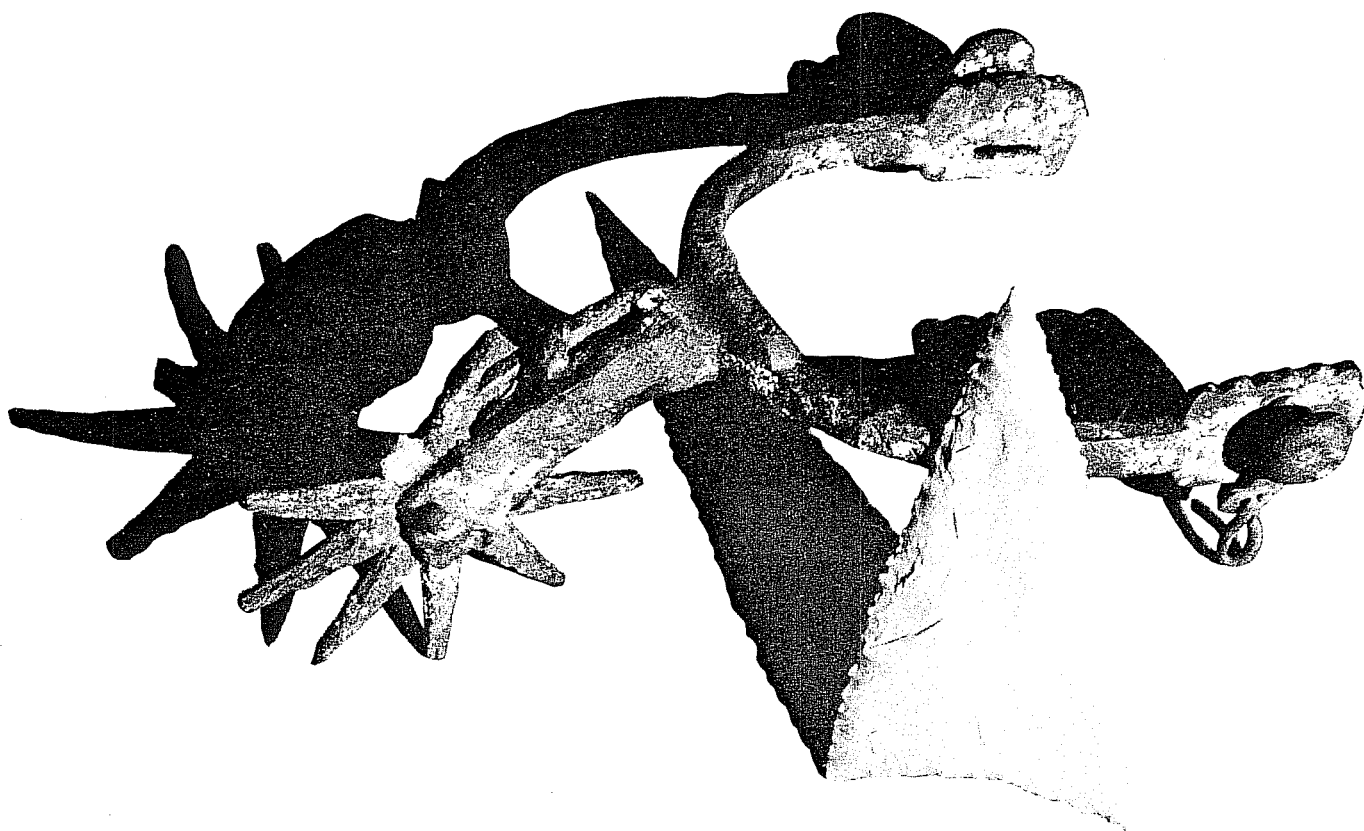


AN ARCHAEOLOGICAL SURVEY OF A PORTION OF THE CHOKE CANYON RESERVOIR AREA IN McMULLEN AND LIVE OAK COUNTIES, TEXAS

By

Alston V. Thoms, John L. Montgomery, and
Alice W. Portnoy

Report prepared by the
Cultural Resources Institute
Texas Tech University



Center for Archaeological Research
The University of Texas at San Antonio
Choke Canyon Series: Volume 3

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ABSTRACT

An intensive cultural resource survey was carried out on approximately 2544 hectares (6285 acres) of the proposed Choke Canyon Reservoir by the Cultural Resources Institute (CRI) of Texas Tech University from August through October 1977. The project was undertaken in response to needs of the Bureau of Reclamation. This report is one of a multivolume study concerning the area's cultural resources. During the 1977 survey, 113 archaeological sites, 42 low density artifact scatters, and five isolated finds were located and recorded. A no-collection policy was maintained, except isolated finds. In the late fall 1977, 15 of the recorded sites were subjected to limited testing activities. The cultural resources recorded during the survey document the presence of human groups in the reservoir beginning in late Paleo-Indian times and extending to the present. Based upon the limited occurrence of diagnostic artifacts, most of the prehistoric occupation occurred during the Archaic. Historic sites recorded were occupied primarily during the last quarter of the 19th century and the first quarter of the 20th century.

This report documents the research design and particularly the methodology utilized during the project. Special emphasis is given to describing the systematic and intensive survey, as well as to the random/judgmental approach of selecting the various sites for limited testing. Cultural material recovered during testing activities are described in techno-morphological terms.

The nature of survey projects in general and the paucity of reliable time markers recovered during field work severely limited the development of a cultural chronology for the study area. Research efforts resulted in the development of a model of lithic technology based on the ready availability of raw materials. Also presented is a settlement and subsistence pattern model which is based primarily on a rainy and dry season dichotomy and the availability of food resources.

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This study was carried out as a subcontract with the Center for Archaeological Research (CAR) at The University of Texas at San Antonio (UTSA). Dr. Thomas R. Hester, Director of CAR and Principal Investigator of the entire project, maintained order in this joint venture and cooperated with CRI personnel in every possible manner. We also extend a special thanks to Grant D. Hall, Field Director for the overall project, Dr. Joel Gunn, Daniel E. Fox, Royce Mahula, David Brown, and all of the CAR field crew. Each person contributed his time and knowledge as well as direct assistance during the project. Discussions with these people provided us not only with a significant learning experience, but also with valuable insight in past human behavior in the Choke Canyon Reservoir area.

Thoms and Montgomery carried out most of the testing phase of the survey project. However, time limitations were imposed and without the assistance of several volunteers during field work we would not have been able to complete the reported testing. We extend our gratitude to Bill Shumann, Larry Henson, David Brown, Don Rael, Philip A. Bandy, and Walter Thoms, each of whom contributed several days to our field effort. Walter Thoms (Alston's father) was especially helpful because of his knowledge of the area and acquaintance with local residents.

We also wish to express our gratitude to the Texas Historical Commission, especially Alton Briggs; to the Bureau of Reclamation, especially Stephen Ireland, Bob Rowell, and Rudy Olivo; and to Joe Coughran of the U.S. Soil Conservation Service at Tilden. These people and their organizations freely extended valuable information and services, cooperating with us throughout the study. Without their assistance, the successful completion of this project would not have been possible.

People in other departments at Texas Tech University made substantial contributions to the project. Dr. Henry Wright of the Range and Wildlife Department arranged for us to use their FM transceivers during the survey; this was of great help. Dr. Stuart Pimm of the Biology Department helped us with the computer programming. Dr. B. L. Allen of the Plant and Soil Science Department did the soil analyses. We also appreciate the use of the cartography equipment in the Geography Department and the drafting equipment in the Civil Engineering Department.

Many people associated with the Cultural Resources Institute also contributed to this study. We extend a special word of thanks to Dr. William J. Mayer-Oakes, Director of CRI and of the CRI portion of the Nueces River Project. He provided the authors and others associated with the project with guidance

and insured that all phases of our study were completed and met his high standards of scholarship. Alice Portnoy acted as project manager and editor. Richard Alvey and Christopher Jurgens assisted Thoms and Montgomery throughout the survey phase of the project. They also washed all the artifacts and completed the initial cataloging and classification procedures. In addition, Alvey prepared draft copies of the site maps and defined the vegetational associations within the study area. The final versions of the drafted illustrations were prepared primarily by Brook Bowman with assistance from Steve and Toni Ireland. Many of the primary data tables were organized and proofed by Janie Randolph, Roanne Vidal, and Linda Thoms, who also assisted in preparing the final version of the property maps. Typing of the various drafts of this report was done by Linda Austin, Janie Randolph, Roanne Vidal, and Elaine Reimer.

Most of the original draft report was written by Thoms and Montgomery, but Alvey prepared the sections mentioned above; Portnoy wrote introductory material for several sections and added transitional material in some sections. Montgomery and Thoms jointly prepared the draft chapter on cultural materials. Montgomery wrote the draft sections on geology, physiography, climate, and site-testing methodology. Thoms prepared the draft sections on site descriptions, survey strategy and data, settlement and subsistence, cultural history and recommendations. Portnoy later extended Thoms's and Montgomery's work and revised the original draft report.

Thoms and Montgomery also extend sincere appreciation and special thanks to their wives, Linda Thoms and Cori Montgomery, who endured their prolonged absence and provided encouragement throughout this project.

INTRODUCTION

This report of the survey and limited (surface and subsurface) testing of previously unrecorded sites is one part of a three-part subcontract between Texas Tech University (TTU) and The University of Texas at San Antonio (UTSA). The subcontract project was carried out between July 1, 1977 and September 1, 1978 by TTU's Cultural Resources Institute (CRI). As are the other two parts of the project (historical research and historic sites archaeology), this part is based on the Scope of Work requirements of the Bureau of Reclamation RFP #50-V0897 and the subsequent proposal and research design submitted to UTSA by CRI (Mayer-Oakes 1977).

