Benchmark

Volume 34, Issue 5 May 2020

The **NORTH TEXAS ARCHEOLOGICAL SOCIETY (NTAS)** meeting for **May 14th** will be ***canceled***.

NTAS meetings are **free** and visitors are always welcome (see **Page 3** for the location and directions).

Inside this issue:

President's Message

NO MAY NTAS MEETING

James Everett, President

It is a pleasure to start this month's article with some very positive news. In April, NTAS Newsletter Editor Molly Hall gave birth to a healthy baby, and both mother and newborn are doing well, although sleep has been a little hard to come by – at least for Molly. Congratulations Molly and our best wishes to you, the baby, and your entire family.

After our outstanding NTAS meeting on March 12, the month's regular "March Madness" turned into March "weirdness" due to the increasing number and severity of stay-at-home orders. Then a strange new "normal" settled in as we became even more quarantined in April and became used to wearing masks on our repeated quests to find toilet paper. Now the self-isolation is stretching into May and beyond. Since so many of our regular archeology activities (e.g., monthly meetings, the TAS Field School, the TAS Annual Meeting) have been canceled recently, the NTAS Board decided to solicit poems, essays and photographs related to how members coped during the past few months, including feedback on what reading materials, podcasts, etc., NTAS members enjoyed during this era of social distancing. We appreciate the response to our request and some of the submissions appear in this edition of the newsletter.

For the July newsletter, we have requested that members send us their favorite field school-related memories, since there will be no TAS field school this summer. That request caused me to start thinking about my field school experiences, especially my first field school, which I attended in 1971 at Kerrville. I drove to Kerrville in my 1957 Chevrolet, with the windows rolled down since the car did not have air conditioning. Filled with anticipation, I pulled off the highway and into the lush, green pasture, shaded by huge live oak trees, that served as the field school headquarters. As I finished checking in and picking up my registration packet, the volunteer at the card table pointed to his right and said,

Continued on Page 2

Connect with NTAS:

facebook.com/NTXAS.org

www.NTXAS.org **info@ntxas.org**

President's Message

Continued from Page 1

"Take whichever lawnmower you want." "Lawnmower?" I asked. "Yeah," was his reply. "Just mow the area where you want to pitch your tent." I pushed the lawnmower to the camping area I had selected, used it to clear a small area for my tiny pup tent, and returned the lawnmower for the next registrant to use.

The rest of the week was a blur of burned rock middens found on site surveys, evening presentations by recognized experts, and sinking the *Titanic* during the spirited nightly sing-along around a campfire. In the process, I got to know TAS and some of its outstanding members, like the Principal Investigator, Alan Skinner, and the *Titanic* "captain", Dr. E. Mott Davis.

Two experiences from my week on one of the survey teams have stayed with me through the years. As we neared a steep limestone bluff along a bend in the river, our group came upon an injured, gigantic red-tailed hawk. A kind-hearted beginner on the crew insisted that the hawk needed medical assistance and she refused to listen as the crew chief warned her against approaching the limping bird, which had backed against the cliff face. I suspect that that was the last time the would-be Florence Nightingale tried to help a bird of prey in the wild. Another first-timer insisted on collecting the shiny, black "jewels" we kept encountering along the trail. She did not believe us when another survey crew member and I told her the jewels were goat droppings. Needless to say, the glistening black necklace that she made by stringing the jewels together quickly "melted" in the June heat.

I speak for all NTAS members when I encourage all members who have attended TAS field schools to share some of <u>your</u> most cherished field school memories (serious or humorous) by June 26 so they can appear in the July newsletter. Until then, keep reading interesting books, watching positive videos, and sharing your thoughts and memories through the newsletter.

Preparing a display for the public

Home Sweet Home, Kerrville, 1971

NTAS Monthly Meeting Location & Directions

NTAS meets at 7:30 p.m. on the second Thursday of each month (except June and December) at the University of North Texas Health Science Center, 3500 Camp Bowie Boulevard, Fort Worth **(in the Research and Education Building, Room 114)**, near the intersection of Camp Bowie and Montgomery Street.

