archaeometry

Archaeometry **55**, 2 (2013) 258–276 doi: 10.1111/j.1475-4754.2012.00684.x

REFINING ESTIMATES FOR THE SEASON OF SHELLFISH COLLECTION ON THE PACIFIC NORTHWEST COAST: APPLYING HIGH-RESOLUTION STABLE OXYGEN ISOTOPE ANALYSIS AND SCLEROCHRONOLOGY*

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Stable oxygen isotopes from estuarine bivalve carbonate from Saxidomus gigantea *were analysed combined with high-resolution sclerochronology from modern and archaeological shells from British Columbia, Canada, to determine the seasonality of shellfish collection from the archaeological site of Namu. The combination of high-resolution sclerochronology and a micro-milled sampling strategy for $\delta^{18}O$ analysis permits a precise estimate of archaeological seasonality, because seasonal freshwater influxes and changes in temperature have dual effects on the $\delta^{18}O$ value of the shell. Sclerochronological analysis identifies the timing and duration of growth that is temporally aligned to stable oxygen isotope results, since $\delta^{18}O_{shell}$ appears to be strongly influenced by seasonal inputs of very low $\delta^{18}O$ snowmelt-water from adjacent coastal mountain ranges. The results show that shellfish were collected year-round at this site over a 4000-year period, and these data combined with other zooarchaeological lines of evidence support the interpretation of year-round occupation.*

KEYWORDS: SEASONALITY, BRITISH COLUMBIA, STABLE OXYGEN ISOTOPE ANALYSIS, SCLEROCHRONOLOGY, *SAXIDOMUS GIGANTEA*, HOLOCENE

INTRODUCTION

Identifying the seasonality of shellfish collection using growth patterns and stable isotopes in freshwater and marine molluscs has been a component for understanding patterns of shellfish harvest at archaeological sites for over 30 years. Growth lines and increments that form seasonally and/or annually have been used to attain a lower-resolution seasonal identification in some species, mainly distinguishing between warm and cold periods for the timing of shellfish collection (i.e., Coutts 1970; Claassen 1983; Milner 2001). Shell stable oxygen isotope values (i.e., Shackleton 1973; Killingley 1981; Deith 1986; Kennett and Voorhies 1996; Mannino *et al*. 2003; Rick *et al*. 2006; Mannino *et al*. 2007; Stephens *et al*. 2008) can provide more precise seasonality estimates, but require sufficient sampling resolution and knowledge of local environmental factors that control oxygen isotope values.

Recent advances in sclerochronology have shed light on a variety of factors that influence seasonal and annual shell growth, and subsequently how these growth structures are interpreted in archaeological contexts (Andrus 2011). More recent sclerochronological and stable isotope studies from the north and south coasts of British Columbia (BC) and Alaska have demonstrated

*Received 11 December 2011; accepted 29 February 2012
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