INTRODUCTION

As bivalve growth rates can be used to indicate different light and dark periods (Fig. 1). The amount of shell added, resulting from the rate of bivalve growth, is primarily based on water temperature (Goodfriend et al. 2000). Freshwater bivalve species show different light and dark bands, which can be used to estimate the age of the shell and the environmental conditions at the time of growth. One explanation for this dampening of seasonal variation is the presence of seasonal variation in the water temperature of the Cannon River.

METHODS

Two mussel shells were collected in the early 1990s from the Cannon River near Northfield, MN (Fig. 2), one Potamilus alatus and one Potamilus subplanus, known commonly as Pink Heelsplitter. Two thin sections from the Lampsilis shells were taken, and one thin section from the Pink Heelsplitter. From thin sections, multiple samples of shell carbonate were extracted using a Dremel Multifile hand-drill for the Pink Heelsplitter shell. From the Pink Heelsplitter, 4 sample sets were taken (Fig. 3). From the Lampsilis, 15 samples from dark bands only were taken along a transect from the thin section, and 14 samples were taken, alternating light and dark bands, from the same thin section and sample sets were analyzed (Fig. 4). Samples were recovered with 100% $\delta^{13}C$ under positive pressure, with dry ice, in order to achieve a relative stable isotope standard. Results were analyzed statistically by regression analysis, and a t-test paired two samples for means.

RESULTS

Lampsilis shells in cross section show an alternating light and dark banding pattern that is easily visible to the naked eye. Of these bands, a light-dark pair likely represents one year based on a 18O cycle. In the annual light bands, the dark band likely represents summer carbonate precipitation, and the light band represents precipitation during the spring and fall, when water temperatures are cooler but still warm enough for the mussels to grow. Lampsilis and bivalves in general, have the potential to store a high-resolution isotope record. The Lampsilis sampled in this project record isotopic variation throughout its growth period, but no significant change, implying a relatively stable regional climate from the 1970s to the 1990s, when the mussel was alive. Lampsilis should be used in more depth in the future as a potential predictor for paleo-temperature, in order to fully understand the seasonal and interannual variation of the mussels.

DISCUSSION

When examined in cross-section, the Lampsilis shell revealed a number of alternating light and dark bands (Fig. 1). Because of repeated cycles in oxygen isotope ratios between light-dark pairs, other studies hypothesized that the one light-dark pair is one annual cycle (Brey and Mackensen 1997). The Lampsilis shell sampled in this study shows a similar repeated cycle; therefore we conclude a light-dark pair of bands represents a year of shell growth.

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WORKS CITED