The Proposed Project

The Scope of Work for the Nueces River Project (Choke Canyon Reservoir) required that research be directed toward the following objectives:

1. Establishment of a sound cultural chronological framework for the project area;
2. Examination of settlement and subsistence patterns evident in the project area;
3. Preparation of nomination forms for each site or district considered eligible for inclusion in the National Register of Historic Places;
4. Recommendations for Phase II mitigation.

In addition to the required topics, several other topics were proposed by CRI. They were considered supplemental and had as their objective the provision of more specific data useful in interpreting past human behavior. They were as follows:

1. Study of natural resources available to prehistoric inhabitants of the project area;
2. Study of lithic technology with emphasis on tool types and functions;
3. Study of seasonality and scheduling practices;
4. Development of a predictive model based on ethno-historical and archaeological data stressing human behavior with emphasis on settlement and subsistence patterns.

Changes in the Project

The original proposal submitted by CRI contained an elaborate research design that was both monetarily and temporally expensive. It was submitted to the Center for Archaeological Research (CAR) of UTSA, the prime contractor, as a statement of what could be done, assuming that the requested funds were available from the Bureau of Reclamation. After reviewing the proposal and gaining additional knowledge about available funds, CAR reduced the funds allotted to the TTU survey/testing project by approximately 50%. The proposal for the entire Choke Canyon project was then submitted to the Bureau of Reclamation. The Bureau then found it necessary to reduce funding for the survey/testing project by approximately 10%. There was not sufficient time to develop a new research design each time there was a reduction in funding. Rather, we took the position that we would strive to attain as many and as much of each of the original objectives as was permitted by available time and money.

Effects of Changes

These changes affected costs, personnel, and field techniques; directly related were various effects on the accomplishment of project objectives.

First of all, we had less time to prepare for field work, but we could compensate for this because both Montgomery and Thoms had previous experience in the south Texas area.

As a result of the reduction in our project time, the anticipated complementary data from CAR were processed at a time when we were already preparing our report. This had an effect on the objectives of determining seasonality and scheduling practices as well as elucidating cultural history. The CRI project did not recover a significant number of soil samples or faunal remains, and only one site yielded sufficient charcoal for dating purposes. While the CAR project did recover the above types of materials, they were not analyzed in time for incorporation into the CRI study. Because only a limited amount of cultural material was recovered (from 10% of the sites recorded by CRI), there were not enough materials for a detailed study of site function. This also prevented us from making detailed site-by-site recommendations for Phase II (testing phase) and National Register nominations.

Increasing the transect width resulted in a reduction in the intensity of the survey. The decrease in survey intensity obviously affected the number of sites recorded in relation to the target universe ("all potentially observable cultural resources," Thoms 1978:3). This has been demonstrated by CAR's discovery of previously unrecorded sites in an area surveyed by CRI (Grant D. Hall, May 15, 1978, personal communication). With fewer of the observable sites recorded than anticipated, the Choke Canyon survey data are less complete as they reflect the target universe. Therefore, there is a greater possibility that potentially significant sites remain undiscovered. We feel, however, that the vast majority of observable cultural resources were recorded and that our survey techniques allowed us to record numerous examples of all types of sites. The fact that some sites remain unrecorded, of course, affects the settlement pattern study, but again we feel that the negative effect is minimal. Our Choke Canyon survey data are most amenable to a study of the area's settlement patterns.

Data gathered regarding natural resources were not significantly affected by the survey being less intensive. The primary difficulty in studying natural resources in the Choke Canyon area rests on the fact that only a small percentage of the area retains native vegetation. Most of the area has been mechanically cleared and the present vegetation is more a result of clearing activities than of natural processes. During the Historic period, other factors such as overgrazing and droughts have altered the vegetational pattern resulting in a denser brush cover.

The various changes in our overall survey strategy affected the results of the work at Choke Canyon. We were able to accomplish less than anticipated primarily because fewer cultural materials were collected during the project. As a result, we concentrated on utilizing our most reliable data, site location. These data have been found to be useful in developing a general settlement pattern model which includes some seasonality and site function information.

ARCHAEOLOGICAL BACKGROUND

This report of the work done by CRI-TTU under subcontract to CAR for the Bureau of Reclamation is one part of a many-part-project. Duplication of both effort and report material is being avoided. A comprehensive treatment of the archaeological background and regional prehistory will be found in Volume 5 (Hall, Black, and Graves 1981) of the Choke Canyon research series. The reader is also referred to the report of the initial archaeological survey of Choke Canyon carried out by personnel from the Texas Historical Commission (THC) (Lynn, Fox, and O'Malley 1977:38-42) and to Montgomery (1978:15-23).

A limited archaeological reconnaissance of the Choke Canyon Reservoir area was carried out in 1968. Eighteen sites were recorded during this survey, and it was clearly demonstrated that the area contained substantial and potentially significant prehistoric and historic cultural resources (Wakefield 1968). In 1974 and 1976, the major portion of the Choke Canyon Reservoir area was subjected to a cultural resource survey which resulted in the discovery of 161 prehistoric and 11 historic sites (Lynn, Fox, and O'Malley 1977). Due to difficulties in obtaining access to certain privately owned areas within the reservoir area, approximately 3239 hectares remained unsurveyed in 1977. The survey conducted by CRI was originally intended to complete the coverage of the remaining areas. However, the problem of land access was not completely solved, and only 2544 hectares were accessible to CRI. As of the end of 1978, approximately 695 hectares within the reservoir area remained to be surveyed.

ENVIRONMENTAL SETTING

Physiography

The Choke Canyon Reservoir (Fig. 1) is located within the area of southern Texas which is part of a natural region termed by some as the Rio Grande Plain (cf. Inglis 1964; Hester, Gilbow, and Albee 1973; Montgomery 1978). Texas boundaries for this region are the Rio Grande on the west and south, the Gulf of Mexico on the east, and the Balcones Escarpment of the Edwards

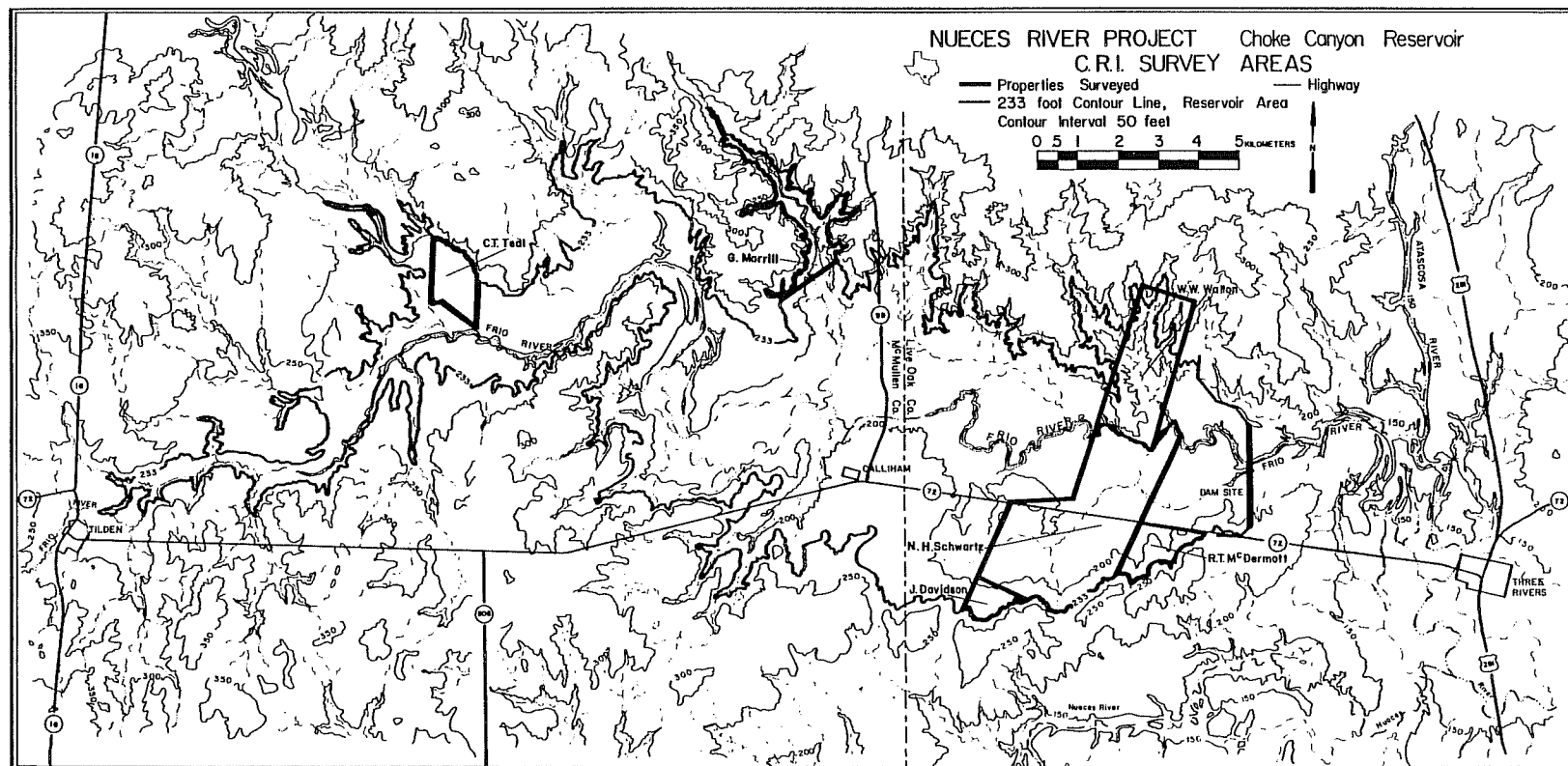


Figure 1. Nueces River Project, Choke Canyon Reservoir, CRI Survey Area.

