ABSTRACT
This paper sets out a theoretical proposal for obtaining an absolute date for the Taos Pueblo, a living archaeological site that may be the oldest continuously occupied structure in North America. The paper first explores the history and current state of archaeological and anthropological study at the Taos Pueblo and within the larger Taos community, determining that past academic studies have not fully aligned with the goals of the community itself, and have done harm in relationships between archaeologists and members of the Pueblo. I propose that the living heritage framework, as described in Trujillo (2019) and in accordance with the goals of the Taos Pueblo Preservation Program, should be applied to most appropriately address the needs of the community as a living site. Finally, I explain specific procedures for how to obtain a radiocarbon date for the site, after detailing the different options for sampling and analysis.

INTRODUCTION
The Taos Pueblo is a continuously occupied site of the Taos Pueblo Tribe, located in what is currently New Mexico, two miles northeast from the town of Taos, NM. The North and South Houses are widely understood to have been lived in by the tribal community since at least 1000 CE, making the site one of the oldest continuously occupied places in North America. However, there is still much left unknown about the site, or that has been researched only in a limited capacity. This includes an exact age of the Pueblo, and little has been done to use absolute dating methods at this specific site. This paper sets out to determine a theoretical path towards an absolute date for the site, in order to gain additional evidence for the age of the Taos Pueblo’s continuous community.

My approach will include specific respect for the Pueblo as not only the rightful land of the Taos Pueblo Tribe but also as a living site, and the active home of dozens of people. I will draw from past Indigenous archaeological research as well as the writings of Indigenous scholars who have worked at the Taos Pueblo to investigate how archaeological research can honor the goals of the community. Ultimately, I argue that the best method for providing an absolute date for the age of the Taos Pueblo settlement would be radiocarbon dating, and provide suggestions for how this archaeological project might fit within a larger “living heritage”-based approach to site conservation at the Pueblo.

BACKGROUND ON INDIGENOUS ARCHAEOLOGY METHODOLOGY
In seeking to understand how a specifically Indigenous Archaeology-informed approach is necessary at the Taos Pueblo, it is vital to consider the history of academic activity in the Taos and nearby Indigenous communities. For most of the community’s history since Spanish contact in the 16th century, academic research has been in the form of non-Indigenous scholars leading inquiries regarding their own questions in ethnography, anthropology, and archaeology. It is important to note that these projects did not just disrespect the autonomy of the Taos community by prioritizing their own research, regardless of how their goals might or might not serve the community at the site, but also that these projects have often had materially negative consequences to the people living in the Pueblo. As a result of the many threats to the safety and sovereignty of the Taos Pueblo, the community is protective of their land and cultural heritage. Previous non-Indigenous academic researchers have often treated the tribal government’s protection of their own cultural heritage as an anti-academic bias, or a “conservative” tendency that ought to be staunchly opposed; this hostility toward the tribal government built barriers to any possible universally beneficial projects.

One example of this is the 1964 Ellis and Brody study entitled “Ceramic Stratigraphy and Tribal History at Taos Pueblo.” The study details an archaeological attempt to date the site by digging into Refuse Mound III, which is slightly north of the main plaza. The research’s success was limited due to perceived tensions between the archaeologists and the Taos community, as is specifically noted in the publication. Ellis and Brody write that they feared their dig site “might be broken into during the night by some of the Conservatives who still questioned the wisdom of excavation” (Ellis and Brody 1964:317). This fear led to rushed excavations, and contamination of the different layers of the stratigraphy, which draws doubt over their later analysis. This is just one example of how acrimonious projects not only disrespect the community’s autonomy, which is the primary issue, but also do not even result in fruitful academic inquiries. Despite their fears, this project had actually been permitted by the tribal government on the grounds that additional
dating information would be useful to the efforts of the tribe to gain legal protection against encroachments on their land by the United States. This shows that it was possible for the researchers to center Indigenous goals, but the lack of respect to the community derailed their work and led to less favorable outcomes for all actors. However, this tense dynamic is not a necessary condition of archaeological research, as new advancements and collaborations have begun to demonstrate.