Traveling west on I-30 from downtown, take the Montgomery Street exit. Turn right on Montgomery and continue to the five-way intersection at Camp Bowie. Turn right onto Camp Bowie, followed by an immediate left onto Clifton Street. **Turn into the first parking lot on the left (Administrator and Visitor Parking). You will drive past an information booth as you enter the parking lot. Park on the far (north/west) end of the parking lot and enter the Research and Education building. Once you enter the building, turn right and proceed down the hallway to Room 114.**

Update Your Calendar - NTAS Monthly Meeting Speakers

May 14th: No Meeting
June: No Meeting
July: To Be Determined

Welcome New NTAS Member:

Christine Upton

Letter from the Editor

Molly Hall

As we are all well aware, the COVID-19 pandemic has changed the way we operate our daily lives (well, those of us who were introverted hermits prior to the pandemic haven't had to adjust much!) In light of the fact that NTAS would not be having meetings in April or May, and the fate of future meetings is up in the air, the board solicited newsletter content from the membership. Ideas for what this content could include were:

-Insight into how the membership is spending their time in relative isolation

-Recommendations for books, shows, podcasts, etc. that other members might enjoy indulging in to pass the time.

-Memories from past TAS field schools, to honor the tradition even though the 2020 field school has been canceled.

We received several contributions presented on pages 5-7 of this issue. And are ***continuing to collect anything the membership would like to share***. The field school memories will appear in the July newsletter, an issue where we traditionally share photos and comments on the current year's field school.

Personally, since I started working from home (and subsequently went on maternity leave), I have enjoyed the film *Harriet* about Harriet Tubman and her work on the underground railroad and the book *Hidden Figures* about the African American women computers of NACA (later NASA). I also regularly listen to the podcast *Stuff You Missed in History Class*, which has an archive of over 1,000 episodes on history (and prehistory) topics from all around the world. My last recommendation is the podcast *Invention*. Though some of their episodes can feel cursory if it's a topic you already know about, the hosts' enthusiasm for the subjects of the episodes is genuine and endearing.

In addition to responses about how we spend our time and field schools of the past, we received a more technical article from Jimmy Barrera and are excited to share it in this issue on pages 8-13. It has been quite a while since the NTAS (TCAS) newsletter has published technical articles and field reports, but we hope that this article will inspire many of you to share such things with us in the future. We know that you are active in field work and research other than that sponsored by TAS or NTAS. Please feel free to share what you are discovering, producing, and learning.

Upcoming Texas Archeology Events
Canceled or Postponed

NTAS Homer Norris Art Raffle — *Postponed, hold on to your tickets!*
TAS Field School — *Canceled*
TAS Ceramics and Archeology 101 Academies — *Postponed, pending future scheduling*
TAS Annual Meeting — *Canceled*

See the TAS website for more details and to register: https://www.txarch.org/tas-academies

TAS Academy Scholarships are available from TAS and NTAS via their websites

What I Have Been Doing

Eddie Osburn

I've been pretty active in my flintknapping hobby the past few weeks. I dug out some old raw material that I had put away years ago and found several really nice pieces that deserved to be worked.

The first piece is from a slab of Pink Dothan flint from Alabama. I replicated a Hardin point. This was a really good piece of flint which made it relativity easy to knapp. Any flintknapper will tell you that the better the stone, the easier it is to work.

The second piece is from a piece of Burlington chert from Missouri. It, too, is top quality flint and was easy to knapp. I formed it into a replica of a Langtry which is found in West Texas along the Pecos River.

The third point is made from Polka Dot agate from Utah that I had forgot I owned. I made a point from this material several years ago but no longer have it and this piece is too pretty to just remain a slab of rock. I'm not sure it replicates any particular style but it is a shape that fits my eye and I have made this style many times.

The final point is made from Silicified Sandstone from Australia. This is also the second time I have used this material as I purchased two pieces of it about five years ago. It was not an easy point to make as the different colors all had different degrees of hardness. You can see the shape is much like the polka dot point (a habit of mine).

Recently I have obtained a few pieces of dichoric glass and two pieces of *mille fiori* glass (thousand flowers) from Italy that I will be working with in the near future and will be showing when completed.

Archeologist Spending Time in Isolation

Freddy Frankel

I have been reading an excellent book entitled "Dinosaurs Rediscovered" (M J Benton).

It is a current (2019) summary of how we know what is currently known about dinosaurs, explained in a fairly simple vocabulary.

It reads like a textbook for an 'intro to Paleo' class but is far more interesting than the one I read in college in the mid 70s.

