

Strontium Stable Isotope Ratio Analysis of the Loma Sandia Archaic Period Mortuary Site of South Texas

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About this project:

- ▶ Project focuses on Loma Sandia, a Late Archaic hunter-gatherer site in the Texas Coastal Plain (TCP).
 - ▶ Hunter-gatherer sites often argued to be markers of territoriality.
- ▶ Will use strontium (Sr) stable isotope ratio analysis to assess circumscribed mobility and territoriality during the TCP Late Archaic.
- ▶ Utilizes the Economic Defense Model (EDM) and concepts of social boundary defense and perimeter defense to construct hypotheses.
- ▶ This paper will focus on two of these hypotheses.

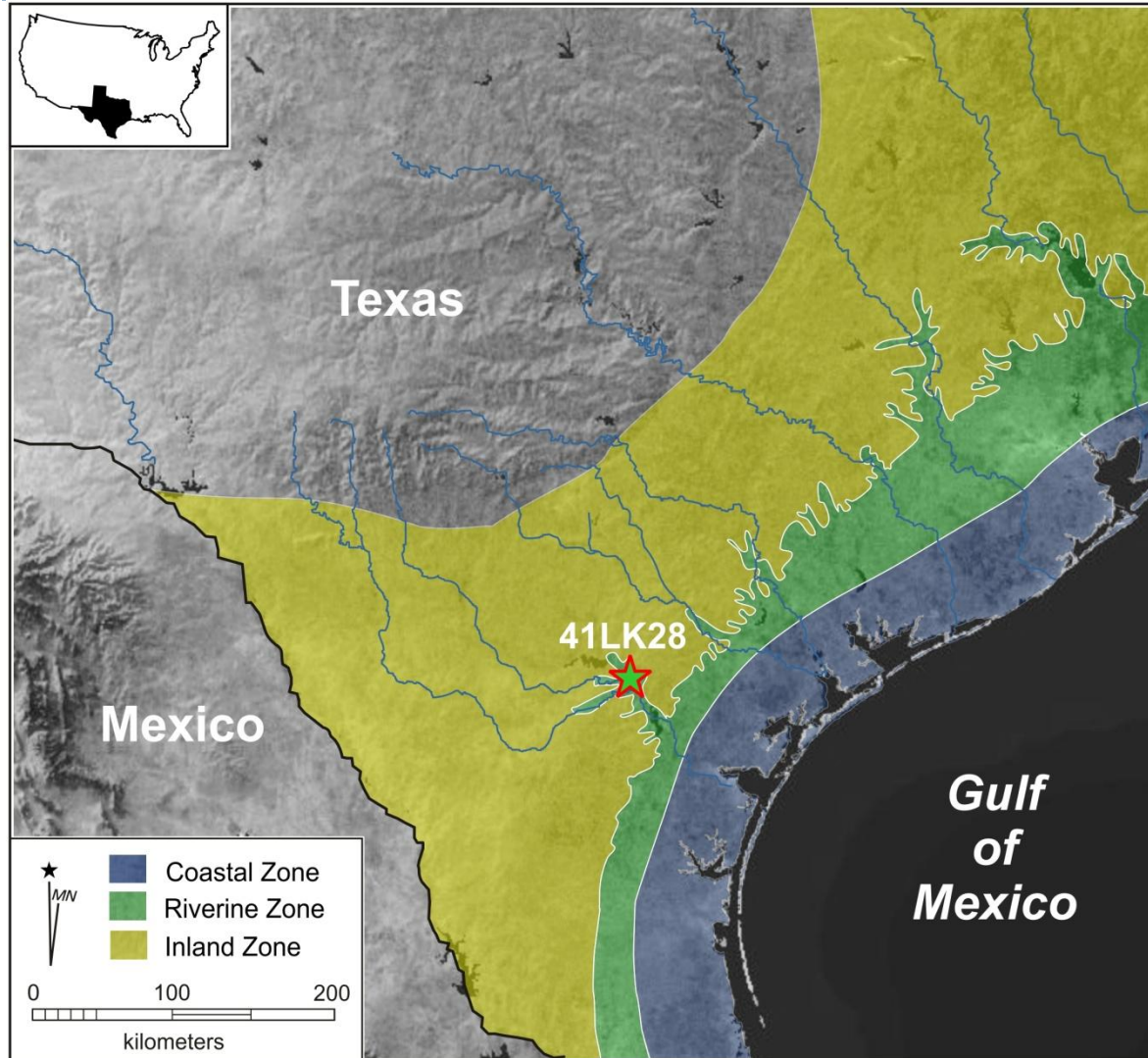


Hypotheses

- ▶ If territoriality was practiced in the TCP, then little to no variation will be seen in Sr isotope signatures.
- ▶ If female exogamy was practiced in the TCP, then female Sr signatures are expected to have more variation than male.



Texas Coastal Plain (TCP)