More recently, in the aftermath of the 1970 return of lands to the Taos Pueblo tribal government, collaborations between the tribal government and outside institutions have founded multiple conservation efforts that do align with community goals. These projects have established a clear guideline for the goals of the tribe with respect to conservation and archaeology. I have these guidelines in my research to align the project of dating the Pueblo with the goals stated by Taos authorities. The current tribal-lead plan for site management is detailed by the Taos Pueblo Preservation Program (also referred to as the “TPPP”), headed by Luis Mountain Zamora and Mary Kay Judy, first established in 1981. The main goals of the program are site restoration of adjacent houses, using only compatible materials and traditional techniques, and the education of young people within the Taos Pueblo community in the techniques of adobe construction and restoration. An additional goal of the TPPP is that any archaeological work done at the site ought to provide material benefits back to the community, specifically towards employment and educational opportunities for tribal members.

The plan also details how previous conservation work through other organizations can be made to fit into the new tribal-lead framework. The Pueblo is designated as a UNESCO World Heritage Site, on the basis that it is “a remarkable example of a traditional type of architectural ensemble from the pre-Hispanic period of the Americas” and additionally that the nature of continuous occupation has “retained most of its traditional forms up to the present day” (UNESCO). The World Heritage Site designation has been both a benefit and a deficit to the community in the past. While it does provide additional streams of funding and certain access to expertise, increased tourism has threatened the ways of life of people living in the community, and UNESCO’s goals do not specifically center the autonomy of the people of the Taos Pueblo. However, under TPPP, the tribe has been able to reconcile the universal goals of UNESCO with tribal goals, specifically in providing additional housing for the tribe and introducing requirements that all restoration projects only use compatible materials and authentic techniques, prioritizing Indigenous expertise towards UNESCO’s own ends.

Trujillo’s (2019) research agrees with my analysis of the UNESCO goals and the Ellis and Borden study that previous preservation and archaeological work at the Taos Pueblo has not shown sufficient respect for the nature of the site as a living community. Her interviews with community members identify several goals, including bringing more people in to live in the historic center full-time, maintaining adobe structures around the site, and preserving the tribe’s control over their own heritage with respect to research done at the site and any outsider’s academic work. Her paper specifically recommends taking a “living heritage” approach to any conservation projects, which, by her definition, consists of three factors: the focus, on continuing tangible and intangible heritage, the community in control, being those living in the Pueblo rather than conservation professionals, and finally the goal, which ought be the “continual process of creation for the present community” (Trujillo 2019:2).

In line with the guiding principles of the TPPP and the community desires identified in Trujillo’s interviews, my proposed research seeks to combine community advancement through job opportunities and hands-on archaeological experience for students and adults in the community with the academic goal of research. I believe this research fits within the community’s desire to use academic methods to accompany their oral history in their own understanding of the site. Additionally, new evidence to flesh out the timeline of the site is useful for legal claims to the land and to fortify tribal protections. Previously, radiocarbon dating and other scientific methods, such as DNA analysis, have been used to provide additional evidence to tribal rights claims in other NAGPRA (Native American Graves Protection and Repatriation Act) cases, most famously in the case of the “Kennewick Man.” The first and most important step of any potential project at the site would be to reach out the board of the Taos Pueblo Preservation Program and to determine if they agree that it fits within their understanding of the goals of the community, and, if it does, to also approach the Taos Pueblo tribal government to gain legal approval, respecting the rights of these two bodies to deny archaeological work as they see fit.

BACKGROUND ON PUEBLO ARCHAEOLOGICAL DATING

The largest source for absolute dating methods in the American Southwest for a similar period comes from “Dating the Valdez Phase: Chronometric Re-Evaluation of the Initial Anasazi Occupation of North-Central New Mexico” (Boyer 1997). It should be noted that the term “Anasazi” is a outdated term for Ancestral Puebloans, being a Diné (Navajo) word meaning “ancestors of our enemies.” Exonyms such as this are common in outdated terms referring to Indigenous groups, and this paper uses “Ancestral Pueblos” to more neutrally refer to groups that founded many settlements in the Southwestern Pueblos. Boyer (1997) collects and compares many different methods used to date other structures and settlements in the Taos Valley, although not the specific building that this paper addresses. The studies he draws from use a variety of methods, including obsidian rehydration, radiocarbon dating, and dendrochronological methods, from a variety of sources. Many of these are from the “Pot Creek” Pueblo site, which is located south of the Taos Pueblo in Santa Fe, NM, and was abandoned in the 13th century CE. Samples were drawn from a variety of materials, including pottery, pithouses, and rock structures plastered with adobe. This paper supports dates for occupation of the Taos Valley area in the 11th century CE, and gives significant background on the potential merits and limitations of radiocarbon dating in Southwestern sites.