The use of SEM scopes, CAT scans, 3D imaging, data mining and manipulation, feather and coloration technology, interdisciplinary collaboration, excellent diagrams and so on make this one of the best books I've seen on this general topic. A great addition for your home libraries!

Knapping

Marvin Glasgow

I cannot speak for Professional Archeologists, however avocational archeologist, *which I am one,* can get out and investigate possible locations for Native American (Indian) campsites on private property, including ranch land. When you are offered access to 300 to 1000 acres to see if there is any evidence that Indians may have camped there, you jump at the opportunity, weather permitting.

Then there are folks like me that do flint knapping as a hobby. Speaking for myself, I have been trying my hand at duplicating the types of points found at a registered site. Attached is a copy of some of my work at duplicating those found at the Bell Camp Site in Parker County. As you can see they are quite small and require a lot of patience to make and not break (see photo on page 7).

When I get tired of that, I put together displays of point types found in Texas, listing their types (names) and time frame of when they were made (see right photo below). Then sometimes I just make an artistic framed display of arrowheads (see left photo below). That gives me something to do.

Artifacts

Tony Sims

These ancient artifacts
That we all seek to find
To know just who or what they were
And see their unique kind

We'll dig down in the earth
Through jungle or desert or hill
In blistering heat or frigid cold
The hunt, our greatest thrill

And when the gods are fair
And treasures we unearth
We'll call the pros to bring their squad
And help them in this mirth

Often our quest is fated
To finding none at all
But the search is what we seek
We'll always answer the call

So grab your trowel and shovel
And join us in this quest
The world is full of ancient things
Hunting them with friends is always the best

TAS Cap as a COVID-19 Shield

Tim Sullivan

I came up with this way to add a layer of protection! I had a few sheets of plastic (the ones used for making transparencies before power point) around and stuck it up under my TAS cap. It works great as a shield!

Nitre and Gunpowder Production for the Confederacy in Texas

James E. Barrera

As a boy hunting and hiking hills and valleys of the Frio River and Sabinal River around Uvalde County, I was exposed to various critters and other interesting adventures including a bat cave and Confederate nitre works. We always heard stories about how the Confederacy mined the cave and produced nitre which was needed to make gunpowder, but no one really knew the details. While watching millions of Mexican Free-Tailed bats (Figure 1; *Tadarida brasiliensis*) zip around the warm hill country sky, I wasn't thinking about magic in the little gift these buggers leave behind. Just that it was a serious smell that I would always remember.

By 1863 the Union blockade of Confederate states thoroughly prevented supplies from reaching southern ports, this affected most goods including gunpowder (Campbell 1925). The Confederate Nitre and Mining Bureau was under great pressure to rapidly increase production of nitre (niter), also known as potassium nitrate, or saltpeter. Nitre, along with sulphur (sulfur) and charcoal, is a primary ingredient for making gunpowder (Whisonant 2001). According to Johnson (1990), Confederate nitre production was steadily pushed westward and by late 1863 was basically driven out of Arkansas and into Texas. Johnson (1990) thoroughly discusses that from late 1863 until the end of the Civil War, the nitre from Texas largely kept the Confederacy in supply.

Based on details about mining raw nitre ore in Texas (Shroyer 1973), it appears that nitre could not be mined out of geological deposits and be used to make gunpowder in Texas at this time. Therefore, in Texas the Confederacy had to produce nitre from bat guano. To have nitre that it is ready for gunpowder, the Confederacy assigned the Bureau of Nitre and Mining the responsibility of mining caves and making nitre across the south includ-

Figure 1. No this is not a beanie baby for your pocket. It's a wild bat! Mexican Free-Tailed bat courtesy of Stephanie Lee Shelton, TPWD website.

ing Texas (Mohr 1948; Whisonant 2001). In Texas this process involved mining bat guano from caves of varying difficulty to access (and breath in), which had to be processed through leaching and boiling (or evaporating) to extract the highest concentration of nitre from the guano (LeConte 1862; Adriance et al. 1895; Phillips 1901). Various sources estimate that for every 100 pounds of nitre that was produced, approximately 2,500 pounds of guano was needed (Jasinski 2012). By late 1864 Texas was producing about twice as much Nitre as any other Confederate state (Lera 2001). And according to Lera (2020) the Confederacy never lost a battle due to lack of gunpowder.