Plateau on the north (cf. Montgomery 1978:3). Given these boundaries, the Rio Grande Plain encompasses most of the southern Texas region between San Antonio and Brownsville, Texas. Approximately 26,350 square miles are included within this region (Chambers 1946:111).

Given the boundaries described above, the Rio Grande Plain lies within the physiographic unit termed the West Coastal Plain by Fenneman (1938) and Thornbury (1965). Other physiographic terms for this area include the Coastal Plain (Hunt 1967) and the South Texas Plains (Johnson 1931).

The Rio Grande Plain exhibits a varied topography. At the base of the Edwards Plateau, the region reaches its maximum elevation of 1000 to 1100 feet above mean sea level (Chambers 1946:112). The elevation of the Rio Grande Plain gradually decreases as one moves east towards the Gulf of Mexico. The central portion and most of the northern portion of the area are rolling plains, while the southeastern portion is a level section which generally parallels the Gulf of Mexico coastline. In contrast, the western and southwestern regions exhibit a rugged or dissected topography due to the action of short, rapid streams flowing into the Rio Grande (*ibid.*).

Geology

Previous studies within the reservoir area (e.g., U.S. Department of the Interior 1975; Lynn, Fox, and O'Malley 1977) have described the geological characteristics of the study area. The reservoir area is underlain by Tertiary strata formed by sedimentary processes. The Frio River has cut into three geological formations during its history. The deepest of these is the Jackson Group which is overlain by the Frio Formation. The uppermost geological formation is named the Catahoula.

All of these sedimentary formations were laid down during the Cenozoic era, an interval of time marked by numerous marine transgressions and recessions over parts of present-day Texas (Plummer 1966:526-529). The earliest Fayette Formation is a widespread Eocene marine deposit laid down during extensive sea advancement, while the later Frio and Catahoula Formations are primarily Oligocene land deposits which indicate sea regression. Each formation retains specific lithologic characteristics which are related to the cyclical Cenozoic sea movements.

Plummer (1966:678) provides the following lithologic description of the Jackson Group:

It consists of shallow-water, marine, and beach deposits, composed of medium and fine-grained, thin-bedded sand, argillaceous and tuffaceous clays and tuffs, and lentils of coarse, rounded, and polished sand grains. In many places the beds are somewhat fossiliferous. They represent the lower, or Eocene, portion of the pyroclastic epoch, during which violently active volcanoes began to play an important part in supplying material to the sediments.

In the western area of the Choke Canyon Reservoir area, the sandstone layers capping the Jackson Group have formed topographic features referred to as bluffs or cuernas (Lynn, Fox, and O'Malley 1977:6). The top of the Whitsett member of the Fayette Formation is overlain by the Frio and Catahoula Formations.

The Frio Formation is characterized by the presence of massive, greenish gray clay. As a whole, this formation consists of "over 95% clay, about 4% sand and sandy silt, and concentrations The silt is gray, extremely fine grained, noncalcareous, and very gypsiferous" (Plummer 1966:706). Lithologically, the Frio Formation represents nonmarine depositions, which contrasts with the earlier Jackson Group.

Unconformably overlying the Frio Formation is the Catahoula Formation. The formation is primarily a tuff bed which ranges in color from white to greenish gray. The tuff is "finely textured, massively bedded, . . . and are interbedded with tuffaceous clay and tuffaceous sand" (*ibid.*:721). In lithological terms, the Catahoula consists of about 60% pyroclastic materials (tuff), 20-30% sandstone, 10-20% argillaceous clay, and a trace of conglomerate. The tuff component of the Catahoula Formation has "at least six types of soils" (Plummer 1966:721).

Outcrops of all three of the formations described above can be related to general physiographic features within the region of the Choke Canyon Reservoir. Plummer (1966:681) has noted that the Jackson Group outcrops are characterized by an undulating topography with moderate slopes, generally wide valleys, and ranges of low hills. Most of these surfaces are lightly vegetated.

The next formation, the Frio, is surficially expressed as a generally flat, featureless plain covered by mesquite, various cacti and thorny brush. This plain has been termed the Frio Plain, and it extends from the southeast corner of Atascosa County southeastward across McMullen County to Rio Grande City. The width of this plain varies, with the narrowest areas located in Live Oak (1.6 km) and McMullen (3.2-6.4 km) Counties.

Catahoula outcrops in south Texas occupy "a belt of rolling, moderately dissected, more or less improved and cultivated farmland in south-central Texas and pasture land in south Texas which extends from southern Gonzales County, through northern Karnes, northern Live Oak, and northwestern Duval Counties, to eastern Webb County, then bends southward across eastern Webb County and disappears beneath younger formations in Zapata County." Width of this outcrop area is widest in McMullen (12.8-16.0 km) and Duval Counties (Plummer 1966:713-714). Jett (1977:6) reports that this formation forms the narrow "choke" area of Choke Canyon at the proposed damsite on the Frio River.

Topographic Setting

Topographic setting is defined in this report either in terms of water courses or is given an upland designation. River is used to describe the Frio River, and primary tributary refers to major water courses which empty into the river. All primary tributaries are named on the USGS 7.5' topographic maps. These are San Miguel Creek, Opossum Creek, and Willow Hollow, all of which empty into

the Frio River from the north. Secondary tributary defines water courses which have confluences with primary tributaries. The term minor tributary refers to small drainages which empty into secondary tributaries, as well as to small unnamed water courses which flow directly into the river. Most of the minor tributaries which empty into the Frio are located south of the river on the N. H. Schwartz, J. Davidson, and R. T. McDermott properties. Each of the above water courses is subdivided into three parts: the floodplain, the terrace(s), and the valley wall. We use the term upland to describe areas above and not directly associated with a specific water course. These terms are slightly modified from those used by Lynn, Fox, and O'Malley (1977) to describe the Choke Canyon topography. Figure 2 illustrates our usage of terms which subdivide water courses.

Climate and Weather and Its Effects on Human Behavior

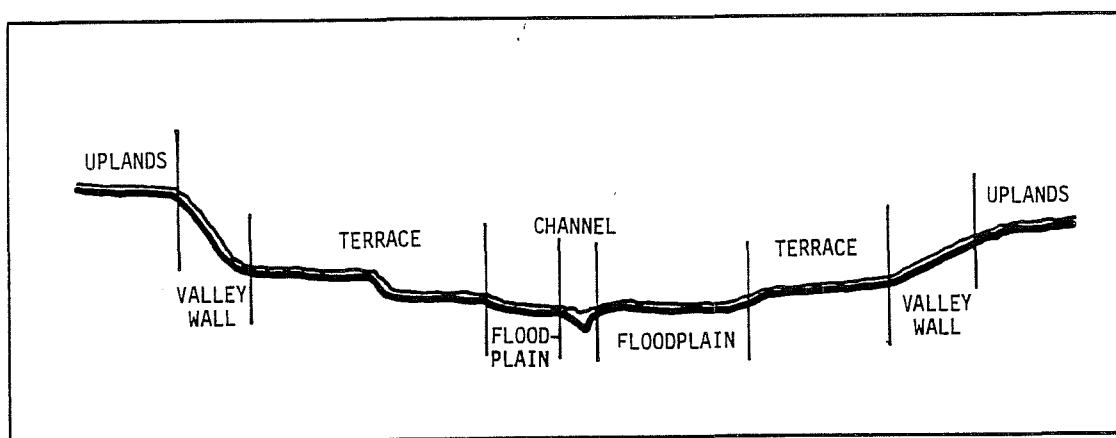
The Rio Grande Plain has a generally mild climate, due primarily to the area's proximity to the Gulf of Mexico. The Gulf of Mexico, which retains a stable water temperature, provides a moderate (in terms of temperature) source of air flow over the Rio Grande Plain. By being the most southward region of Texas as well as having the protection of the Edwards Plateau to the north, the Rio Grande Plain is generally spared severe winter weather (cf. Chambers 1946:112).

Mild winters and long growing seasons are usual within the Rio Grande Plain. When colder conditions do occur, they are short lived and the temperature rarely drops below freezing. Thornthwaite (1948) has described the contemporary climate as being semiarid and megathermal. The Choke Canyon Reservoir region has also been described as an area exhibiting a mesothermal steppe climate with the dry season occurring in the winter months (Russel 1945).