The primary methods for dating Pueblo communities have not been absolute methods, but rather ceramic stratigraphy, which compares different pottery construction and decoration techniques across sites and depths, resulting in relative dates. This method was attempted in Ellillie and Brody (1964), and while the results supported a similar date for the age of the Taos Pueblo community, they were clearly
limited by the issues noted above. While this method is useful in drawing comparisons across sites, it does not provide exact dates, and excavation requires invasive digging projects that significantly damage sites. Site damage is not only academically problematic, as it always destroys some amount of data due to disruptions to the site, but also socially problematic, as invasive methods require greater infringements on the activities and lives of living communities. The background for 10th century ceramic stratigraphy is also provided in Boyer (1997).

“Oral history is a robust source to contextualize archaeological finds, and is uniquely representative of Indigenous group’s understanding of their own history.”

Finally, another method of anthropological research and dating used in the Taos Pueblo community is oral histories. Another project by Boyer, in 2008, entitled “North People and South People: Ethnohistorical and Archaeological Evidence for the Origins and Organization of Taos Pueblo” combined previous ceramic stratigraphy information with oral histories that detailed migration patterns into the area. Oral history is a robust source to contextualize archaeological finds, and is uniquely representative of Indigenous group’s understanding of their own history. It also yields potential relative dates, although oral histories do not tend to note specific measurements of time, preferring sequences of events or specific notable developments, or individual people. These histories would be central to understanding the context of both Taos and other groups at the time the Pueblo was built, and absolute dating is not intended to displace oral histories but rather to map them onto an exact calendar timeline.

This paper seeks to propose research that would fulfill two specific gaps in the literature. First, I explore potential radiocarbon dating and dendrochronology uses in large-scale/multistory adobe buildings, and thus find new sample possibilities for radiocarbon dating many adobe structures, as opposed to the artifact and kiva sampling used in Boyer (1997). Second, I apply specific Indigenous Archaeological methods, which note not only the historical and current context of inequities perpetuated by academic work in the Taos Pueblo community, but also the potential social benefits of such research, if done appropriately. Finally, this research would be unique in addressing the needs of a living community, unlike the abandoned communities worked with in other dating projects like Boyer (1997).

SITE DESCRIPTION

The site consists of a central plaza, dominated by the large, multistoried adobe North and South Houses, pictured in Figures 1 and 2. There are also multiple surrounding smaller houses made in traditional adobe styles, which vary in age. To the west of the main Houses are the ruins of the previous Saint Gerome church and the currently standing Saint Germone church, both also adobe buildings. The site includes six kivas still in use, and one which is currently disused. Also of archaeological interest are the two surrounding walls that encircle most of the site, one of which is a ruin of a previous adobe wall, and another is a later adobe wall that is still standing. There are also several refuse mounds around the site, which consist of mostly ash and discarded waste, including many potsherds.

PROPOSED RESEARCH PROCEDURE

In order to find the most suitable material to analyze for absolute dating, the oldest parts of the site must be identified. These could be

Figures 1 and 2. North and South Houses of the Taos Pueblo, from 2008, photography by Edmondo Gnerre, sourced via UNESCO Taos Pueblo page.
located through oral history, as well as an analysis of the construction techniques used to build adobe structures, which build new rooms and stories on top of and beside older rooms. Given this, the oldest parts of the site are likely the innermost rooms of the North and South Houses. Additionally, plaster is layered on each autumn season to preserve the adobe underneath, according to oral reports collected by Trujillo (2019), so the thickest walled rooms are likely the oldest. However, we cannot be certain that all the layers are evenly thick, so it is possible that a thinner walled room might predate a thicker walled one. Refuse mounds have likely been in use continuously since the beginning of the site’s occupation, considering any settlement would need a place to deposit waste, and as is supported by Ellis and Brody’s methodology. Ellis and Brody (1964) identify one such refuse mound, Refuse Mound III, as the likely oldest one, based on consultation with the community. Other structures, such as kivas, may be older or younger, and asking the community would be the best method to approximate if they are known to be significantly older than other structures. Finally, the two walls are unlikely to be the oldest structures at the site since they are identified as defensive measures, built to oppose the Spanish colonizers in the 16th century. Since this will be an imperfect estimation of relative dates, or there might be multiple oldest parts of the site, multiple sample sources will be ideal. Once the places or objects that likely represent the oldest parts of the site are located, we must determine the best way to chemically analyze them in order to find an absolute date for the materials.