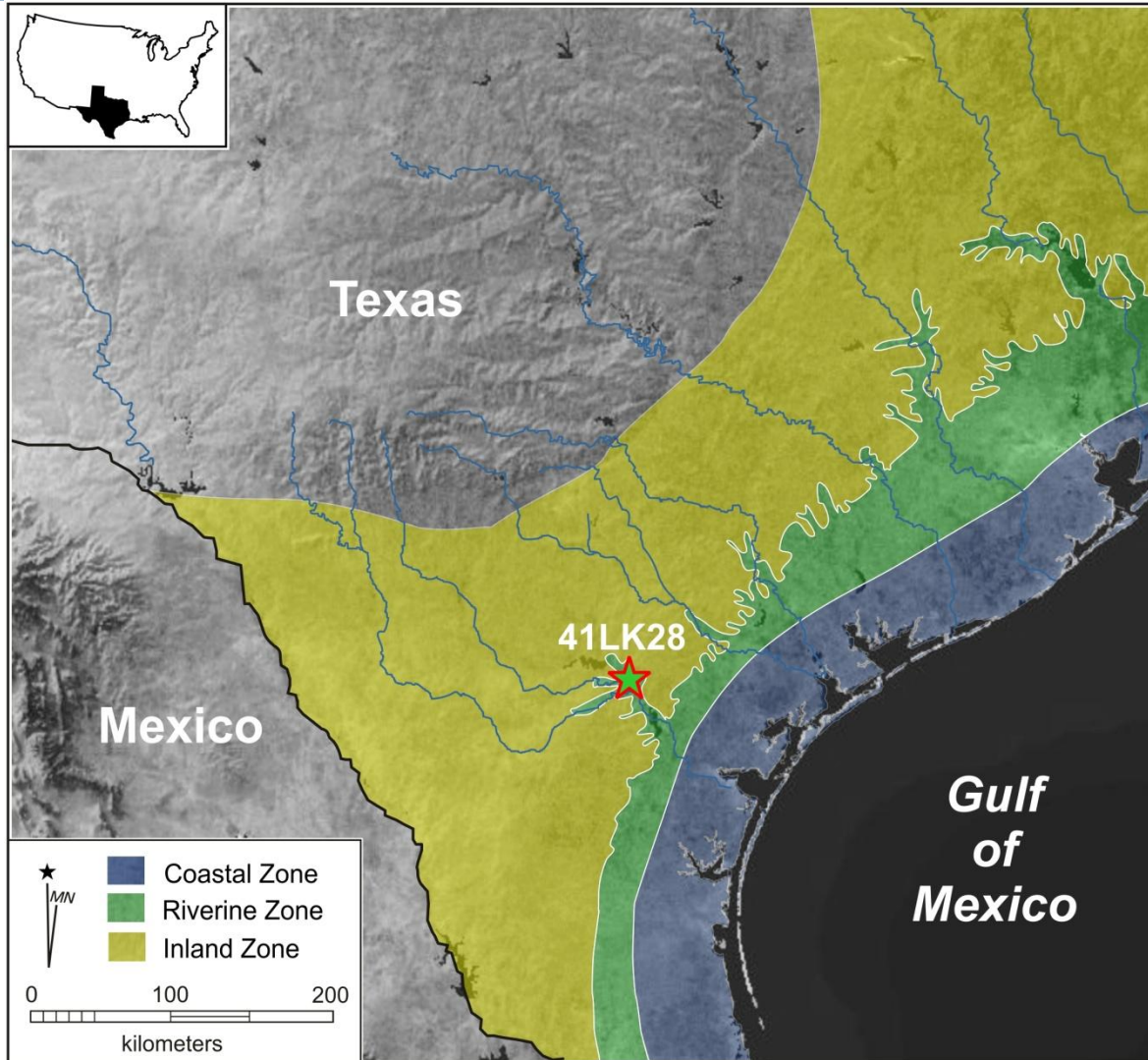
Location of Loma Sandia and the three ecological zones of the Texas Coastal Plains. (Figure adapted from Hard and Katzenberg [2011] by Leonard Kemp.)

Exogamy

- ▶ Cabeza de Vaca provides ethnohistoric evidence for female exogamy during the Late Prehistoric.
- ▶ Carbon and nitrogen isotope studies have shown dietary differences between sexes which maybe explained by exogamy.



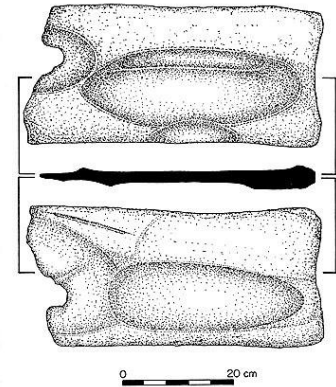
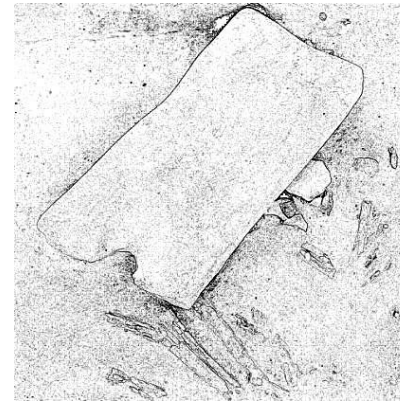
Loma Sandia

