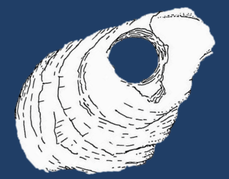
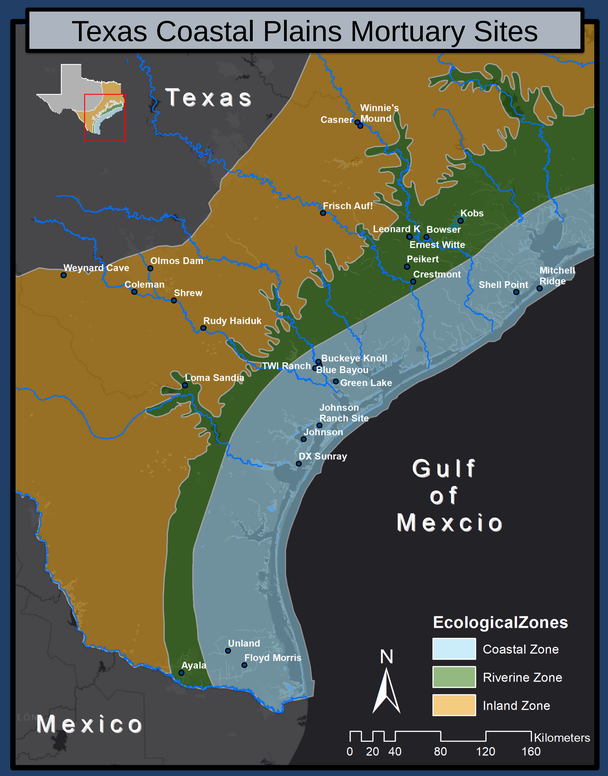
Demographic Change thru Age Profile Analysis of Burial Data:
Hunter-Gatherers on the Texas Coastal Plain



Overview:

- Using hunter-gatherer age profile data available through mortuary sites on the Texas Coastal Plain (TCP) Gulf region we look at the proportion of juvenile to adults to assess demographic change through time.
- Mortuaries of TCP hunter-gatherers were in use for more than 6,000 years, providing us with a large amount of burial data representative of the Texas Coastal Plain occupation.
- TCP mortuary sties offer a rare opportunity to study hunter-gatherer demographics through time, as hunter-gatherer demography is difficult to reconstruct.
- The demographic responses of the TCP populations provide a general understanding of socio-natural relationships as well as a way to assess several important factors such climatic changes, environmental carrying capacity, regional factors, and general health.
- Our goal is to use that demographic dataset to investigate long-standing questions related to the timing of population growth in the Texas Coastal Plains Hunter-Gatherers.

Texas Coastal Plains Mortuary Sites



Expectations:

Archaeological, ethnographic, and environmental data suggest that Holocene populations developed stable social and human-resource systems that shaped occupational history. During the Late Archaic period (4,000-1,200 B.P.) the number of mortuary sites significantly increased, which may indicate population growth. During the Late Prehistoric (1,300-300 B.P.) a series of pronounced cultural and technological changes occurred, but whether these changes are also linked to changes in population is unclear.

Methods:

- We compiled a list of dated burial/mortuary sites (n>2). Multicomponent site were excluded unless the components and burials could be dated.
- Using each recorded burial in the site lists we worked to identify if the remains represent an individual, multiple individuals or isolated remains to get an accurate number of individuals.
- We categorized individuals into one of 4 standardized age categories following Bocquet-Appel's (2002) methods (n(0-4), n(5-19), n(19+), and n(unknown)).
- We followed Bocquet-Appel's methods for calculating the juvenility index and applying it to archaeological populations.

The Juvenility Index as an Archaeological Measure of Population Growth

- Using a database of stable pre-industrial populations Bocquet-Appel looked at growth rates and life expectancy tables to adjust the index for archaeological data.
- Below is Bocquet-Appel's juvenility index:

$$P(5-19) = \frac{n(5-19)}{n(5+)}$$

- The juvenility index quantifies the proportions of individuals aged 5-19 (P(5-19)) to all identified individuals over the age of 5.
- This provides an estimate of the population growth rate, and is considered a random space time sample of cemeteries.
- The calculated *P(5-19)* value can then be compared to Bocquet-Appel's calculated zero growth rate for stable pre-industrial populations.

P(5-19) = 0.183 = Zero Growth Rate

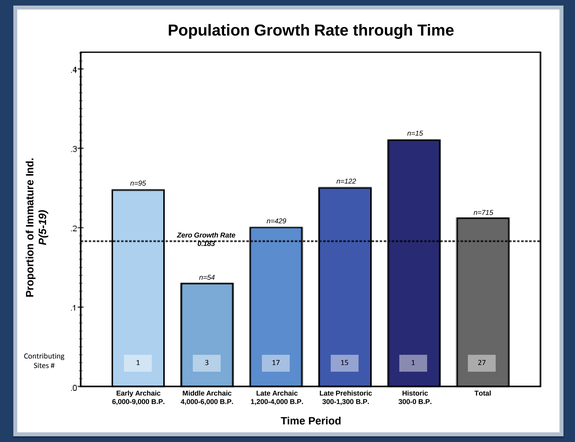
Results:

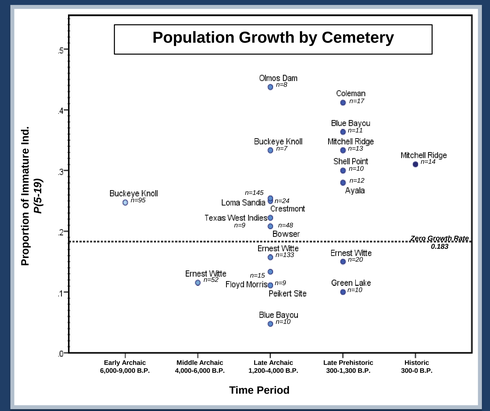
- During the Early Archaic, the juvenility index shows that populations were growing, with more offspring than needed for replacement.
- However, during the Middle Archaic, the index suggests that the population was in decline, with an estimated growth rate well below zero growth.
- Moving into the Late Archaic, the estimated rate was just above the zero growth rate, with the Late Prehistoric and Historic both showing an increasing rate, well above replacement.

Discussion:

- Results are considered preliminary for a number of reasons, but most significantly because of our concerns with sampling biases, these include:

- Low sample size of particular periods
- Size differences of individual sites
- Cemetery geographic distribution
- Paleoanthropological sampling and demographic processes
- Post-depositional taphonomic processes and generally poor preservation
- Archaeological excavation disparities,
- Natural vs. unnatural death
- Chronological period that is too large, normalizing the data





Time Period	Dates B.P.	Dates A.D./B.C.	Number of Cemeteries	*n(0-4)*	*n(5-19)*	*n(19+)*	*n(unk)*	n(5+)	P(5-19)	Largest Contributing Site
Early Archaic	6,000-9,000 B.P.	7050-4050 B.C.	1	**13**	**23.5**	**71.5**	**2**	95	0.247	Buckeye Knoll: 95
Middle Archaic	4,000-6,000 B.P.	4050-2050 B.C.	3	**6**	**7**	**48**	**6**	54	0.130	Ernest Witte: 52
Late Archaic	1,200-4,000 B.P.	2050 B.C. - A.D. 800	17	**46.5**	**86**	**344.5**	**98**	429.5	0.200	Loma Sandia: 145.5 Ernest Witte: 132.5 Bowser: 48
Late Prehistoric	300-1,300 B.P.	A.D. 800-1700	15	**11**	**30.5**	**91.5**	**7**	122	0.250	*Mostly sites under 20*
Historic	0-300 B.P.	A.D. 1700-0	1	**3.5**	**4.5**	**10**	**0**	14.5	0.310	Mitchell Ridge: 14
Total	***6,000+ years***	***27 sites and 37 cemeteries***		**80**	**151.5**	**565.5**	**113**	***715***	***0.212***	

Conclusion:

- The significantly low population growth rate during the Middle Archaic is interesting. Environmental data shows a period of significant aridity at 5,000 B.P. which could have contributed toward the declining population during this time.
- The Late Archaic shows signs of population growth which generally meets our expectations based on wetter more favorable conditions, and an increase frequency of mortuary sites.
- However, we see an even greater estimated growth rate in the Late Prehistoric and Historic. This conflicts with ethnographic accounts that suggest populations were in decline during historic times.
- We hope that additional information will allow a finer space-time subdivision of the data and allow a more accurate understanding of population demographics in the Texas Coastal Plain.

Future Research:

- Refine the chronological placement when ever possible by which we can look at population demographic changes.
- As part of a larger NSF funded project examining the Evolution of Social Networks in the TCP, it will be incorporated into this larger project.
- Ongoing research will generate a large number of directly dated burials that will add to the database.
- We will compare the results with those of the TCP Radiocarbon Database (in this same session) to better correlate the trends we are seeing.

Acknowledgements:

We would like to first acknowledge the countless people who have contributed to the published and unpublished documentation of these burial sites, there are far too many for us to list here in the references, but without their work this project would not have been possible. We would also like to thank Raymond Mauldin and Cindy Munoz at the Center for Archaeological Research for aiding in finding published and unpublished reference material. Additionally Marybeth Tomka and Jean Hughes at the Texas Archaeological Research Laboratory were essential to finding unpublished databases, original site reports and field notes that were necessary for the success of this project. Finally, this project would not have been possible without the support of the National Science Foundation award #1520308, 2015.

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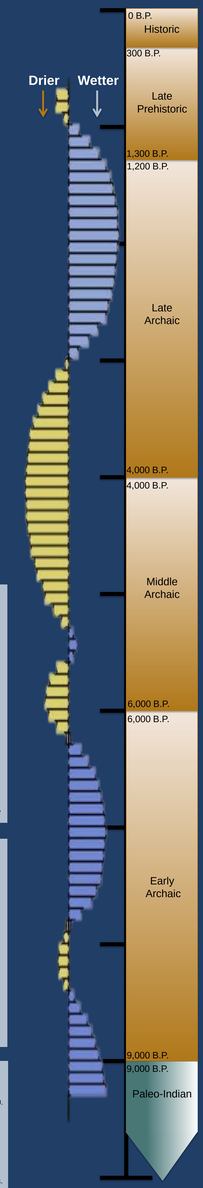
*Stratigraphic illustration source
**Wet Dry year figure and chronology adapted from Ricklis et al. 2012 pg. 13 & 23

Texas Coastal Plain Temporal Sequence



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