One method would be AMS radiocarbon dating. Radiocarbon dating has been widely utilized in archaeology to determine the absolute, as opposed to relative, date of an object at a site. This technique relies on the fact that an organism stops accumulating carbon when it is no longer living, and the known half-life of the carbon isotope Carbon-14 allows archaeologists to determine the amount of time that has passed since the death of the organism, within a margin of error. Radiocarbon dating was used in multiple samples noted by Boyer (1997) for materials from a similar time period at the Pot Creek Pueblo, showing support for its potential use. Although he did note that previous carbon samples were of “low quality,” which he posits was likely due to limited materials, although the “context quality” was high (1997:2-3).

However, there are some limitations to this strategy. First and foremost, it can only be used to date organic material. Once again, traditional adobe construction techniques can be used to locate suitable organic material. The TPPP outlines the traditional process of building adobe structures. First, bricks of straw and a specific mud are made in molds and dried in the sun. These bricks are then laid with mud mortar into walls, which are several feet thick. The walls are finally sealed with an adobe wash, and covered in a last white layer on the interior and an additional mud layer on the exterior. After the walls are constructed, wooden beams called vigas are installed in the ceiling to support the roof, and, if building additional floors above the room, wooden latillas are crosshatched on top (Zamora and Judy 2015:39-40). These techniques show two key sources of organic material that would be built into the oldest rooms of the North and South Houses: the straw of the inner wall-bricks, and the wood of the vigas and latillas.

An important consideration of any work done at the Taos Pueblo is the commitment to preserving the structural integrity of the North and South Houses. The sample sizes needed to use radiocarbon dating on wood are relatively small, only 3-100 milligrams according to the Beta Analytic Testing Laboratory’s current sample guidelines for mass spectrometry carbon dating. Sampling the outside of the wood beams also addresses the issue of inner tree rings containing more carbon isotopes than outer ones, with outer tree rings containing the truest carbon age to that of the actual tree’s death. Thus, obtaining the wood samples is unlikely to structurally damage the Houses and is the best candidate for carbon dating. The abundance of wood used in adobe construction also solves the issues of lower sample availability noted by Boyer (1997).

There are two possible objections to sampling the wood: the possibility of “old wood” usage, and “new wood” repairs, each of which might yield incorrect isotopic results for the date of the actual building. Although wood may have theoretically been repaired after the original construction, vigas are very likely to be original, since they are integral to the structure. This greatly minimizes the likelihood of mis-dating. Finally, the last potential issue with wooden vigas as a source of carbon is the “old wood effect,” which notes that wood may have been collected and cut down before the construction of the buildings. However, since construction practices have been continuous in the Taos Pueblo community, and Taos builders do not use aged wood, it is likely that previous builders also used relatively freshly cut wood. Thus, I propose wood sources are the best candidate for sample collection.

Another significant strength of using wood samples from the vigas is the potential to pair radiocarbon dating with dendrochronology, which utilizes tree rings to date an object. This is extensively covered by Ahlstrom’s “The Interpretation of Archaeological Tree-Ring Dates” on Southwestern dendrochronology. He specifically identifies how not only is there a robust academic history of dendrochronology in the Southwest that tie exact dates to specific carbon isotope levels, but also notes previous use of dendrochronology on beams in adobe structures. While none of his work is specific to the Taos Pueblo, the overall research basis is easily translated from similar construction techniques in other Southwestern Pueblos, and would provide a very strong basis for dating the wood of the Taos Pueblo’s vigas. Additionally, Fritts and Dean (1992) specifically apply dendrochronology to the Chaco valley within the period of interest for this proposal, 900-1200 CE. While their research aims at questions of climate change, their methods show the strength of date evidence on the basis of dendrochronology.

Several other carbon dating sample options exist, however, which allow for a more complete picture of the age of the site and a greater likelihood of finding the oldest part of the Pueblo. It may be possible, in consultation with tribal experts in adobe construction, to take a core from a wall of the Houses, and separate out the straw from the innermost bricks. Again, since the mass of straw needed for chemical analysis is not large, this would likely not structurally compromise the building. Hector (1993) mentions the use of radiocarbon dating on the bricks of adobe structures at Los Peñasquitos in California, which were constructed in a similar style to those at the Taos Pueblo, so there is precedence for this application. Despite that, it is more invasive and destructive than wood samples would be.
Aside from carbon dating, another potential method for dating clay was established by Wilson et al. in 2009, in a paper entitled “Fired Clay Ceramic Dating by Dehydroxylation Kinetics.” This method has potential to be used on pottery or even on samples of brick itself, which is promising given the adobe usage at the site as well as the plentiful potsherds from refuse mounds. It dates clay objects by re-drying the object, thus evaporating uptaken water and determining the mass of water gained since the object was originally heated, and then exposing the clay to air again, to determine the rate of water uptake. Combining the rate of water uptake with the total uptaken mass of water, it is possible to calculate an absolute date for the object.

