I am a bioarchaeologist/paleodemographer interested in interrelationships between people and their environments across time.  I study both how humans have impacted their environments and the return effects for people. My research has two areas of emphasis. First, for many years, I have been exploring the relationship between culture change, cycles of epidemic disease, and human demography and life history in the Holocene (e.g. Paine 2000; Bentley et al. 2002; Paine and Boldsen 2002, 2006; Paine and Storey 2005, 2006).  This effort has two goals: first, to examine the specific question of epidemic disease impact on Holocene demography and life histories, and second, to use this specific problem to elucidate and address general problems in the field of paleodemography.  My second emphasis is on how the ancient Maya interacted with their environment over time. Previously, I have also used demographic studies based on ancient settlement patterns to explore the ecological impact of population growth and land use on the Classic Maya collapse at Copan, Honduras (e.g. Paine and Freter 1996). I am currently studying similar processes in and around El Mirador, a massive Preclassic (2350 BP - 1850 BP) Maya center in northern Guatemala.

The primary thrust of my current research is exploration of human-land relationship at El Mirador. In May 2016, Andrea Brunelle (Geography) and I received a SEED Grant for fieldwork at El Mirador. El Mirador is a massive Preclassic Maya center in northern Guatemala.  The site was the political center of the Maya region in the late Preclassic before it collapsed around 1850 BP.  Why El Mirador collapsed as Classic centers, like Tikal, grew and flourished, is a critical question in the study of New World complex societies.  Hypotheses focus on: 1) population growth and the destruction of agricultural systems; and, 2) conspicuous consumption of lime plaster for elite construction.  Our research strategy combines of LiDAR imagery, GIS, settlement archaeology, and palynology.  We use the geographical data to develop an algorithm to identify residential sites, which will be compared to GIS data from archaeological surveys to create a sampling strategy for excavation and paleoecological cores.  The results of the field sampling and analyses will be used develop a research program to answer the questions above.

The SEED grant served to establish a cross-disciplinary research partnership between Anthropology and Geography and permitted us to undertake an initial 6-week season of archaeological fieldwork, collecting pollen cores, and developing our overall larger sampling strategy.  During the summer 2017 field season we: 1) ground truthed LiDAR-based identification of ancient residences; 2) worked to define the sample universe and sampling strategy for future settlement archaeology; 3) assessed conditions affecting pollen recovery. Subsequently, the REDlab collected preliminary pollen data for ecological reconstruction.  We used the SEED field season to provide proof of concept, which we are using as a basis for proposals for outside funding. During the 2018 field season I supervised field testing and Ground-Penetrating RADAR-based search for subsurface of ‘hidden’ structures. Estimating the prevalence of hidden structures is essential to our overall research strategy. In the 2018 and 2019 field seasons I conducted series of excavations to test the feasibility of identifying ‘hidden’ or ‘invisible’ structures using ground penetrating RADAR (GPR) (e.g. Barba et al. 2009; Skaggs et al. 2016) and to develop procedures for estimating the number of hidden structures at El Mirador. Brunelle and I, along with co-PIs David Wahl (UC Berkeley), and Carlos Morales Aguilar (U Texas) have submitted three (unfunded) proposals to the National Science Foundation, CNH2: Dynamics of Integrated Socio-Environmental Systems program. Though COVID-19 prevented field research from 2020-2022, we intend to return to the field as soon as possible, and to continue to submit proposals to fund our research program..

Alexandra Greenwald in the Anthropology Department, I will be establishing a new study of ancient weaning patterns. Reconstructing ancient demography from skeletons was major focus of my research for many years (Paine and Boldsen 2006, Hawkes and Paine eds. 2006). I collected and analyzed (with Boldsen) the HPHD and developed hypotheses about relationships between epidemic frequency and life history. A fundamental problem in skeletal demography is the interplay between selective mortality and unobservable heterogeneity. Skeletons do not directly represent living populations. They represent individuals who died at a given age, rather than those (usually the majority) who lived. This makes understanding the health of ancient populations difficult. I (2000) built demographic projections, which modeled living processes and produced model death distributions, but these were indirect tests. Direct means to test hypotheses did not exist. This new collaboration with Greenwald provides new, cutting edge means to address the selectivity problem. Because isotopes in teeth preserve aspects of diet from childhood, hypotheses re: reproductive decision making, and their effects on survival have become testable. Dr. Greenwald and I submitted a grant to the NSF Biological Anthropology (unfunded) program in January 2022. We intend to continue to seek funding for this research.