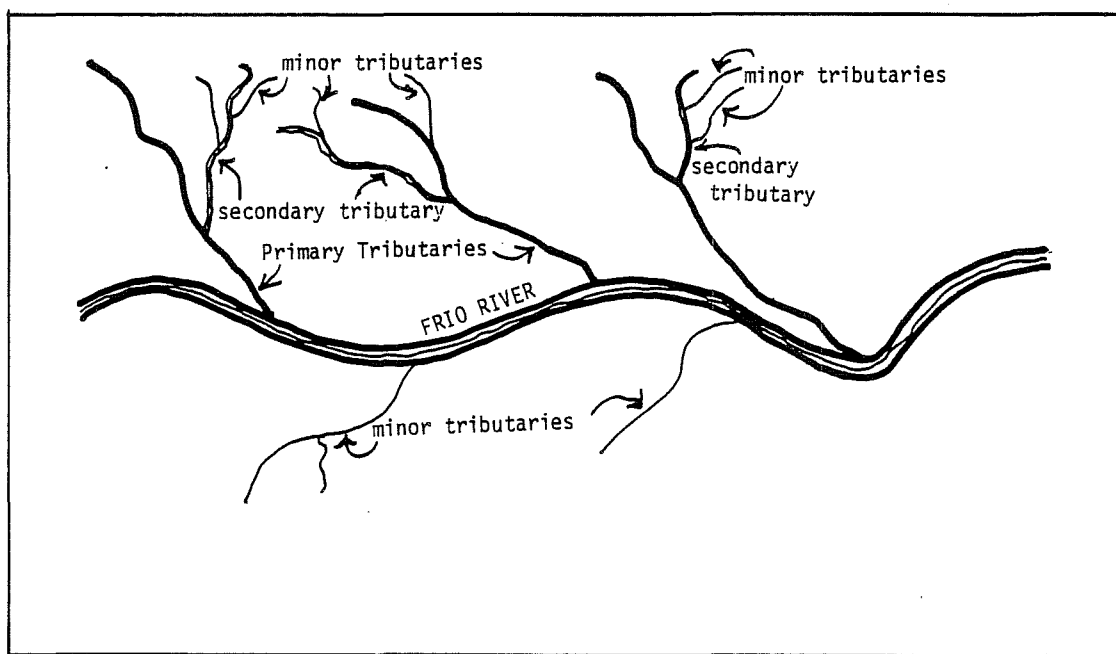
Tilden, Texas is a contemporary town located at the west end of the proposed reservoir area. Yearly climatological information from the U.S. Department of Commerce Tilden Station (No. 20-41) has been summarized by Lynn, Fox, and O'Malley (1977:7). They report that the yearly precipitation figures for Tilden average 23.08 inches (60 cm), with most precipitation occurring during thunderstorms and heavy downpours. Evaporation exceeds precipitation by about 36 inches (91.44 cm) annually, which leads to the mesothermal and megathermal designations given above by Russel (1945) and Thornthwaite (1948). South-easterly winds prevail in the area, and occasional hurricanes affect the climatological picture, sometimes in an extreme fashion. Drought conditions are common and also extreme in some cases (Lynn, Fox, and O'Malley 1977:7). Water flow measurements along stations on the Frio River and nearby streams reflect the highly seasonal precipitation cycle.

The Choke Canyon area is typified by a semiarid and megathermal climate (Blair 1950:102). According to Blair, there is a 20-40% deficiency of moisture for plant growth, with plant growth occurring throughout the year. Most of the rain falls in the late and early fall; this corresponds to the period of highest river flows.

Rainfall data at Three Rivers and George West in the Choke Canyon area and at Pearsall and Uvalde upstream on the Frio River were collected. The rainfall



a



b

Figure 2. Subdivision of Water Courses. a, schematic section; b, plan.

upstream peaks in May and June, contributing more water to the rivers during these months than in the fall. There is a low in July, with a rise in the early fall months of September and October (hurricane season). Localized heavy rains may fall at any time during the summer, leading to flood situations. A good example of this is the 21.01 inches of rain which fell in July of 1932 at Uvalde (U.S. Department of Commerce, Weather Bureau 1952:101). Results of that rain were felt all the way down the Frio River to Three Rivers. On July 8, 1932 at Calliham, Texas, the U.S. Geological Survey (U.S. Department of Interior, Geological Survey 1950:286) river gauging station recorded a stage height (crest) of 39.20 feet above datum. The datum at that point is 153.47 feet above mean sea level (msl). At that point, an area over 5 km wide would be submerged by a crest of that height. At Three Rivers, the gauge height was 43.8 feet above datum, datum lying at 101.13 feet above msl (*ibid.*:228). Flood stage at this station is 37 feet above datum (Bunnemeyer 1921:149-151).

Maximum stage height at Three Rivers occurred during Hurricane Beulah in September 1967 (U.S. Department of Interior, Geological Survey 1967:472) with a measurement of 49.21 feet above datum. This would inundate everything below the 150 feet above msl elevation. When plotted on the USGS 7.5' topographic map, most of Three Rivers was inundated. This agrees with flood marks and comments by local residents (David Thoms, May 1978, personal communication). Three Rivers received 21.02 inches of rain during the month of September 1967 (Trowbridge 1967:420). An area 5 km wide was under water during this flood.

During the same storm, Tilden had 12 inches of rain. The Frio River crested at 28.92 feet above datum (218.1 feet above msl), inundating everything below 247.02 feet above msl. Approximately one-half of Tilden was submerged during this flood (Joe Coughran, May 1978, personal communication). Plotting this elevation (247.02 feet) on the USGS 7.5' topographic map, an area of bottomland 1 km wide would be inundated.

Hurricanes occur frequently enough that residents of the area have learned that they must be prepared to move to higher ground during hurricane season. Presumably if the Anglo-Americans who have only resided in the area since 1858 (first occupation of Yarbrough Bend) have learned this lesson, a similar result should have occurred among the aborigines who previously occupied this area for a longer period of time.

To survive in this rather harsh environment, the native Indian peoples had to be tied into the natural cycle of events. If floods were known to occur during the late spring and early fall--removing large sections of bottomland from use--the aboriginal populations would utilize other areas and resources during this time. Oviedo (1974:43) states that Indians killed large numbers of fish during the floods in April and May. Nets were probably used in sloughs out of the main flow. Other resources available on the upland, including game, would also have been utilized at this time. During August through October, prickly pear, mesquite beans, and deer also are available in the more open areas of the uplands. Pecans are available in November and December (James Templeton, November 1977, personal communication). Oviedo (*ibid.*:43-44) says that Indians utilizing the pecan groves on the lower Colorado scared off all the game and had nothing to eat but nuts. River flows for the month of November are low;

river mussels (*Unio* sp.) could also be obtained at this time. From November to March, the aborigines would have been able to utilize the bottomlands. River flows during these months are the lowest of the year--below 150 cubic feet per second at Calliham (U.S. Department of Interior, Geological Survey: 1950, 1960, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974, 1975, 1976).

As a hunting and gathering population, Choke Canyon's prehistoric inhabitants moved in a seasonal cycle to utilize resources in different areas. Other reasons may be attributed to these moves, e.g., river conditions and weather. People who are closely tied to their environment are aware of subtle changes in weather and river flows. They know what these mean and what appropriate actions must be taken.

Flora*

During the course of the survey it was noted that the vegetation of the area could be divided into associations, i.e., groups of plants that are usually associated with each other. One of the crew members, Rick Alvey, recorded and described these associations as follows:

Association 1 consists primarily of live oak, common hackberry, and water elm, with mesquite and whitebrush on its margins. Other plants are ball and Spanish mosses and mustang grapes. This association is mainly along the river bank.

Association 2 consists of common hackberry along the creek edges but thins out toward the association's upstream edge. Large mesquite and whitebrush are common on the margins of the association. Margins are marked by the loss of the large common hackberry, while mesquites get smaller and whitebrush increases. There are occasional intruders such as Texas persimmon, spiny hackberry, prickly pear, agarita, and some acacia. There is a rare live oak in some areas. This association is normally clustered along the water courses and intermittent streams.

Association 3 consists of sparse to thick stands of Texas persimmon, agarita, spiny hackberry, prickly pear, soapbush, mesquite, and some yucca. Common hackberry may intrude on the downslope margin, rarely mescal-bean sophora and tasajillo. The upslope margin is usually marked by increasing numbers of acacias and mimosas, but these species may be scattered throughout. This association is normally on the valley wall slopes.

Association 4 consists primarily of acacias and mimosas. These occur in moderate to extremely dense thickets. Some spiny hackberry is scattered throughout. This association is normally found on very rocky ridge tops along the top of the valley wall.

Association 5 is mainly a mixing of the species from Associations 3 and 4 with many open areas. Plants include large mesquite, clumps of acacias, spiny hackberry, soapbush, agarita, prickly pear, yuccas, and an occasional Texas

*A historical study of floral and faunal changes in the region appears in an MA thesis by Christopher J. Jurgens (Department of Anthropology, Texas Tech University 1980).

persimmon; all are interspersed with native grasses. This association is found mainly on flat upland areas.

Association 6 appears on previously cleared areas that were used for pastures and are not directly linked to any particular geographic zone. Species include Bermuda and other grasses and variable amounts of huisache, mesquite, whitebrush, and other intruders. The association is still used mainly as pasturage.

Association 7 was also cleared originally, but it is now densely overgrown with mesquite, prickly pear, soapbush, whitebrush, some acacias, spiny hackberry, some yuccas, and rarely mescal-bean sophora and spiny allthorn. This association covers most of the south side of the Frio River valley, except for the valley walls and the various stream courses.

Association 8 is that of fields currently under cultivation and is primarily cotton. This association is in the Frio River floodplain.

Association 9 is along an old dry slough bed of the Frio River. The species are mainly Drummond rattlebox and some low grasses and mesquites.

Alvey also noted desert willow growing along State Highway 72, but not in any of the vegetational associations within the survey area.

Fauna

The Tamaulipan Biotic Province defined by Blair (1950:93-117) supports a large number of mammal species. Changes have occurred in this fauna since the 1500s, but it is still typified by predominantly arid-adapted species. Large animals which interfered with ranching activities in the late 1800s were eradicated. Buffalo (bison), pronghorn antelope, gray wolf, jaguar, and bear have all disappeared from the Choke Canyon area. Mountain lions and ocelots have become extremely rare in the area (J. C. Grubb, January 1978, personal communication). Old World rats and mice (Family *Muridae*), nutria, and the armadillo have been introduced into the area in the last 150 years.