While this paper only details use of the method on fired clay, it may be possible to expand this to sun dried clay used in adobe bricks. This potential application assumes it would be possible to determine the initial dryness of the adobe bricks, then measure the uptaken mass of water through the same method of reheating the samples. Given that there is plentiful access to new, recently dried adobe bricks, especially sourced through the TPPP’s construction education initiatives, this may be a possible dating method. However, its usefulness would be limited by the practice of re-plastering, which would limit inner bricks’ exposure to air, and accordingly, to water vapor. Less water would likely be absorbed by the clay each year as it is encased in thicker and thicker layers of plaster. Therefore, while the method is worth exploration for dating potsherds at the site, it is limited with respect to adobe walls.

**POTENTIAL SOCIAL IMPACTS**

Finally, it is vital that the project consider how to provide career advancement for tribal members, one of the planks identified by the TPPP. First, any laborers needed for digging excavations at the refuse mounds, if that was a chosen sample site, should be hired from the labor force of the community. Second, expert consultations and preparation for sample collection in the Pueblo should provide an employment opportunity for the adobe construction professionals created by the TPPP’s traditional knowledge employment plan. These are two opportunities specific to radiocarbon dating sample collection, but this project could easily fit within a larger framework of creating a standing hired group of archaeology and conservation professionals from the community, as is called by community members in Trujillo (2019).

The aim of the employment opportunities goal of the TPPP is firstly to diversify the job market and provide material opportunities for tribal members, but also to recognize the tilted economic benefit that non-member conservation professionals and archaeologists gain from research done on tribal lands. As an institution, archaeology generates financial security and academic recognition for researchers without regard to their reliance on expertise, labor, and resources from the local communities in which they dig. Therefore, employment opportunities and the channeling of funding as appropriate and possible back into local communities can be one step towards making the economic benefits of archaeology more equitable.

Beyond direct employment opportunities, there are also secondary material benefits that the project might provide to the Taos Pueblo community. Trujillo (2019) identified a desire to cultivate greater investment from the younger generations in the traditions of the Pueblo. One way to access that goal is for students to get the opportunity to participate in sample collection and educational outreach about archaeological site-identification and chemical analysis. Considering the multiple steps of the dating project-- site identification, sample preparation, collection, analysis, and finally any restorative processes that must be undergone to return the sample sites to their stable state-- there is ample space for student research, education, and involvement. Any of these could provide high school resume-building opportunities, student research materials, or other soft skills that would be useful for later academic or economic application.

A final consideration of the project is the use of the information gained and how this might benefit the Taos Pueblo community. Carbon dating is not a perfect measurement, but the results are widely respected as an archaeological dating method, and would likely be the most exact dating possible at the site with technology available at present. The first consideration is how this new information can respect and complement traditional knowledge and oral histories. As documented by the oral history aggregation in Boyer (2008), Taos oral histories document movement into what is currently New Mexico from the Rio Grande Valley. Community elders could be consulted to see how they feel this new information could be interpreted to provide a timeline for that movement, or how else they might wish to use the information in their own intellectual understandings. As Trujillo’s (2019) “living heritage” methodology recommends, the project results and interpretation should center core-community knowledge creation.

Overall, my research into how one might date the Taos Pueblo has resulted in a viable method for dating the Pueblo. Through the steps of TPPP and tribal government consultation, site identification, sample collection, and finally chemical analysis, I think a reliable absolute date for the Pueblo site could be determined. My recommendation is that the safest and most effective method would be radiocarbon dating of wood samples from vigas and latillas in the innermost rooms of the North and South Houses, although other detailed methods provide alternate routes for chemical analyses. Ultimately, any archaeological initiatives in the Taos Pueblo must be to the benefit of the tribal community itself, too often have archaeologists placed our own desires for knowledge above the material considerations for Indigenous peoples and communities.

**ACKNOWLEDGMENTS**

Written for Daniela Wolin’s course ANTH/ARCG 171: Great Civilizations of the Ancient World.

**REFERENCES**