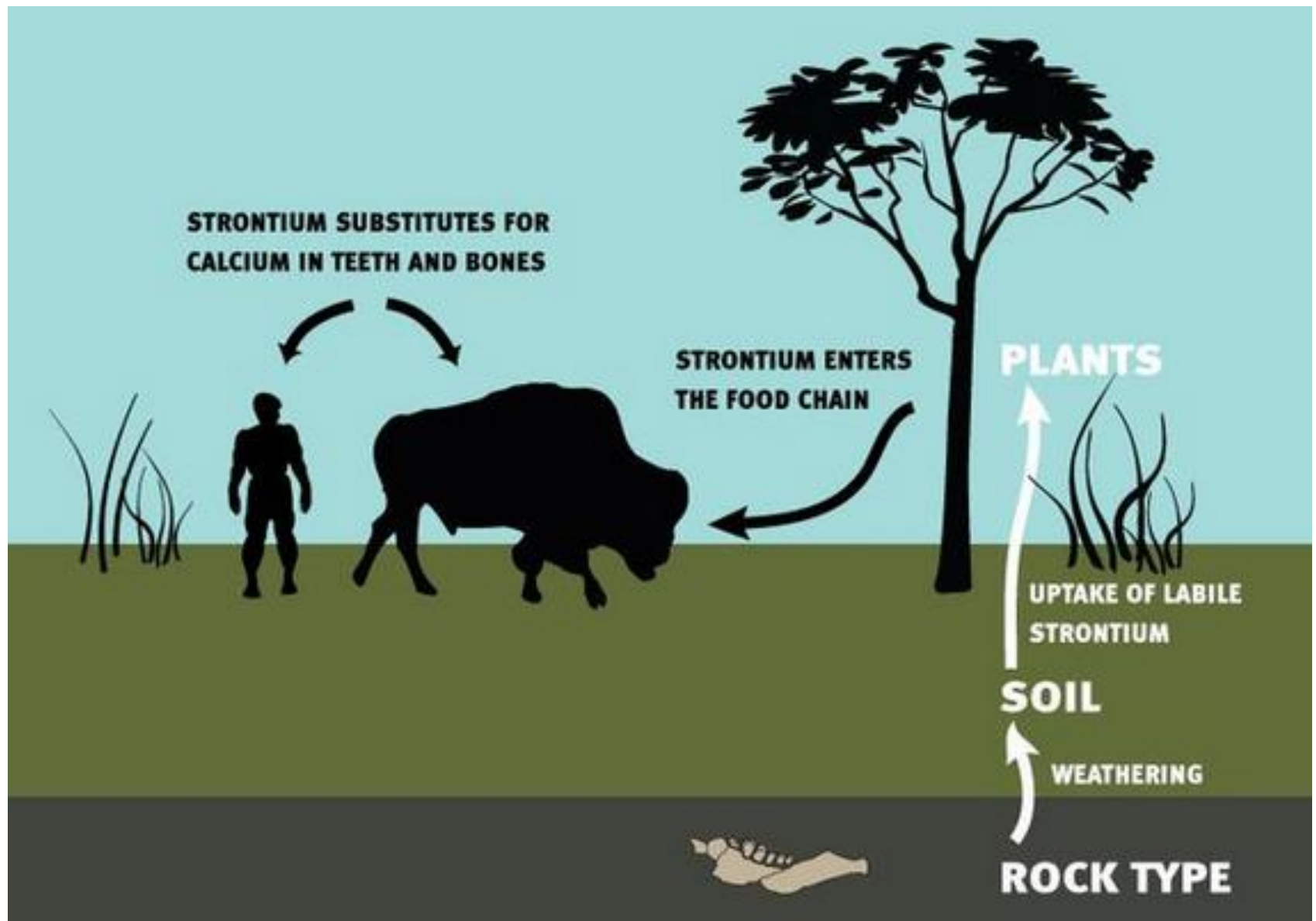


Location of Loma Sandia and the three ecological zones of the Texas Coastal Plains. (Figure adapted from Hard and Katzenberg [2011] by Leonard Kemp.)


Loma Sandia

- ▶ 2800-2600 BP (uncalibrated)
- ▶ 205+ individuals
- ▶ Males and females of all age groups.
- ▶ Burial goods with both sexes and all age groups.
- ▶ Burial goods included: dart points, chipped stone tools, stone pipes, grinding slabs, manos, deer antler racks, marine shell ornaments, red and yellow ocher.





▶ Strontium travels from geologic bedrock through the food chain and into the teeth and bones of humans and other animals without significant fractionation. Image from <http://www.pbs.org/time-team/experience-archaeology/isotope-analysis/>

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- ▶ The cultural human remains from Loma Sandia are currently housed at the Center for Archaeological Research (CAR) at the University of Texas at San Antonio.
 - ▶ The director of CAR and the Texas Historical Commission gave permission for this research as they determined that these remains are culturally unaffiliated with federally recognized tribes and that this project complies with the requirements of the Native American Graves Protection and Repatriation Act.
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Sample Selection

- ▶ Molars were not intact with mandibles or maxillas.
- ▶ Most individuals have severe enamel loss.

- ▶ One intact molar of any kind available, with enough enamel for analysis, was selected from individuals with known sex and age ranges.
- ▶ 54 samples total.

- ▶ Faunal samples were provided by the Texas Parks and Wildlife Department.
- ▶ Samples collected on wildlife management areas (WMAs) during the 2015 hunting season.
- ▶ White-tail deer and javelina
- ▶ Two WMAs from different geologic regions. 10 samples from each