Fire was used in south Texas to drive game (Oviedo 1974:43). Among the coastal Indians, Oviedo (*ibid.*:44) states that during prickly pear season, when the Indians were perhaps near what is now Corpus Christi, they caught deer to eat. At other times of the year, they killed great quantities of "rats" along the rivers (Oviedo 1974:43).

In an analysis of faunal remains from sites in Zavala County, many varied species were identified (Hester and Hill 1975:25-26). At the Tortuga Flat site (41 ZV 155), three bison, eight pronghorn, and 22 white-tailed deer were represented in the areas excavated. This reflects the relative proportions of animals utilized at this site; deer were more common at times than bison even in this northwest Rio Grande Plain site. Smaller lagomorphs and rodents appear to have made up a moderate portion of the aboriginal diet. Cotton rats (*Sigmodon hispidus*) are the most prevalent of the rodents, followed by woodrats (*Neotoma micropus*). Cottontail rabbits (*Sylvilagus floridanus*) are more prevalent than jackrabbits (*Lepus californicus*). Other rodents such as pocket gophers (*Geomys*

sp.), white-footed mice (*Peromyscus* sp.), and ground squirrels (*Citellus* sp.) also occur and are good environmental indicators. Canids and procyonids are found as are mustelids, but no felids appear in the predator faunal record (*ibid.*). At 41 ZV 60 and 41 ZV 14, the faunal record is approximately the same, with the exception of a felid (*Lynx rufus*, bobcat) found at 41 ZV 14 (Hester and Hill 1975:27-29).

Birds occur in the Choke Canyon area in great numbers. The Central Flyway funnels many migratory birds through the area (Peterson 1963:ix). The Choke Canyon area is on the edge of this flyway, lying 120 km inland from the coast (Eric Bolen, October 1977 personal communication). Many migrating waterfowl appear during their seasonal migrations in the spring and fall (*ibid.*:ix). Some winter in the area. A large number of geese and duck species are part of these migrations. In Coahuila, waterfowl were caught by Indian hunters swimming below the surface and drowning them by pulling them under (Ruecking 1953:485). It is possible that south Texas aborigines used the same method. Twenty raptorial species occur in the area (Blair *et al.* 1968:309-320); the Texas Tech field crew observed five of these in Choke Canyon in 1977. Galliform birds are numerous in the Choke Canyon area.

The native wild turkey (*Meleagris gallopavo*) is present in the area. On Leoncitas Creek in 1844, Bollaert (Hollon and Butler 1956:370) noted many turkeys. Hester and Hill (1975:27) report turkey bone from 41 ZV 60 in Zavala County. The native Indians utilized this large bird; it provided quite a bit of meat and males have beautiful feathers (Blair *et al.* 1968:326).

Four species of owl occur in the Choke Canyon area (Peterson 1963:124-131). Feathers would be the only resource obtained from these birds. The archaeological implications of owls are that they deposit small mammal bones in refuse piles beneath their nests (Lundelius 1964:29).

Doves occur in great numbers in south Texas and while they are utilized heavily by modern sport hunters, they are hard to collect without a shotgun. Aborigines would have been able to collect some by means of bow and arrow, rocks, or snares.

Quail will allow humans to approach within range to use rocks or nets. They also cluster in coveys on the ground which would make capture with nets feasible. Traps constructed of basketry and netting would also work; modern wildlife biologists often use wire traps to capture quail for banding (P. B. Uzzell, October 1978, personal communication).

Reptiles and amphibians were utilized by the local Indian population. Oviedo (1974:43) reported that the Indians ate snakes, lizards, frogs, and other kinds of reptiles. Bandelier (1972:62), in her translation of Alvar Nunez Cabeza de Vaca's diary, also reported that the aborigines ate lizards, salamanders, and serpents.

Blair (1950:104) reports 36 species of snakes and 19 species of lizards occurring in the Tamaulipan Biotic Province. Four of the snakes are poisonous; three of these are the pit-vipers: copperhead (*Agkistrodon contortrix*), cottonmouth (*Agkistrodon piscivorus*), and western diamondback rattlesnake

(*Crotalus atrox*). The eastern coral snake (*Micrurus fulvius*) also occurs in Choke Canyon. Other common snakes in the area are water snakes (*Natrix* sp.), corn and rat snakes (*Elaphe* sp.), king and milk snakes (*Lampropeltis* sp.), and the racer (*Coluber constrictor*).

Various turtles occur in different habitats in the reservoir area. Ten species of turtles are listed for this part of Texas (Blair *et al.* 1968:216-229). Except for the Texas tortoise (*Gopherus berlandieri*) and the western box turtle (*Terrapene ornata*), all of them live in semiaquatic habitats. The softshell turtles (*Trionyx* sp.) and chelydrid turtles--snappers, etc.,--grow to large size and would provide a good food source.

One member of the Order *Crocodylia* occurs in the Choke Canyon area. The American alligator (*Alligator mississippiensis*) occurs in and around the Frio River. The Karankawas along the coast (Newcomb 1961:66) utilized alligator "grease" as mosquito repellent. Alligators can be caught in nets (K. C. Jurgens, January 1978, personal communication) or speared through the eyes as the Bidai did (Newcomb 1961:324).

Most lizards in the area are small creatures, but members of the genus *Sceloporus* reach about 10 inches in length. Lizards are agile and hard to catch, but could be caught in large numbers around the edges of brush fires set by the Indians (Oviedo 1974:43; Bandelier 1972). Combined with vegetal food, this would result in a relatively balanced diet.

Amphibians (frogs and salamanders) occur mainly in moist areas along the creeks and rivers. The *Urodela* amphibians (salamanders) are either aquatic or semiaquatic in habitat preference (Blair *et al.* 1968:170-190). Five families of anurans live in the Choke Canyon area. Three of these families (*Microhylidae*, *Pelobatidae*, and *Bufo*nidae) are toads. (We do not know whether Oviedo considered toads as separate from frogs.) Most toads are more arid-adapted than frogs (W. Frank Blair, May 1976, personal communication). Two families of frogs (*Hylidae* and *Ranidae*) occur here. The hylid frogs are tree frogs; the ranids are "typical" frogs like the bullfrog (*Rana catesbeiana*) and leopard frog (*Rana pipiens*). Frogs can be caught by hand or speared.

Faunal analysis of material from late Prehistoric and Protohistoric sites in south Texas (Hester and Hill 1975:25-29) yielded several reptile and amphibian species. Box turtle (*Terrapene* sp.), bullsnakes (*Pituophis melanoleucus*), rattlesnake (*Crotalus* sp.), rat snake (*Elaphe* sp.), racer snake (*Coluber* sp.), horned toad (*Phrynosoma cornutum*), box turtle (*Terrapene ornata*), slider turtle (*Pseudemys* sp.), and unidentified frog remains were identified (*ibid.*:28-29). The riparian zones are smaller in the Zavala County study area than in the Choke Canyon area; fewer aquatic or semiaquatic species might be found. More might occur in sites in the Choke Canyon area.

The Rio Grande Plain possesses a large and varied ichthyofauna (Hubbs 1957: 89-104; Hubbs 1976). Many of the species are small fish, averaging less than four inches in length. Larger fish, such as gar, carp, catfish, sunfish, and drum, would have been obtainable by seining or bow fishing. Ruecking (1953:484-486) lists fish as a food eaten; they were caught with seines or shot with bows in historic times.

Species such as alligator gar, carp, channel catfish, or flathead catfish will grow to large sizes. Older flathead catfish may weigh 100 lb. Blue catfish can grow to 150 lb or more. Maximum weight for alligator gar is 300 lb (Blair *et al.* 1968:39-105). While modern Euro-Americans think of the gar as a "trash-fish," they can be eaten. Fish bone occurs at the Late Prehistoric Tortuga Flat site (41 ZV 155) in Zavala County (Hester and Hill 1975:25). Alligator gar (*Lepisosteus spatula*) bone also occurs at 41 ZV 60 in Zavala County (*ibid.*:27). It has been reported that Indians of the region were using seines as a method of catching fish (Ruecking 1953:484-486). Cordage nets, depending on the mesh size, will operate as efficiently as modern nylon nets; large fish can be handled in this manner. Using smaller mesh size, seines can catch even minnows. Large numbers of these would provide as much food as fewer, large fish.

Of the modern ichthyofauna, many species reach their greatest densities in lakes. Large lakes were not a major habitat in this area in prehistoric times; therefore, lacustrine schooling fish such as shad were not as prevalent. Riverine fish such as gar, carp, various suckers, and catfish would have been prevalent. Prior to the erection of barriers downstream such as at Lake Corpus Christi, some marine species may have been able to move upstream in the Nueces drainage. In the Colorado River drainage, the Atlantic needlefish (*Strongylura marina*) has been caught as far upstream as Bastrop (Hubbs 1957:95). This is over 120 river miles from the coast. Hubbs (*ibid.*) suggests that coastal species such as sheepshead minnow (*Cyprinodon variegatus*), tidewater silverside (*Menidia beryllina*), and rainwater killifish (*Lucania parva*) may occur throughout the Tamaulipan Biotic Province.

What effects could changes in stream flow have on aquatic habitats? Price and Gunter (1943:143) state that small streams on the eastern flank of the Reynosa cuesta became intermittent in the period 1870-1895. A change to intermittent flow would eliminate most aquatic fauna in the feeder streams. This would reduce the amount of available food for an aboriginal hunting and gathering population.