For Texas the Nitre and Mining Bureau was based out of San Antonio as this area was closest to the sources of guano needed for nitre production (De Paepe and Hill 1981). San Antonio was also the largest city in Texas at the time and had established supply lines, including to Mexico, and experienced suppliers who could work with the Confederacy (Lawrence 2017). Major Isaac Reed, based out of San Antonio, commanded the Nitre and Mining Bureau for the Trans-Mississippi Department and was served by three other Confederate officers in Texas, including one in charge of nitre from Mexico (Lera 2001). Research indicates that the largest guano sources used during the Civil War came from Uvalde and Comal Counties, with caves in these counties referenced more than other Texas counties (Thrall 1879; Marrs 1906; Reddell 1961; Plemons 2007). Although at least 16 Texas counties are documented with caves mined for guano during the Civil War (Roessler 1872; Plemons 2007).

The following discussion is a series of historic sites or companies related to Confederate nitre and gunpowder production in Texas, however, none of the sites or companies listed in this paragraph were found to have archeological records or additional details. The 1862 Texas Legislature report lists a December 1861 charter for the Texas Powder Company, which may have been in Bexar County. Several mill sites in Bexar County operated during the Civil War (Campbell 1925) that could be the site of the Texas Powder Company, including the Old Powder Mill location recorded with a Texas Historical Commission historical marker (marker 4102). In December 1863 the Paluxy and Brazos Sulphur, Nitre and Powder Company was chartered (Texas 1864). Two locations in Burnet County are mentioned: Mohr (1948) states that a potential nitre works is near the mouth of Falls Creek, also Longhorn Caverns has a historical marker (marker 9724) describing that gunpowder was manufactured and stored at these caverns during the Civil War. Jasinski (2012) describes a nitre production site and guano source in Comal County, with the nitre produced in or near Landa Park (historical marker 16021). Research for this article was unable to locate archeological records related to guano mining or nitre production anywhere near Comal County. In north-central Texas the location of a Confederate gunpowder mill is recorded with a historical marker (marker 7989), stating that this location operated four months in 1862-1863 near downtown Waxahachie. According to historical records, the Waxahachie Powder Mill exploded destroying this operation in 1863 (LPC 1892). Other Confederate gunpowder mills in Texas are a mill in Tomball, Harris County (Winkler 2015), and one or more mills in the Galveston County area (GWN 1863; Marrs 1906).

The archeological record for nitre production in Texas during the Civil War is scarcer than the historical record. There are features in the archeological record of Texas related to nitre and gunpowder production such as mills, a powder magazine, a nitre works, and a cave. Durrenberger (1965) and Carson (2017) state that the Anderson's Mill site (41TV130) was producing Confederate gunpowder by 1863, which would support events driving this need in 1863. Jasinski (2012) states that Anderson's Mill was used as a Confederate gunpowder mill and that it was associated with the Travis Powder Company. The Marshall Powder Mill site (41HS17) in Harrison County, east Texas, is located along the Louisiana border. This appears to be the only site associated with Confederate gunpowder where archeological excavations have been performed. The Marshall Powder Mill site is also found in a fair amount of historic documentation. This site consisted of a large gunpowder mill, and other facilities, covering an area over 300 acres in size (Speir and Jurney 1996). Interestingly, letter correspondence between Confederate officers, Major Rhett to Major J. P. Johnson, in October of 1863 state that nu-

merous facilities were being constructed at Marshall including a powder mill and magazine; however, it does not appear that the powder magazine has been identified during archeological investigations at 41HS17 (Moir 1995; Speir and Jurney 1996). The Marshall Powder Mill site is a great example of a site that contains numerous features beside the mill and powder magazine that could be identified and better understood through further archeological investigation.

A significant feature recorded as an archeological site (41MR44), and listed on the National Register of Historic Places, is the Jefferson Powder Magazine perched along Big Cypress Bayou in Marion County. The Jefferson Powder Magazine is one of three brick and mortar magazines built sometime prior to the Civil War and used by the Confederacy during the war. Only one of the original three powder magazines exists today (Figure 2). The Jefferson Powder Magazine located along Big Cypress Bayou was accessible from the east via steamboat, thanks to a navigable bayou, and rail. This powder magazine and the town of Jefferson was a far inland port for the Confederacy (Moir 1995).