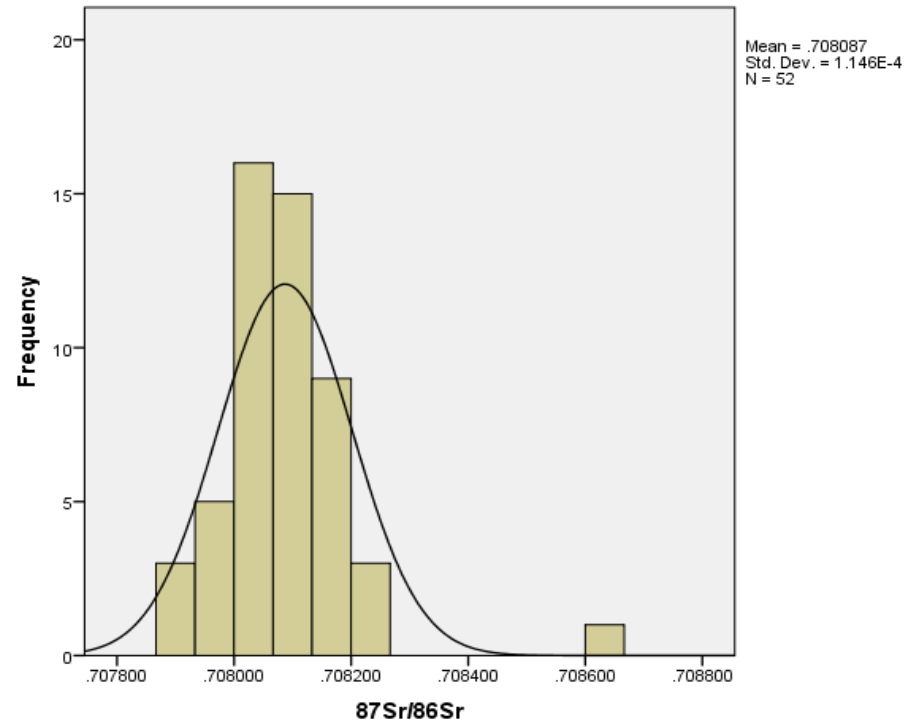
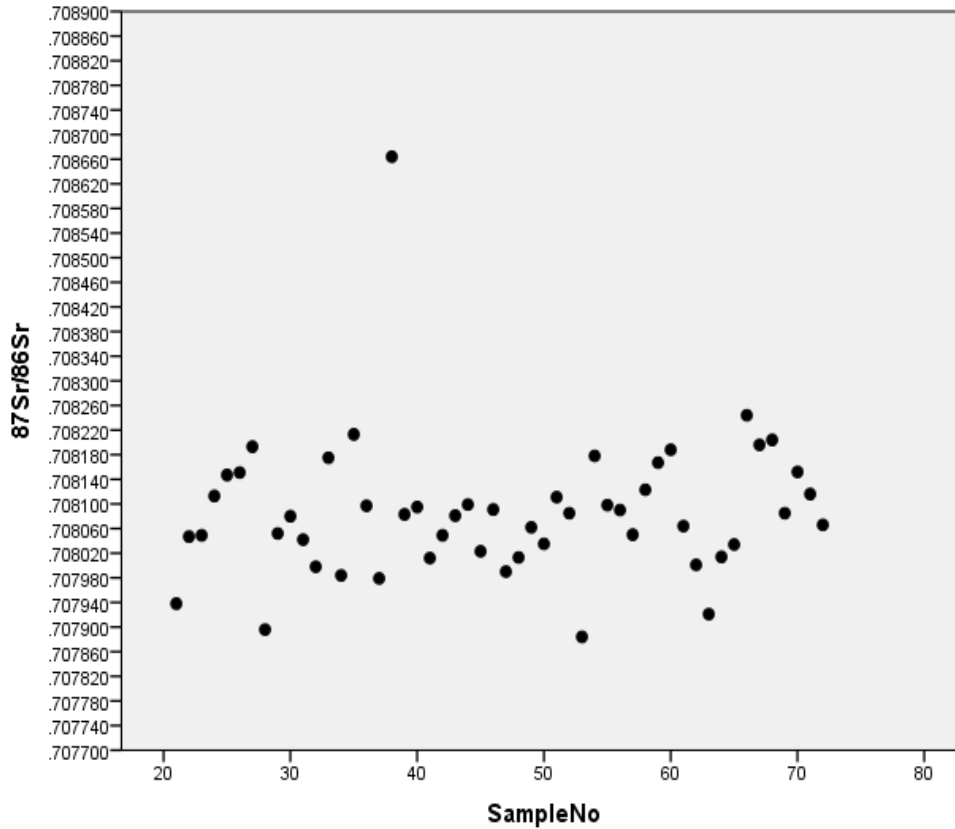
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- ▶ After removing pulp and dentin from human tooth samples, each tooth was ground with a pestle and mortar.

Lab Analysis

- ▶ Samples sent to the University of North Carolina at Chapel Hill Isotope Geochemistry Laboratory in the Department of Geosciences.
- ▶ Sr isotopic compositions measured with VG Micromass Sector Thermal Ionization Mass Spectrometer.
- ▶ 52 out of 54 samples human samples returned.
- ▶ 20 out of 20 faunal samples returned.

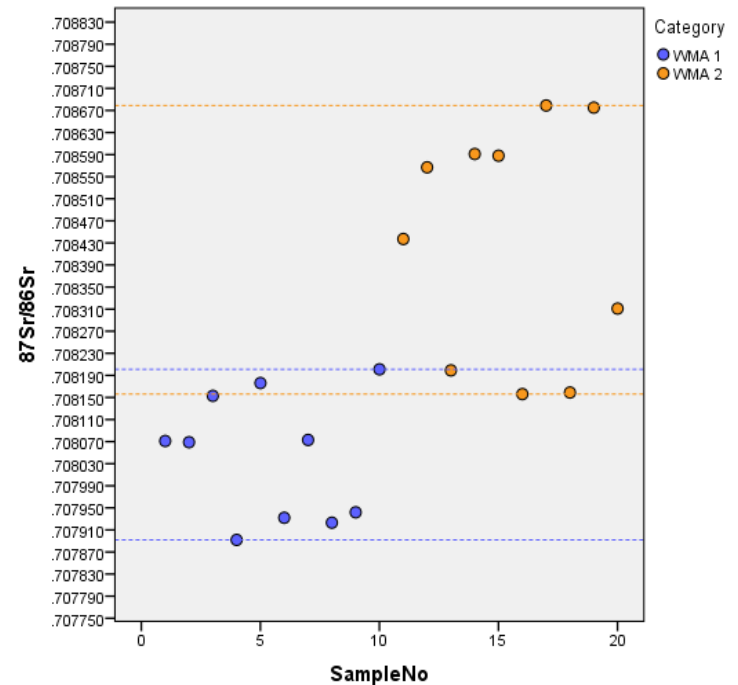
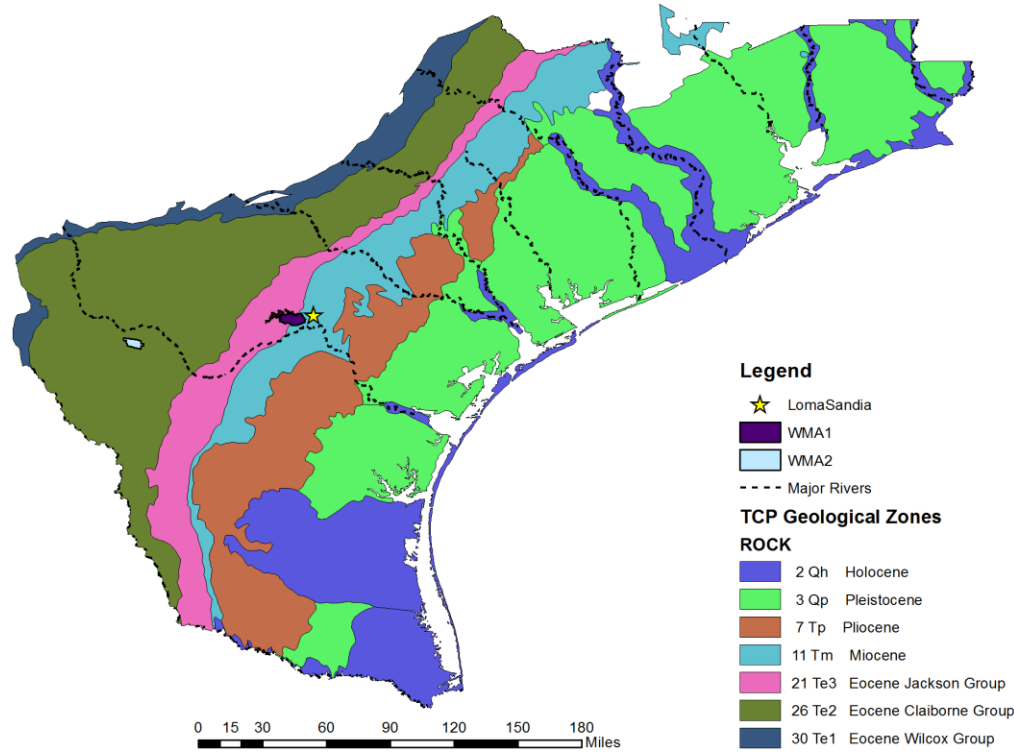