THE FIELD PROJECT

The field project was conducted in two stages. The first stage, intensive survey, took place from August 1977 through September 30, 1977. The goal was to discover and record all cultural resources on the surface of the 2544-hectare (6285 acres) study area. We recorded 111 sites, 43 low density artifact scatters, and five isolated artifact finds. The second stage, supplementary investigation of a representative sample of the recorded resources, took place from October 14, 1977, through November 17, 1977. It consisted of various combinations of controlled surface recording and collection and test pit excavation at 15 sites. Two additional sites were recorded for a total of 113. Its goal was to collect data which could contribute to an understanding of natural resources, lithic technology, seasonality, and settlement and subsistence patterns in the area.

The Intensive Survey

Concept and Significance

The survey of the 2544-hectare area in Choke Canyon Reservoir was designed as an intensive survey. Scovill, Gordon, and Anderson (1972:3) broadly defined intensive survey as "a comprehensive and extended physical examination of an area, for the purpose of obtaining an accurate sample of data on all archaeological resources, situations, and associated environmental variables."

The term 100% survey is often used interchangeably with the term intensive survey. However, it is not practical and probably not possible to document the complete surface extension of the archaeological record in any given area during an intensive survey. The virtual impossibility of documenting all surface manifestations is sufficient reason to elect to use the term intensive survey as opposed to 100% survey, which implies that all observable cultural resources are recorded.

The ideal goal of anthropological archaeology is to understand the whole of past human behavior. If this goal is to be achieved or even approached, the archaeologist must first know what data are available (i.e., he must define the archaeological record). During the intensive survey the archaeological record is in fact defined by discovering and reporting the nature and surface distribution of cultural resources.

The term target universe has been defined as "all potentially observable cultural resources within a specific study area" (Thoms 1978:3). Target universe is contrasted to the term "known universe, or those cultural resources which are actually documented as a result of an intensive survey in a specific study area." Therefore, the known universe is actually the data base for discussions relating to the target universe. Survey error is defined as the difference between the target universe and the known universe. An indirect correlation exists between the survey error and the data base. As the survey error increases, there is a corresponding decrease in the reliability of the data base (i.e., the known universe) as it represents the target universe (*ibid*).

The level of survey error is extremely significant in intensive surveys (for more complete discussion, see Thoms 1978). Under current conditions in contract archaeology, undiscovered cultural resources may be considered nonexistent and, as a result, potentially significant portions of the record of past human behavior are excluded from future discussion. The preceding statement reflects the fact that most federal agencies have developed guidelines for implementation of cultural resource management laws. The necessary archaeological investigations are often divided into sequential phases such as: 1) archival and literature search; 2) intensive surveys; 3) test excavation; and 4) final mitigation (often full-scale excavation). While intensive surveys are only a part of the larger concept of cultural resource management, they define the known universe and are an acceptable primary tool for cultural resource managers.

Considering the significance of intensive surveys, it is of paramount importance to minimize the survey error. Conducting the survey with enough intensity to discover a maximum number of cultural resources is the most direct

way to minimize survey error. Intensity of surface coverage is measured directly by the spacing between individual surveyors (assuming transect coverage of the study area) and secondarily by the rate of coverage (Schiffer, Sullivan, and Klinger 1978:21). However, survey error is not the only factor which conditions the archaeologist's ability to understand the whole of past human behavior.

Seven sources of bias which intervene between human action and the archaeologist's perception of that action may be identified as follows: 1) not all behavior patterns result in patterned material culture; 2) of those which do, not all will occur where there is an opportunity for inclusion in archaeological context; 3) of those so occurring, not all will be included in such context; 4) of those which are included, not all will be preserved; 5) of those which are preserved initially, not all will survive; 6) of those surviving, not all will be exposed to, or by, the archaeologists; and 7) among patterns exposed to the archaeologist, not all will be perceived or properly identified (Collins 1975:29).

Survey error is of course a part of Collins's seventh source of bias. The objective of the preceding discussion is simply to make clear that there is a significant difference between the target and the known universes. Furthermore, the archaeologist must be aware of this difference for it conditions his interpretations of past human behavior. The first six of Collins's (*ibid.*) sources of bias are not subject to significant amelioration by the archaeologist. The archaeologist can, however, decrease the level of survey error by striving for greater intensity during the survey.

Obviously, many factors condition the actual level of intensity for any particular project. In contract archaeology, the most apparent conditioning factors are the monetary and temporal restrictions stipulated in the contract. Schiffer, Sullivan, and Klinger (1978) have discussed a variety of controllable and uncontrollable factors which condition the likelihood of encountering cultural resources, i.e., the discovery probability. Uncontrollable factors include the abundance, clustering, obtrusiveness, visibility, and accessibility of archaeological materials; controllable factors include survey techniques and strategy (*ibid.*).

Many conditioning factors can be minimized by making adjustments during the proposal and/or project stages of an intensive survey. For example, when funding is low, it may be feasible to suggest a sampling design which allows for the desired level of intensity of coverage of representative portions of the study area (see Thoms 1976, for an example of this approach). It may also be possible to modify the proposed survey techniques during the project and still maintain an acceptable level of intensity of coverage. When seasonal environmental conditions limit surface exposure, it may be possible to re-schedule the project. Schiffer, Sullivan, and Klinger (1978) suggest a variety of ways to compensate for the conditioning factors of the intensive survey.

Definitions

Since 1974 it has been a CRI practice to define the term site, as well as other categories of cultural resources, on a project-by-project basis. In a

very broad sense, the term site can be defined as "an area in which past human activity has modified the natural environment, usually with the addition of cultural materials" (Thoms and Proctor 1977:18). However, in the Choke Canyon area it is difficult to walk 160 km without discovering some evidence of past human activity: major portions of the reservoir area could be defined as sites. Much of the scattered cultural debris in Choke Canyon is confined to gravel ridges and represents limited (as evidenced by surface materials) quarry activities. As a result of continual erosion and also brush-clearing activities, many cultural surficial manifestations are almost wholly destroyed. But one encounters a very thin scatter of heat-fractured rock and/or chipped stone debris on many slopes and relatively flat areas. Much of the cultural material on the surface may have been exposed as a result of rodent activity, vegetational processes, normal pedological processes, and/or recent human activities, such as cutting *senderos* (local term for linear clearances) and building fences or roads.

Considering the above, as well as information derived from background research and our previous experience in the area, we decided to define and categorize observable cultural resources we anticipated discovering in the reservoir area. Definitions presented below were derived during the evening following the first day of survey activities. A site is defined as any area which exhibits 10 or more cultural items, including tools, lithic debitage, heat-fractured rock, and faunal remains associated with other more definite cultural artifacts, e.g., lithic debitage, per 25 m². Following general discussions by Collins (1975:61-68) and specific suggestions by Schiffer, Sullivan, and Klinger (1978:3), we employ the term low density artifact scatter (originally we used the term non-site); we have defined this term in a subjective manner as an obvious near-site-level concentration of cultural materials. The third category of cultural resources is termed isolated artifact and is defined as a single potentially diagnostic cultural item (or fragment[s] of same), usually a tool, which is not associated with other cultural materials.

Choke Canyon Survey Strategy

The survey of the 2544 hectares in Choke Canyon Reservoir was designed as an intensive survey. Intensity can be considered the amount of effort devoted to inspecting surveyed areas; it can be controlled by the archaeologist and "has the most profound effect on discovery probabilities . . ." (Schiffer, Sullivan, and Klinger 1978:21). The methods and techniques employed in implementing an intensive survey have varied through time and from project to project. Traditionally, the method of coverage has been pedestrian in nature. During the last few years variations of the transect technique have become commonplace as a means of systematically covering the surface (e.g., see Martin 1973; Thoms 1976; Thoms and Proctor 1977; Beckett and Bussey 1977; Reher 1977; Whalen 1977). This approach has been previously employed in south Texas; examples include the 1976 survey of portions of Hidalgo and Willacy Counties, Texas (Mallouf, Baskin, and Killen 1977:99-100) and several surveys by CAR.

The Cultural Resources Institute (CRI) first employed the transect technique during the summer of 1974 (see Thoms 1976). Since that time all CRI survey projects have employed the transect technique, but in various widths and

patterns within individual transects. Generally, however, surveyors walk a zigzag pattern within their respective transects.

As previously stated, the proposal for the intensive survey included a research design with specific methods and techniques for conducting the survey. Considering that the planned survey was to be intensive, the primary objective was to locate and record the maximum number of observable cultural resources. The zigzag transect technique was proposed with individuals spaced at approximately 25 m, the width varying depending on environmental conditions. In general, it has become common to have spacing from 10-75 m when employing the transect technique (Schiffer, Sullivan, and Klinger 1978:22). At the proposal stage it was estimated that a rate of coverage of 12 hectares (30 acres) per person per day could be achieved. This estimate was based on CRI's previous survey rates, background research, and general familiarity with the region's environment and potential cultural resources.

Because heavy rains in the spring of 1977 resulted in abnormal vegetational growth in the study area, the survey was delayed until late summer when visibility was greatly enhanced as a result of a prolonged dry period.

Surveys Compared

During the spring of 1974 and the spring of 1976 some 10,931 hectares (27,000 acres) of the reservoir were subjected to an intensive archaeological survey by the Texas Historical Commission (Lynn, Fox, and O'Malley 1977). It is helpful to compare the general nature and results of the THC (1974, 1976) and CRI (1977) surveys. This will provide the reader with an overall perspective of the archaeological record in the reservoir area and explain the reasons underlying the differences between the two surveys. Our survey area maps (Figs. 3, 4, 5, and 6) illustrate all cultural resources recorded by CRI, as well as those adjacent to our survey areas that were recorded during the earlier survey. For a complete documentation of all sites recorded during the previous survey, the reader is referred to Lynn, Fox, and O'Malley (1977).