The only two archeological sites in Texas directly related to nitre production during the Civil War

Figure 2. Jefferson Powder Magazine located at the bank of Big Cypress Bayou. J. Barrera photo.

are located together along the Frio River in northern Uvalde County (Chandler 1991). These two sites were recorded by the legendary avocational archeologist C. K. Chandler in 1991. And unfortunately, we did not cross paths during his archeological recording of these two sites, although I was wandering these woods and floating the Frio at the same time on this ranch. These two archeological sites are the Nitre Works site (41UV138; spelled "Nieter" on original site form) and the Bat Cave site (41UV139, also historical marker 600). The Nitre Works site (Figure 3) and Bat Cave site are approximately one mile apart. With the Nitre Works site located at the bank of the Frio River, and the Bat Cave site on a limestone hilltop overlooking the Frio River valley. C. K. Chandler (1991) recorded extensive looting damage in the prehistoric deposits at site 41UV138, an unfortunate testament of complete disregard for a significant Texas resource. I can confirm that portions of 41UV138 look like an artillery range full of gaping looter holes. The Nitre Works site (41UV138) is just another example in Texas of an archeological site where ethical and professional archeological investigation can reward researchers by providing the public with valuable information about our history, versus complete loss and destruction of information such as the looter damages that C. K. Chandler recorded.

The Nitre Works site is a masonry structure of limestone blocks and mortar, consisting of approximately eight square vats that are connected by drain/pump holes. It also has steps for working between the higher and lower vats of the masonry structure. The Nitre Works site was used for the leaching of guano brought from the Bat Cave site. Leaching the guano in vats would have involved transferring the concentrated liquid from one vat to another, leached through fibers and wood ash (LeConte 1862; Marrs 1906; Campbell 1925; Whisonant 2001). This leaching process continued until the liquid nitre concentrate was high enough to boil or evaporate into dried nitre (also called saltpeter crystals), that would then be sacked and hauled toward the hub in San Antonio or another powder mill (Marrs 1906). The Bat Cave site contained the guano supply which was mined and then taken to the Nitre Works site, located at the river, for the water source necessary to leach out the ni-

Figure 3. Leaching vats near the Frio River at 41UV138, the Nitre Works site. J. Barrera photo.

tre. It is not certain how the mining operation was performed from 1863-1865 at the Bat Cave site. But Marrs (1906), who worked at this site for the Confederacy, mentions that burros with rawhide baskets were used in the mining. Marrs also mentions that 600 pounds were procured daily. If 600 pounds of nitre were produced daily this would have taken about 15,000 pounds of guano per day to make. Given that by late 1864 the Bat Cave site/ Nitre Works site is the only Texas location outside of San Antonio that had an officer of the Nitre and Mining Bureau assigned (Lera 2001), it is likely that a lot of guano was mined from this site per day. Starting in 1878 miners for the Texas Guano Company were extracting guano from the Bat Cave site using a tram they built with carts that had an engine driven pully system (Thrall 1879). The Texas Guano Company also built a drying kiln using a steel tube with a steel paddle system to stir and move the guano through the kiln, that could make three to ten tons of dried guano per day with an ultimate destination of Scotland via Galveston (Thrall 1879). Kiln drying of raw guano (not leached) was necessary for guano as a potent fertilizer, however, there is no evidence to suggest that kiln drying of guano was ever part of the Confederate nitre production in Texas. The mention of kilns used to produce Confederate nitre is referencing the need to boil and evaporate in kettles the concentrated "nitre mud", or leached ooze, to create dry nitre that could then be transported toward a gunpowder mill.

This note on nitre and gunpowder production during the Civil War in Texas is to consider that significant archeological sites, features, and associated artifacts from this aspect of war time supply are likely unrecorded and under studied in Texas (Figure 4). Particularly those areas located in the karst bearing portions of the Hill Country. A number of cave/karst features in Texas were used for the production of nitre during the Civil War in Tex-