Human Enamel Data

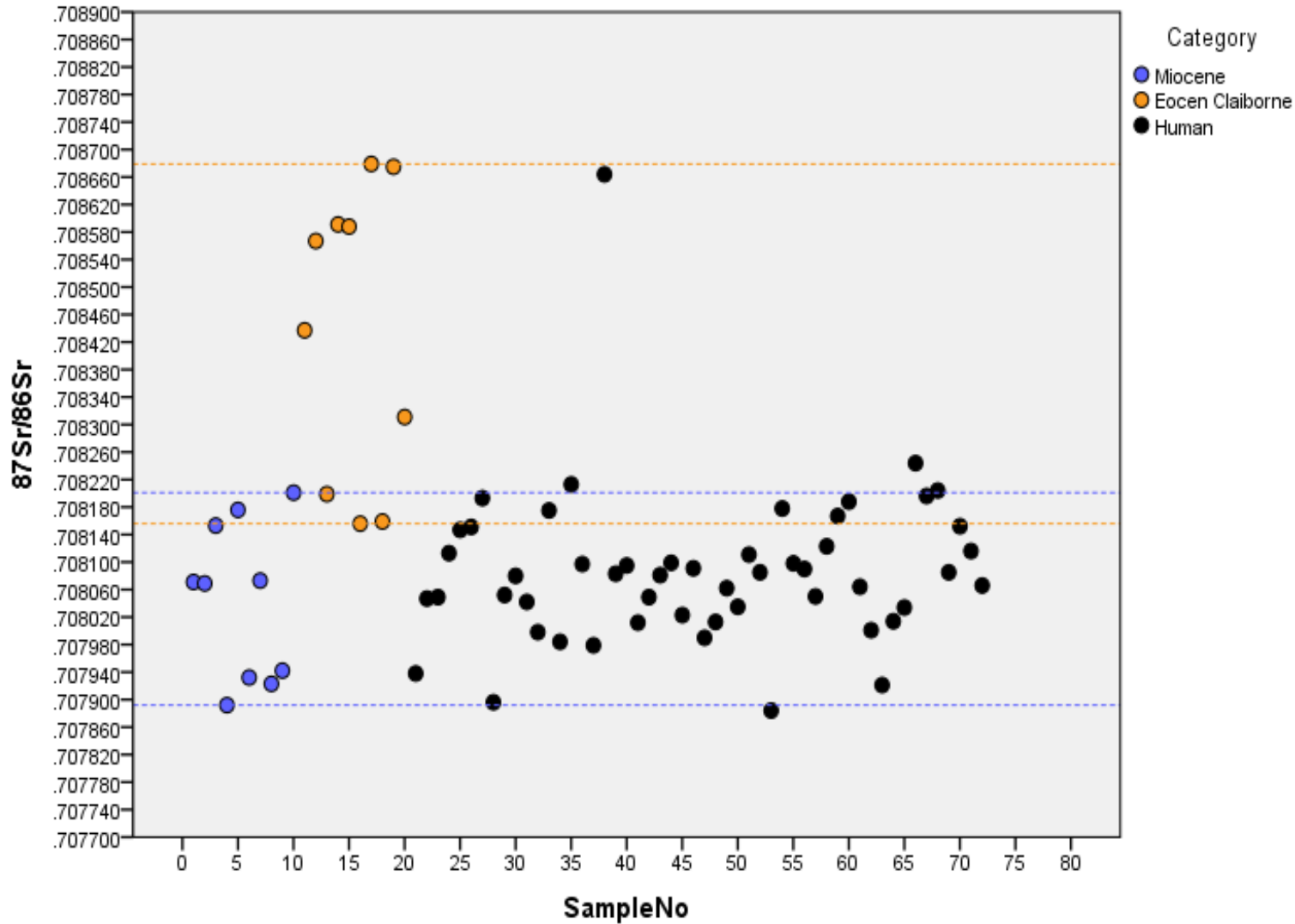


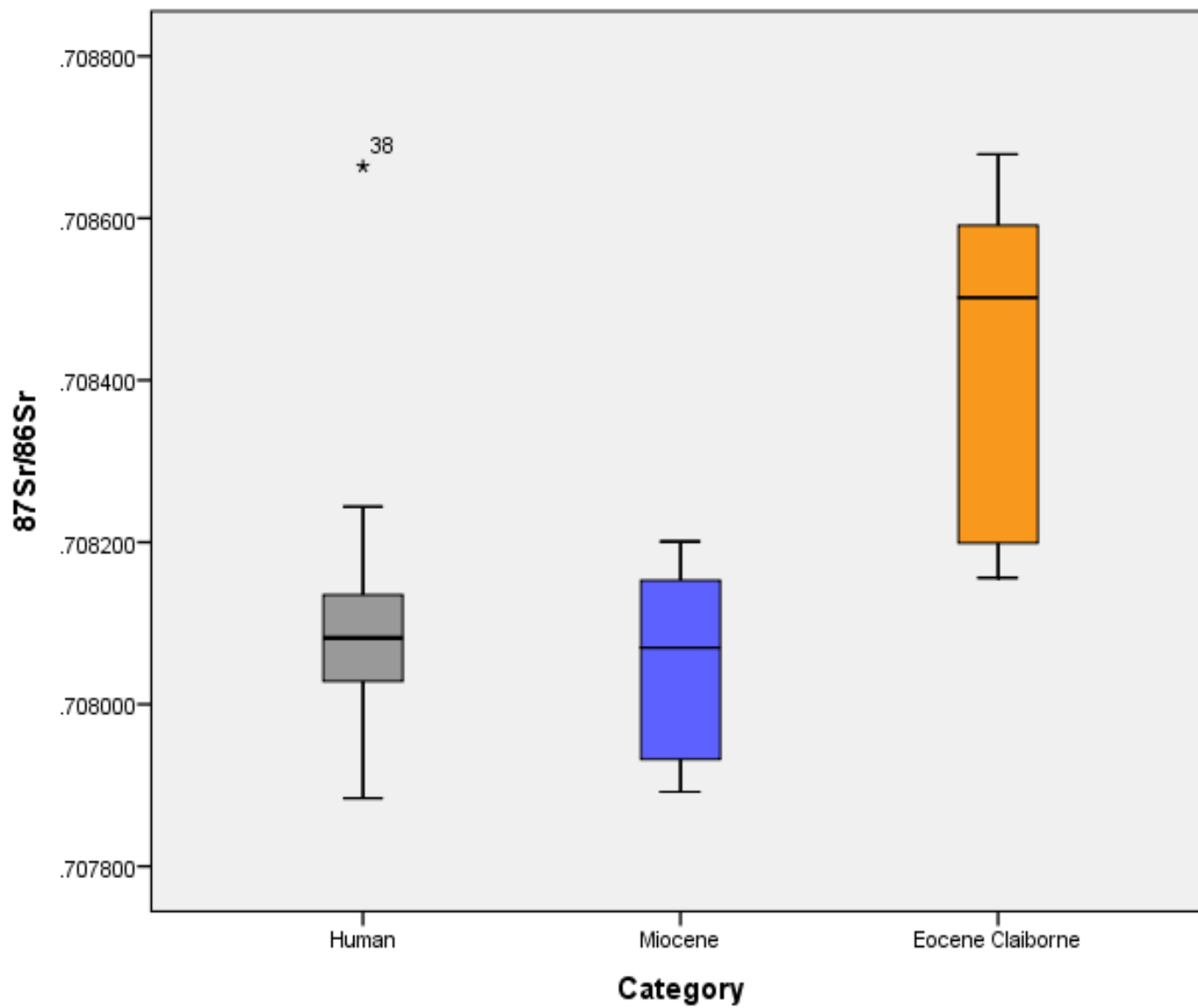
Faunal Data/Bioavailable Sr

Geological Zones of the Texas Coastal Plains & Important Locations

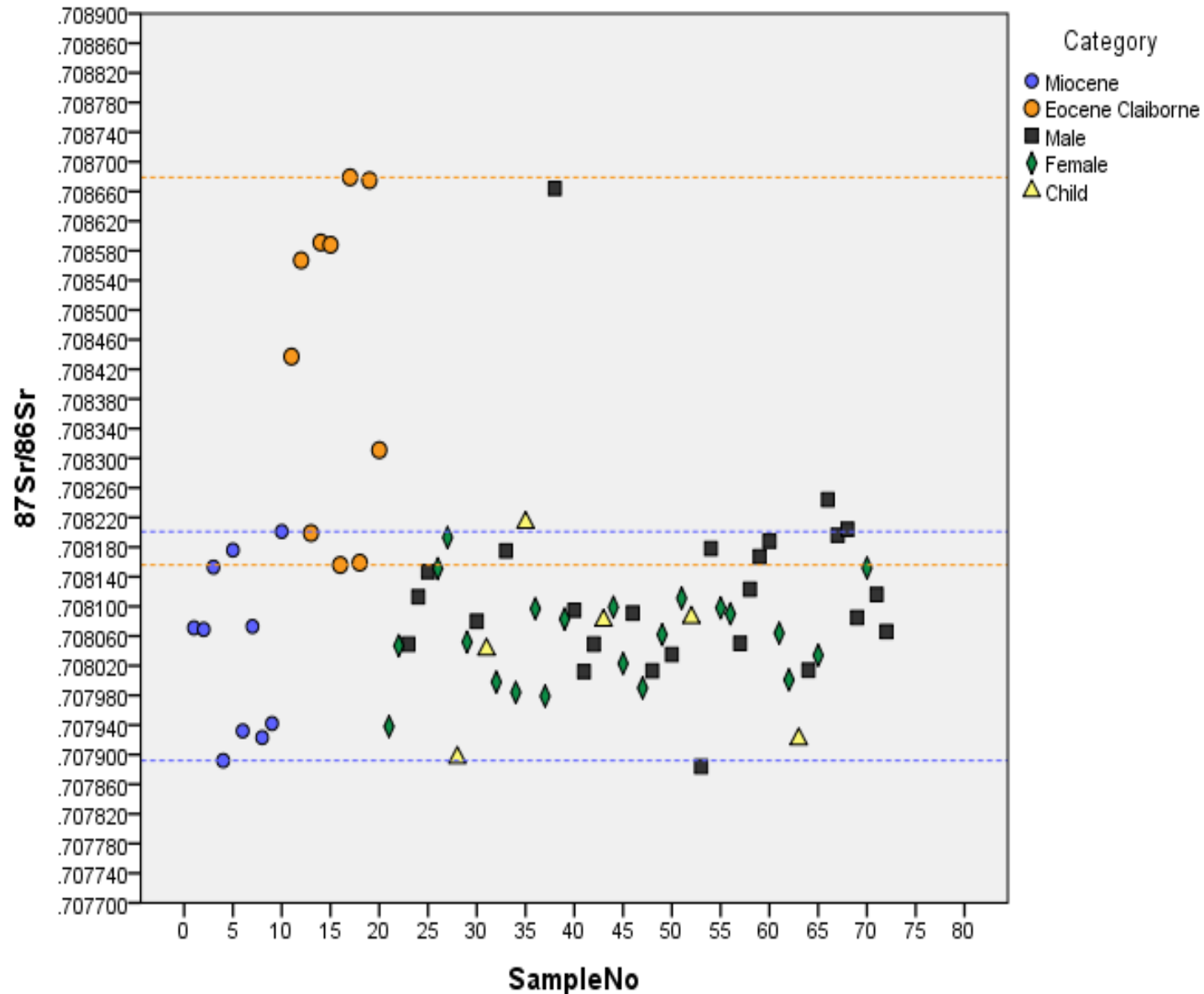


Faunal and Human Sr Values

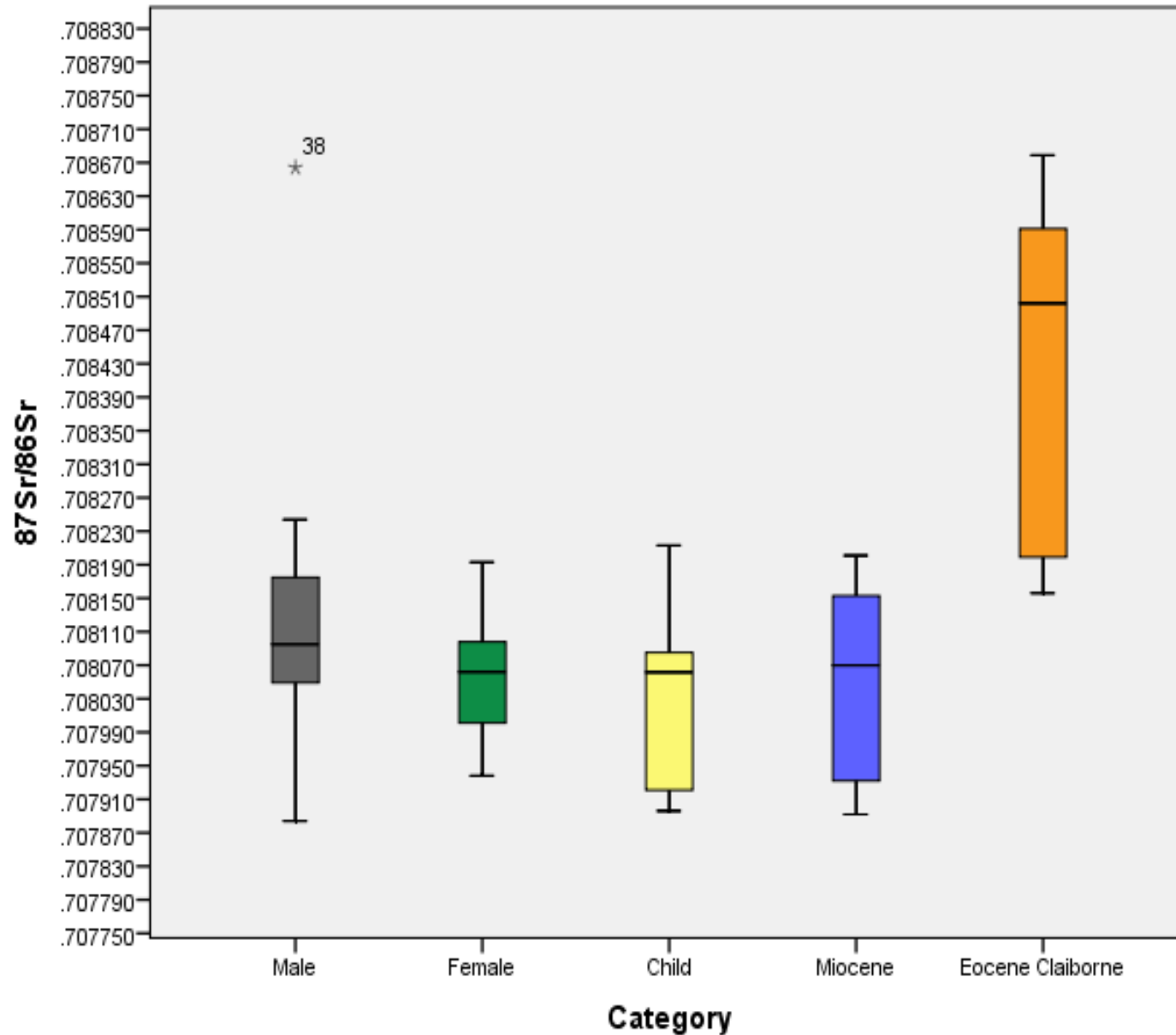




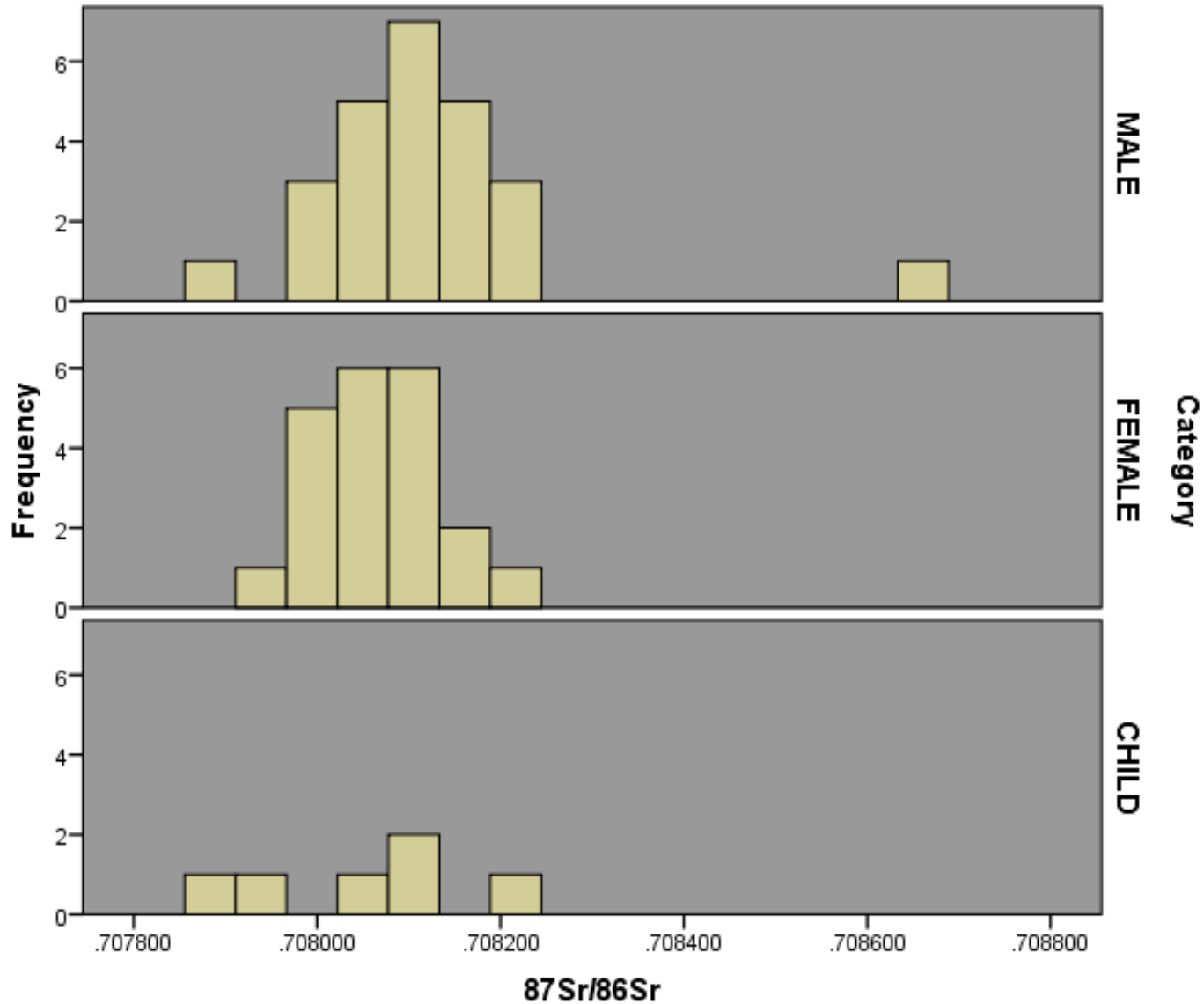
All Data Points with Demographics Displayed



Box Plot Displaying Demographic Data



Distribution of Sr Data by Sex



Interpretation of Data