There are no statements in this THC report concerning the techniques employed to cover the surface. The report states that 230 work days were spent during the survey, including time to test excavate 11 sites. Based on this figure, we have estimated a survey rate of approximately 53 hectares (131 acres) per person day. During the survey 161 sites were located and recorded. This gives a general site density figure of roughly one site every 68 hectares. Sites ranged in size from 10,000 to 600,000 m². Most of the sites were located along the Frio River or its major tributaries (Lynn, Fox, and O'Malley 1977).

The 2544-hectare intensive survey conducted by CRI was completed in 128 person days. With this level of intensity, we were able to average 20 hectares (49 acres) per person day. In the course of the CRI survey, 113 sites were located and recorded. This gives an overall site density of one site every 23 hectares (56 acres). Site size varied from 5 m² to 385,000 m². Some sites were situated along the Frio River and its major tributaries, but most were situated away from the major drainage.

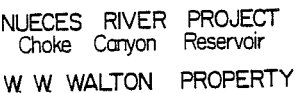


Figure 3. Map of W. W. Walton Property.

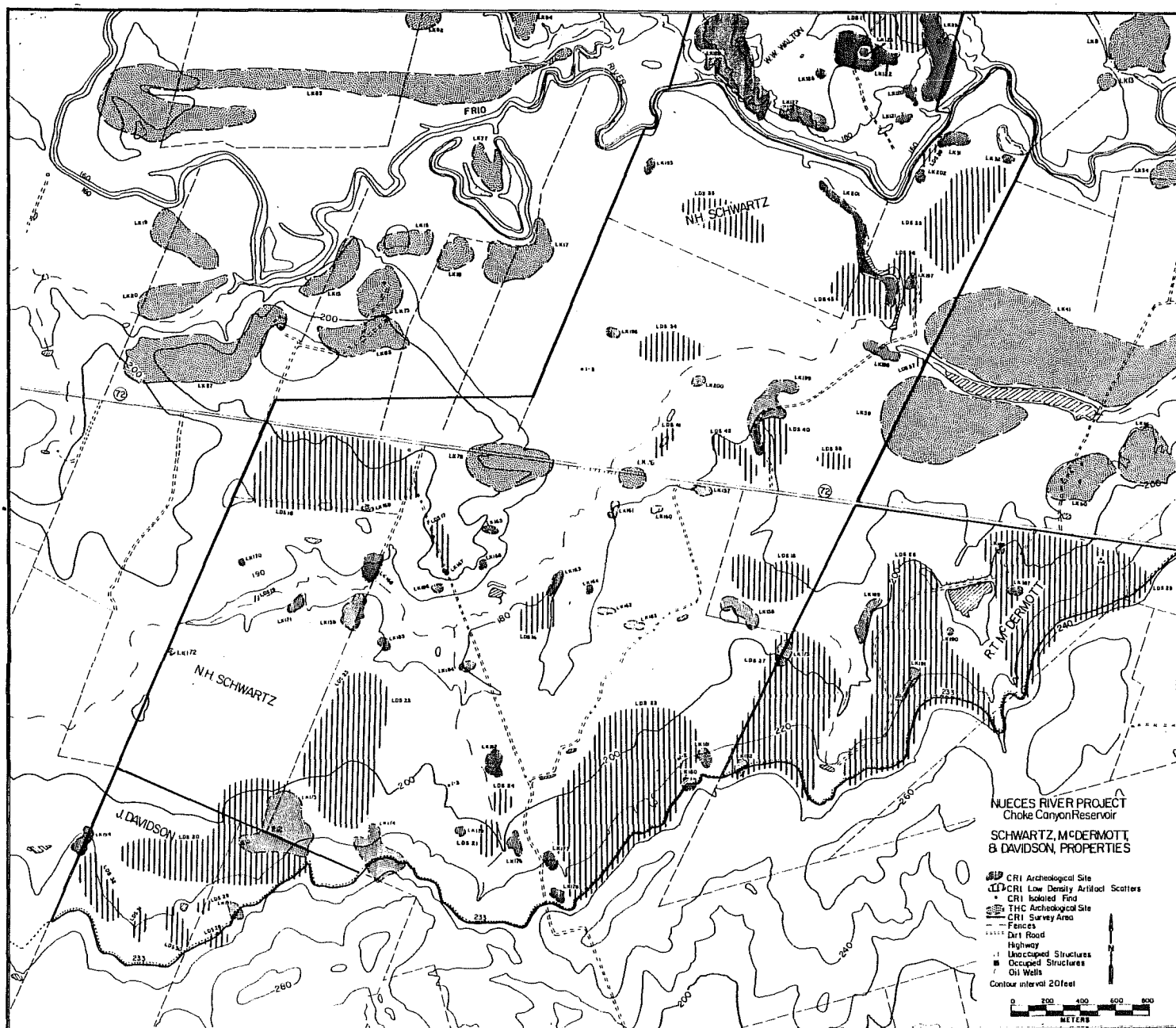


Figure 4. Map of N. H. Schwartz, R. T. McDermott, and J. Davidson Properties.

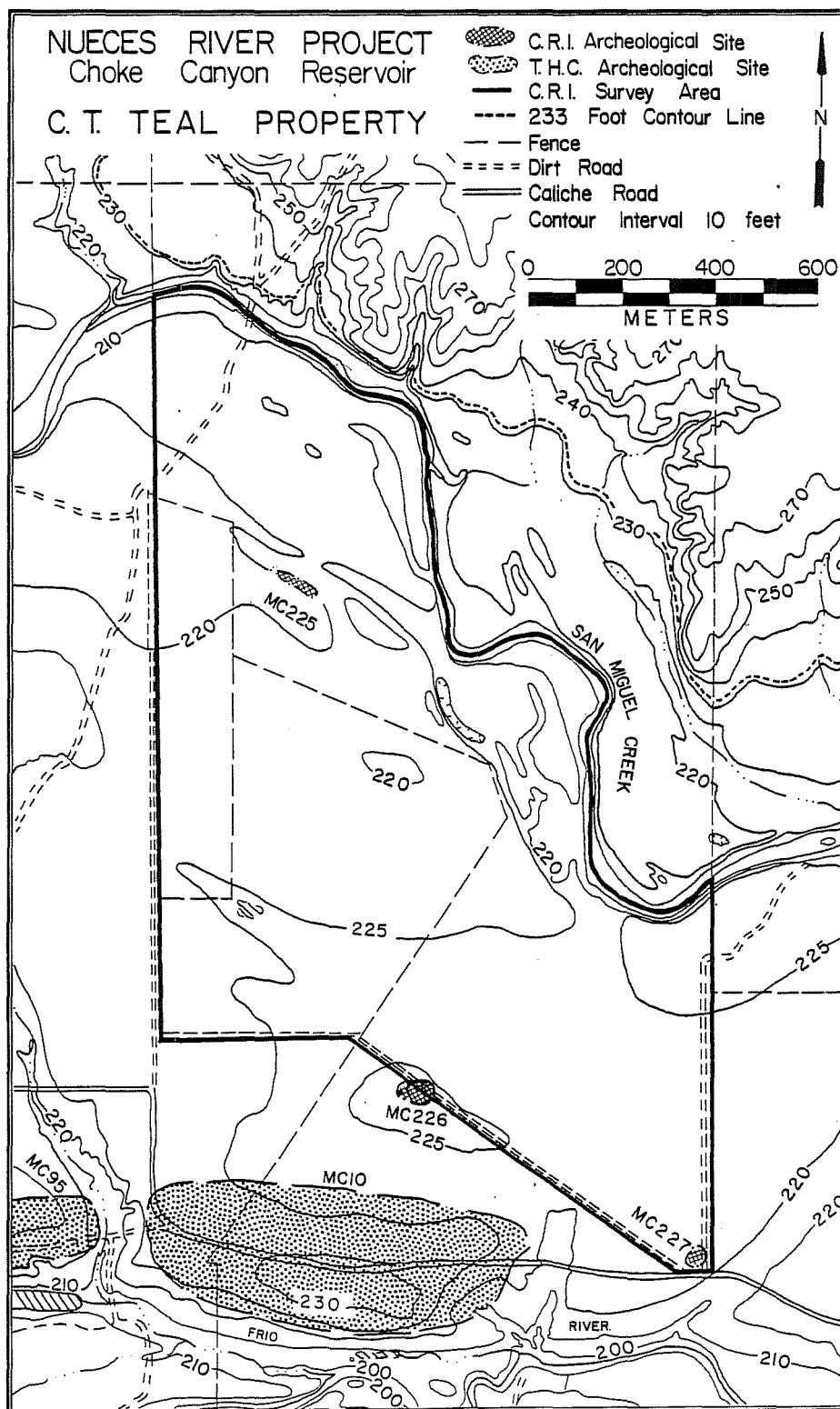


Figure 5. Map of C. T. Teal Property.