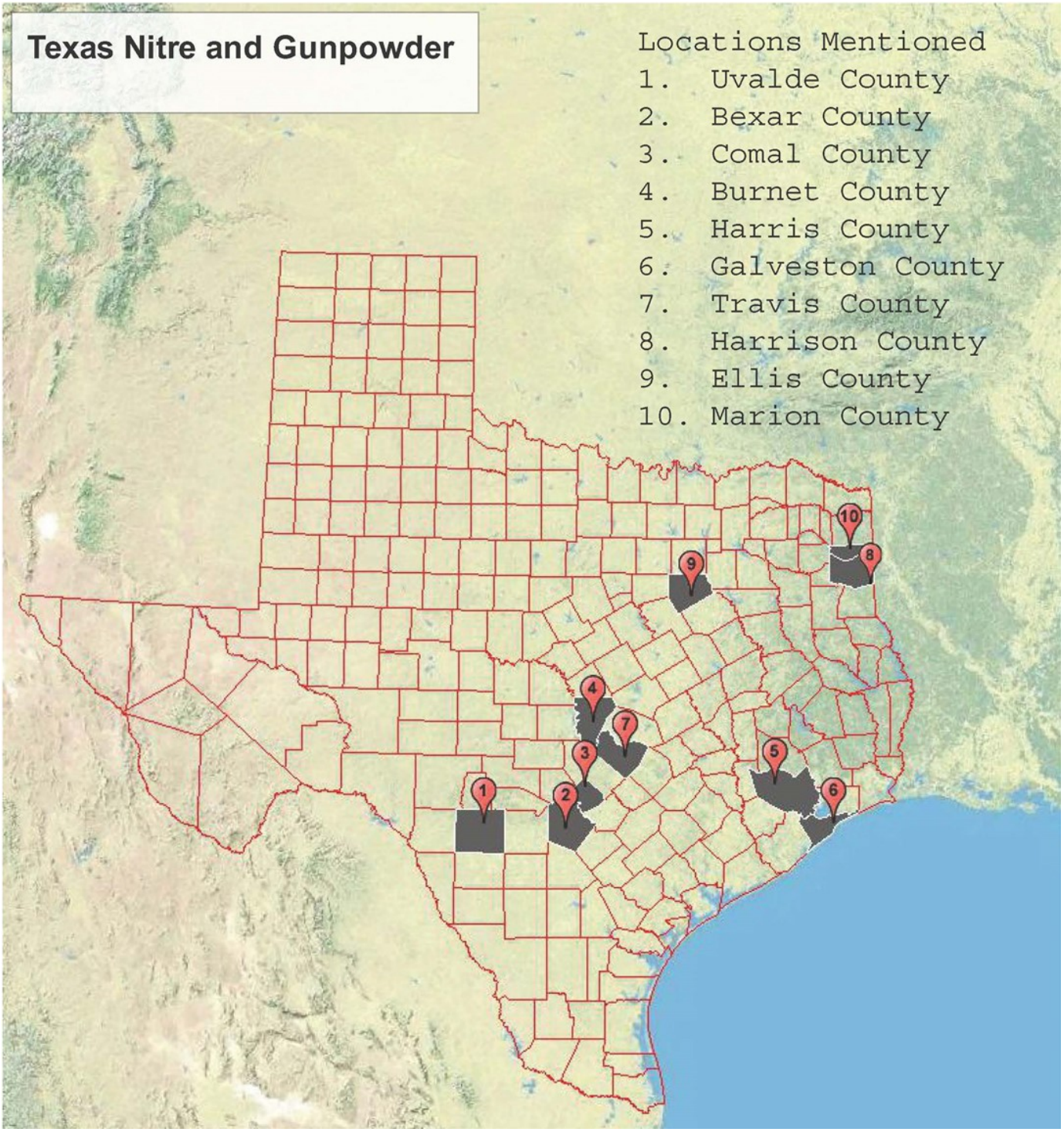

Figure 4. Locations discussed in text. Google Earth base map. J. Barrera

as, with frequent mention of the Bat Cave site (known as Rio Frio, Frio Cave and other names), and upward of 25 other cave/karst features as potential sources of nitre for the Confederacy (Mohr 1948; Reddell 1961; Plemons 2007). Various avenues of research within the topic of Confederate nitre and gunpowder production in Texas can be pursued. Some of these include: supply lines, period of use at specific sites and features, intensity of use at certain features such as the Jefferson Powder Magazine versus the Marshall Powder Magazine, residential features or related near sites, free labor versus slave labor (also impressed labor) in nitre and gunpowder production, origin of sulphur for the powder mills, and many others. Exhaustive research such as the phenomenal example by Johnson

(1990) would certainly reveal more detail regarding Confederate nitre and gunpowder production in Texas. Similarly, careful archeological investigation including surveys and excavation at locations associated with this industry would provide valuable information. Because many of the Confederate records associated with the Nitre and Mining Bureau were apparently destroyed around the end of the Civil War, archeological investigations combined with historic research is ideal for further understanding of this incredible period of time. When next scratching your head at mid-19th century features or artifact collections consider gunpowder production in Texas. This significant period of Texas history and archeology has many avenues awaiting exploration.

