Taphonomic Analysis of Fish Remains from the Mink Island Site (XMK-030): Implications for Zooarchaeological and Stable Isotopic Research.

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This dissertation research is focused on shedding the taphonomic overprint at the Mink Island site (XMK-030) to assess temporal variability of the archaeoichthyofaunal assemblage and to establish sample selection criteria for stable isotope (δ 15N, δ13C) analysis. These retrospective datasets may elucidate the causes and consequences of long-term variability in local fish assemblages when combined with modern fisheries and paleo-oceanographic datasets. To use these data, it is essential to account for biostratinomic and diagenic agents that may have structured and contaminated the fishbone assemblage. Inter-taxa and inter-elemental differences in bone density, shape, size, protein, and lipid content result in differing preservation and contamination potential. Without mitigating for the effects of biostratinomic and diagenic agents, temporal changes in abundance may be skewed in favor of skeletal elements that best survive destruction. Moreover, stable isotope values may reflect differences in preservation and contamination rather than variability in ecosystem structure and function.

A series of experiments using modern (to establish baseline values) and Mink Island specimens have been conducted to assess preservation and contamination levels. The results revealed that fish bone preservation and contamination potential are correlated with completeness percentages and associated radiocarbon years B.P., but not with bone volume density. Additionally the results demonstrated that reinforced skeletal elements do not possess increased preservation potential; however, they do possess increased identifiability.

Preservation and contamination assessment results were used to answer a series of research questions aimed at establishing sample selection criteria for stable isotope analysis. The assessments revealed that Pacific cod dentaries that are intact, unburned, and free of visible contaminants are best suited for stable isotope analysis. The assessments also demonstrated that the modified Bell pretreatment method is ideally suited for archaeologically deposited fish bones because it uses a weak acid concentration, mild lipid extraction solvent, and it avoids heat. Finally, the assessment revealed that because color-affecting contaminants derived from the burial context cannot be removed without heat, color-based methods are unsuitable for assessing the cooking/ burning stage of archaeologically deposited fish bones.

Results of the preservation assessments were also used to guide interpretations of changing human/fish interactions at Mink Island. Interactions were assessed using a four-stage resource depression and intensification model that was derived from optimal foraging theory. The results revealed a significant change in taxonomic representation over time. Mink Island inhabitants shifted their focus from procuring small flatfishes (and sea mammals) during Stage I to procuring large numbers of Pacific cod and sculpins during Stages II and III. Procurement focus shifted again at the end of Stage IV towards the use of more varied fish taxa (sculpins, cods, herring, and salmon). A decrease in reconstructed fork lengths revealed that increased human harvesting pressure on Pacific cod led to resource depression during Stage II. Finally, taxonomic proportion, evenness, salmon index, and skeletal element representation data emonstrated that salmon intensification did not occur during any stage. Mink Island inhabitants employed a mixed procurement strategy, exploiting riverine areas during the summer and exploiting nearshore marine patches during the remaining months.