- ▶ Mobility appears to be highly circumscribed, which infers territoriality.
- ▶ Loma Sandia was not a frequently revisited site by groups traveling between ecological zones.
- ▶ Evidence of territoriality is further supported by a study of carbon and nitrogen isotopes of other TCP mortuary sites by Hard & Katzenberg 2011. The study showed restricted resource use within the riverine-savanna zone.
- ▶ Lack of Sr isotope ratio variation in females does not support hypotheses of female exogamy.



Continued Research

- ▶ Further statistical analysis of human enamel data.
- ▶ Acquisition of faunal samples from seven geologic zones in the TCP.
- ▶ Sr stable isotope ratio analysis of faunal data.
- ▶ Mapping faunal data to geologic zones.
- ▶ Comparison of new faunal data to human enamel data.
- ▶ Reinterpretation of human data with completed Sr map.



Conclusion

- ▶ This research offers an archaeological means of evaluating mobility and territoriality on an archaeological population.
- ▶ Data supports hypotheses of Late Archaic circumscribed mobility and territoriality.
- ▶ Data does not support female exogamy.
- ▶ Greater variation of male Sr values requires further consideration.
- ▶ Continued work on bioavailable Sr will allow for more precise analysis and interpretation.



Acknowledgement

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- ▶ Thanks to Steven Lange and Chris Mostyn of the Texas Parks and Wildlife Department for providing faunal samples.
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