Acknowledgements: Must extend thanks to my - Dream Review Team- for their quick feedback and ample enthusiasm. Consisting of a true Texas Archeology Legend (and far beyond), the revered Mr. Skipper Scott; and none other than the finest barrister of this fine state, my brother Mr. Jose E. Barrera.

References Cited:

Adriance, Duncan, P. S. Tilson, and H. H. Harrington 1895 Bat Guano, and Bat Guano Ash. In *Miscellaneous Analyses*. Texas Agricultural Experiment Station 35:603-604.

Campbell, Charles A. R. 1925 *Bats, Mosquitoes and Dollars*. University Press of the Pacific, Honolulu, Hawaii.

Carson, Charlene Ochsner 2017 *Gristmills of Central Texas*. Arcadia, Charleston, South Carolina.

Chandler, C.K. 1991 Nieter Works site (41UV138) and Bat Cave site (41UV139). *Texas Historical Commission*. Archeological Site Forms. Accessed in April 2020.

De Paepe, Duane, and Carol A. Hill 1981 Historical Geography of United States Saltpeter Caves. In Salpeter. *National Speleological Society Bulletin* 43(4):88-93.

Durrenberger, E. Paul 1965 Anderson's Mill (41 TV 130): A Historic Site in Travis County, Texas. *Bulletin of the Texas Archeological Society* 36:1-72.

Galveston Weekly News (GWN) 1863 "Gunpowder". January 7, 1863. Electronic document, https://scholarworks.uttyler.edu/cgi/viewcontent.cgi?article=1047&context=cw_newstitles, accessed April 2, 2020.

Jasinski, Laurie 2012 Confederate Bat Guano Kiln, New Braunfels. *Handbook of Texas Online*. https://tshaonline.org/handbook/online/articles/dkc09, accessed March 20, 2020.

Johnston, James J. 1990 Bullets for Johnny Reb: Confederate Nitre and Mining Bureau in Arkansas. *Arkansas Historical Quarterly* 49(2):124-167.

Lawrence, L. P. 2017 San Antonio's complicated history as a Confederate supply depot. *San Antonio Express-News*. Electronic document, https://www.expressnews.com/news/local/article/San-Antonio-s-complicated-history-as-a-11095099.php, access March 25, 2020.

LeConte, Joseph 1862 *Instructions for the Manufacture of Saltpetre*. Charles P. Pelham, Columbia, South Carolina.

Lera, Thomas M. 2001 Semi-Official Imprinted Envelopes of the C.S.A. Nitre and Mining Bureau. Confederate Stamp Alliance. *The Confederate Philatelist* 46(4):113-137.

Lera, Thomas M. 2020 The Nitre and Mining Bureau. *Confederate Stamp Alliance*. January 2020.

Lewis Publishing Company (LPC) 1892 *Memorial and Biographical History of Ellis County, Texas*. Lewis, Chicago.

Marrs, William L. 1906 Gunpowder for the Confederate Army. *Confederate Veteran* 14(1):119-120.

Mohr, Charles E. 1948 Texas Bat Caves Served in Three Wars. The Caves of Texas. *National Speleological Society Bulletin* 10:89-96.

Moir, Randall 1995 Jefferson Ordnance Magazine; Jefferson Powder Magazine; 41MR44. *Texas Historical Commission*. National Register of Historic Places listing form. Accessed April 3, 2020.

Phillips, William B. 1901 The Bat Guano Caves of Texas – Enormous Caverns Containing Valuable Deposits of Fertilizer Some of Which Are Being Worked. *Mines and Minerals* Vol. XXI:440-442. August 1900 to July 1901.

Plemons, Douglas 2007 The United States Saltpeter Cave Survey, 2006. *Journal of Spelean History* 41(2) Issue 132. July - December 2007.

Roessler, A. R. 1872 Mineral Resources of Texas. *The Texas Almanac for 1872, and Emigrant's Guide to Texas*, pp. 127-159. Richardson, New Orleans, Louisiana.

