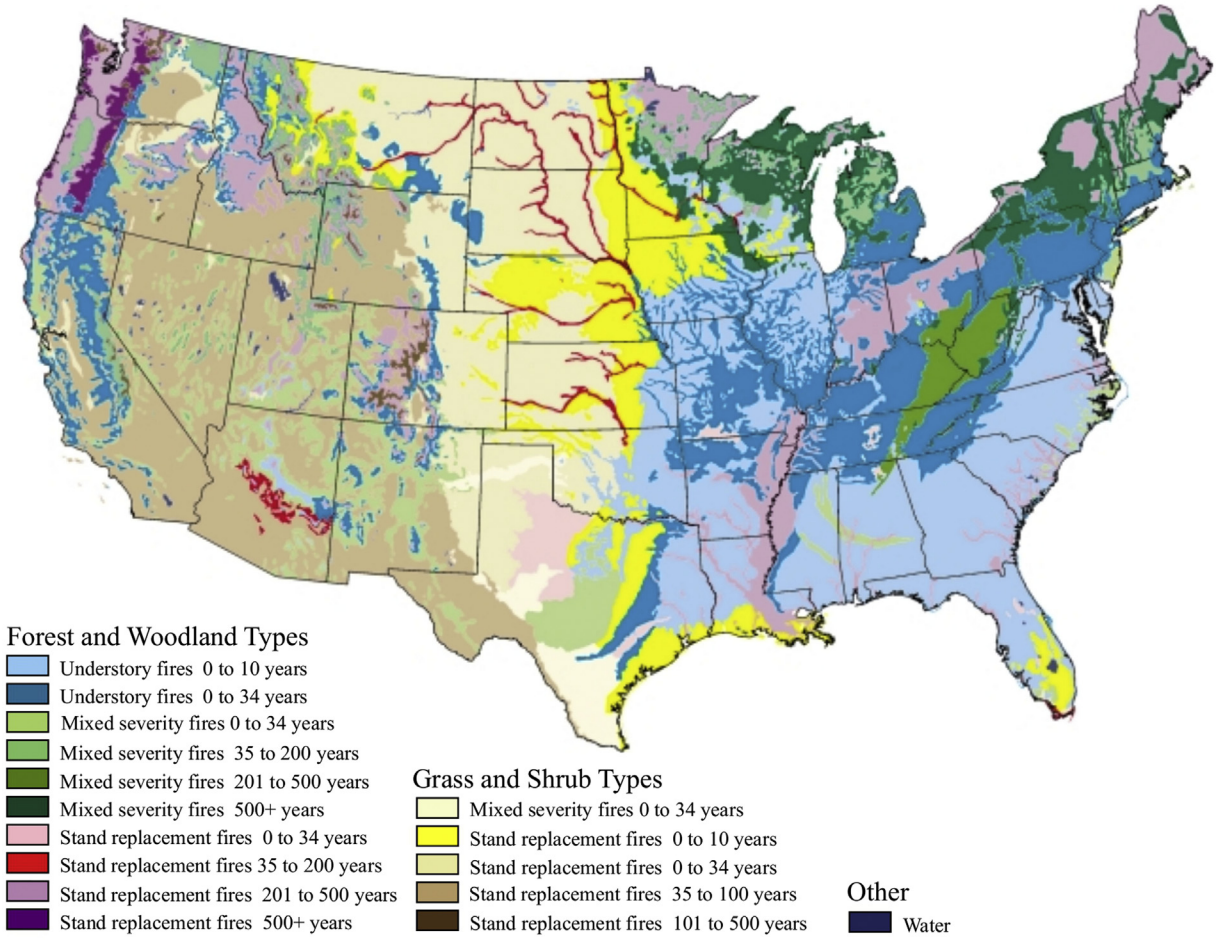

Fig. 1. Map showing the fire intervals for different types of wildfires in USA (Wiens, 1995).

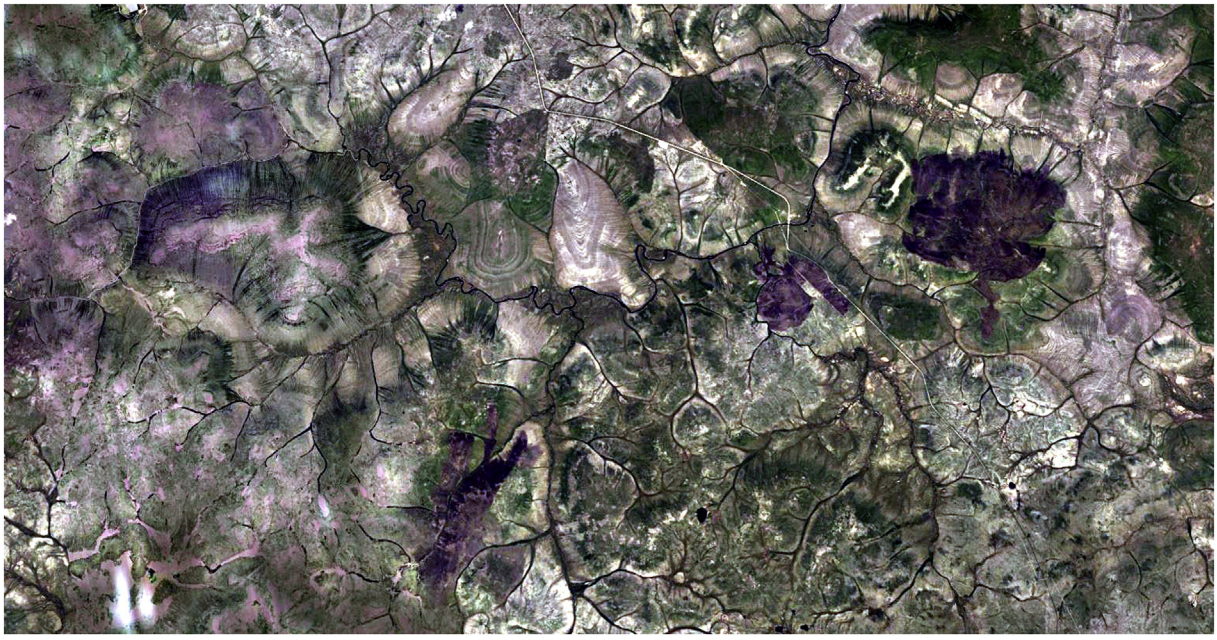

Fig. 2. Landscape mosaic in Siberia covering an area of 65 × 35 km with its centre located at 544106E 7283045N UTM zone 49W. Several black burnt patches from wildfires can be seen.
Google Earth.