Reddell, James R. 1961 The Caves of Uvalde County, Part I. *Texas Speleological Survey*, Vol. 1 (3). A Publication of the Texas Speleological Association.

Shroyer, Dewey Lew 1973 Characteristics of Capote Falls, Presidio County. Master's Thesis, Department of Park Administration, Texas Tech University, Lubbock.

Speir, Thomas E., and David H. Jurney 1996 Archaeological Investigations at the Marshall Powder Mill (41HS17), Confederate State of America 1863-1865, Harrison County, Texas: 1994 Season. *Journal of Northeast Texas Archaeology* 8:1-49. Published by Friends of Northeast Texas Archaeology.

Texas 1862 General Laws of the Ninth Legislature of the State of Texas. Published by Authority, Houston.

Texas 1864 General Laws of the Tenth Legislature of the State of Texas. Published by Authority, Houston.

Thrall, Homer S. 1879 A *Pictorial History of Texas, from the Earliest Visits of European Adventurers to A.D. 1879*. N.D. Thompson, St. Louis, Missouri.

Whisonant, Robert C. 2001 Geology and History of Confederate Saltpeter Cave Operations in Western Virginia. *Virginia Minerals* 47(4):33-43.

Winkler, Liza 2015 Tomball Confederate Powder Mill. Community Impact Newspaper, March 12, 2015. https://communityimpact.com/austin/news/2015/03/12/tomball-confederate-powder-mill-3/, access April 2, 2020.

NTAS - *Preserving the Past for the Future*

NTAS Board

James Everett ***President***	**Dana Ritchie** ***Treasurer***	**Linda Lang** ***Historian***
Bryan Jameson ***Vice President***	**Lloyd Erwin** ***Secretary***	**Gen Freix** ***Internet Chair***
Catrina Banks Whitley ***Vice President—Projects***	**Chris Meis** ***Immediate Past President***	**Molly Hall** ***Newsletter Editor***

Three easy and quick ways to pay your 2020 NTAS dues!

By PayPal: Complete the Application Form and pay online with PayPal at the NTAS website, ntxas.org/membership

By mail: Complete the application below and mail it with your check to:
North Texas Arch Society, PO Box 24679, Fort Worth, TX 76124

In person: Give your dues and completed application to James Everett at the monthly meeting.

May 2020 **NORTH TEXAS ARCHEOLOGICAL SOCIETY (NTAS) MEMBERSHIP APPLICATION FORM**

Name(s) _____

Address _____ **Preferred Phone** _____

City\State\Zip _____ **Email Address** _____

Emergency Contact(s): Please provide the following information regarding the individual(s) from whom we can request or to whom we may provide information in the event of an emergency. Please consider listing at least one contact who does not live at your residence.

Primary Contact Name _____ Alternate Contact Name _____

Relationship _____ Relationship _____

Phone Number _____ Phone Number _____

I want my newsletter delivered by ____ email ($0) **or** ____ by USPS mail. ($10) ***Thank you*** for choosing delivery by email.

Membership Type & Fees (Membership Term: January to December)

_____ New
_____ Renewal

_____ Individual $20
_____ Family $25
_____ Student $10 ***(enrolled in grade school through college/university whose coursework is considered to be half time or more)***
_____ Contributing $30

_____ USPS Mail Delivery $10
_____ Optional Memorial Fund Contribution

****Please make checks payable to NTAS****

Code of Ethics (signature required): I PLEDGE THAT I WILL NOT INTENTIONALLY VIOLATE THE TERMS AND CONDITIONS OF ANY FEDERAL, STATE, OR LOCAL ANTIQUITIES STATUTES CONCERNING CULTURAL RESOURCES OR ENGAGE IN THE PRACTICES OF BUYING OR SELLING ARTIFACTS FOR COMMERCIAL PURPOSES OR ENGAGE IN THE WILLFUL DESTRUCTION OR DISTORTION OF ARCHEOLOGICAL DATA OR DISREGARD PROPER ARCHEOLOGICAL FIELD TECHNIQUES. I UNDERSTAND THAT FAILURE TO FOLLOW THESE GUIDELINES WILL PROVIDE GROUNDS FOR EXPULSION FROM THE SOCIETY.

Signature _____ Date _____