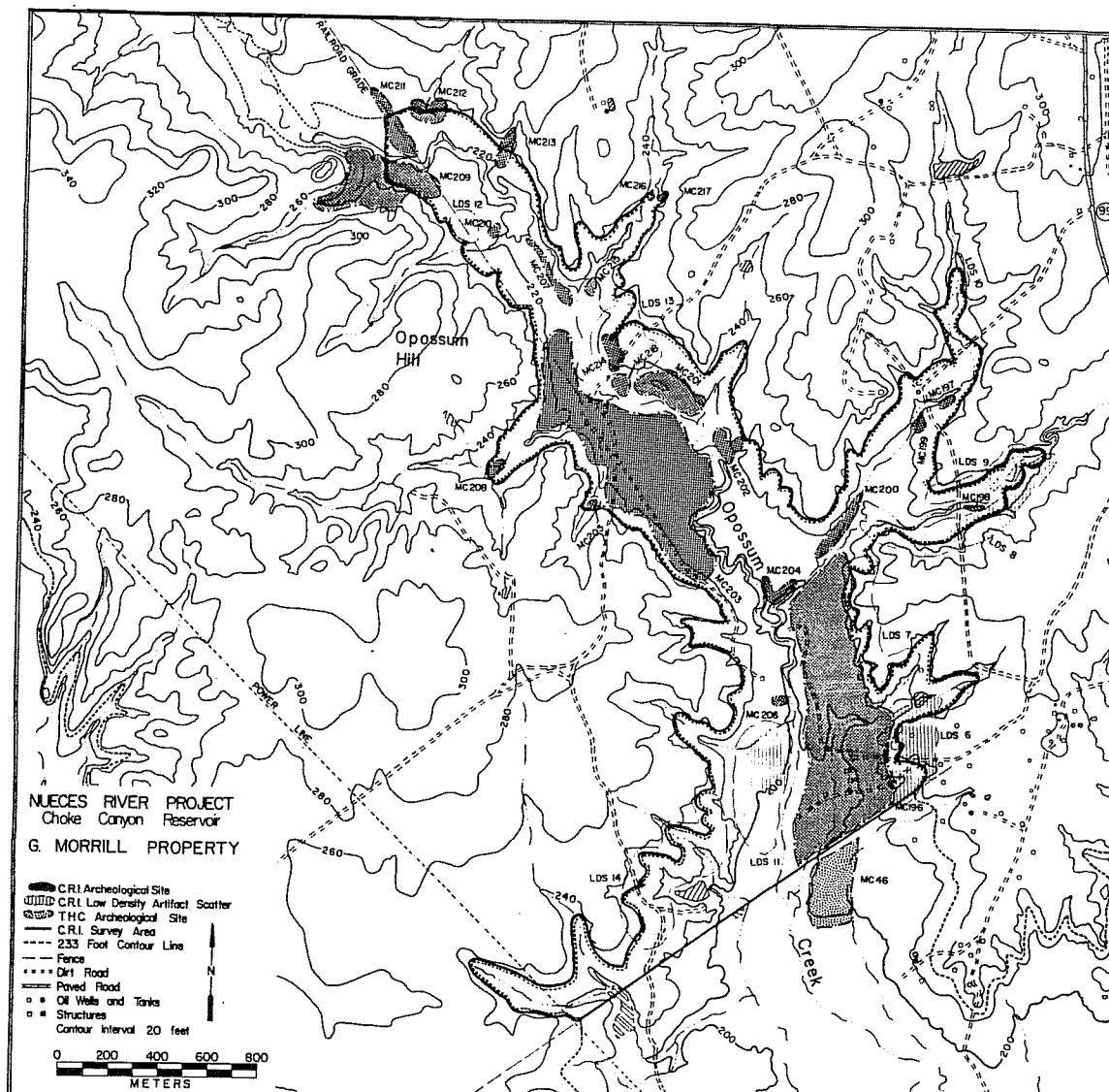


Figure 6. Map of G. Morrill Property.

The obvious question is raised: Why are the results of these two intensive surveys so different? The question is prompted by the fact that the natural environments involved were almost identical and both projects were directed towards recording all observable cultural resources. Similarities and differences between the two projects are summarized in Table 1.

TABLE 1. SURVEYS COMPARED

	<u>Previous Survey</u>	<u>CRI Survey</u>
Reason	Public Law 93-291, for reservoir construction	Public Law 93-291, for reservoir construction
Location	Choke Canyon reservoir area, south Texas	Choke Canyon reservoir area, south Texas
Topography	Dissected plain	Dissected plain
Vegetation	Low brush, cultivated fields, forest	Low brush, cultivated fields, forest
Season and year	Spring 1974 and 1976	Fall 1977
Cost	Approximately \$43,000	Approximately \$43,000
Area	10,931 hectares (27,000 acres)	2544 hectares (6285 acres)
Type	Intensive	Intensive
Method	Pedestrian	Pedestrian
Technique	Undefined	Zigzag transect
Collection Procedure	Site-specific provenience	No collection during survey
Interval between surveyors	Undefined	65 meters
Number of person days in field	208 (approximately)	128
Rate of coverage (per person day)	53 hectares (131 acres)	20 hectares (49 acres)
Site definition	Undefined	More than 10 artifacts in a 25 m ² area
Number of sites recorded	161	113

TABLE 1. (continued)

	<u>Previous Survey</u>	<u>CRI Survey</u>
Site size range	10,000 m ² to 600,000 m ²	5 m ² to 385,000 m ²
Overall site density	14.7 sites per km ² (3.8 per section-- 640 acres)	43.5 per km ² (11.4 per section-- 640 acres)
Low density scatter definition	Undefined	Fewer than 10 artifacts in a 25 m ² area
Number of low density scatters	0*	43
Number of isolated artifacts	0	5
General location of cultural resources	Most sites along river and major tributaries, few away from major drainage	Sites also along river and major tributaries, but most away from major drainage

Despite numerous similarities, the CRI survey resulted in an overall site density approximately three times greater than that of the previous survey. The CRI survey recorded 75 sites smaller than the smallest site recorded during the previous survey, and 18 of these were smaller than 500 m². Furthermore, many sites recorded by CRI were located in areas similar to those where no sites had been previously recorded. It is doubtful that actual settlement pattern differences account for these results since in many cases the two survey areas were separated only by fences. Furthermore, climatological and vegetational conditions were similar during both surveys, and land access to the areas covered was not a major problem for either survey. Given the above situation, the uncontrollable factors--abundance, clustering, obtrusiveness, visibility, and accessibility of archaeological materials (Schiffer, Sullivan, and Klinger 1978)--do not account for the differences between the two surveys.

Once the comparisons are made between the two surveys, it is possible to suggest several reasons for the different results. The following statements are based on comparing the results and on information gathered or deduced from the larger survey which was not included in the final report. Economics and controllable survey factors--survey techniques and strategies (*ibid.*) account for most of the observed differences.

Many of these differences between the results of the two projects can be explained by the fact that both projects were undertaken for essentially the same amount of money (approximately \$43,000). Roughly \$3.93 was available to survey each hectare of the 10,931-hectare area as compared to \$16.91 for the 2544-hectare area. It should be noted that approximately 22 person days were

*Some may have been recorded as sites.

devoted to testing sites in the larger area and 40 person days were spent testing sites in the 2544-hectare area. With available funds almost equal, it is obvious that this conditioned the intensity of the larger survey more than that of the smaller survey.

Both surveys were pedestrian in nature, but specific strategies probably differed considerably. During the small survey equal attention was given to all areas. This was presumably not the case with the larger survey because large areas were declared void of cultural resources; sites were recorded in areas similar to these during the smaller survey. Considering the number of cultural resources recorded during the two surveys, the level of intensity also differed between the projects. This is also made evident by examining the distribution of sites. The observed site size differences probably reflect differing site definitions employed during the two surveys. More detailed comparisons between the two intensive surveys are rendered almost impossible because the final report of the larger survey did not include a discussion of the research design at the technique level, nor did the report detail the manner in which the survey was actually carried out.

Implementation

During the pre-proposal, proposal, and pre-field stages of the 1977 CRI project and as late as the first several days of the field stage, no decisions were made by the contracting agency or by the prime contractor regarding which of the unsurveyed areas of the reservoir would be surveyed by CRI. During discussions with Bureau of Reclamation personnel, it became apparent that only certain land tracts had been condemned and/or purchased by the Bureau. In the final analysis, accessibility to land tracts determined which area CRI surveyed. Acreage surveyed by CRI is shown in Figure 1.

Considering that the areas for intensive survey were already determined, it was not necessary to develop a sampling design to select a representative sample of areas to be covered. Rather, our research design stipulated that all areas would be subject to the same techniques of surface coverage. The primary problem was then to employ a survey strategy that would allow us to effectively and efficiently complete the survey within the limits of available monetary and temporal resources.

The survey began in the southern portion of the Walton property adjacent to the Frio River. Our technique for covering the area was to visually divide it into parcels of contiguous transects approximately 25 m (distance was paced) wide. Individual parcels within specific land tracts generally exhibited existing boundaries, such as fences, roads, *senderos*, and drainages. The parcels were selected because they were distinct units which were also indicated on the topographic maps, and their size was small enough to minimize logistical problems. Each day's survey was initiated along and parallel to a distinctive boundary (e.g., fence, *sendero*, or drainage). Each individual walked a zigzag pattern within his 25-m transect; an effort was made to insure some overlap between transects. Due to the very dense brush, which at times limited visibility to less than 5 m, it was decided that the outside surveyor (Thoms and Montgomery always held both outside positions), or the individual

farthest from the distinctive boundary of the parcel, would mark the limits of his transect with wire flags. Upon completing a transect, the individual who set the flags would return on the adjacent transect and collect the flags while another surveyor marked the outside limits of the new sweep (equivalent to four transects) by setting another line of wire flags. The two individuals responsible for the middle transects kept in continual visual and/or verbal contact with surveyors to their right and left. A combination of setting wire flags and continual communication among crew members provided reasonable assurance that we were not missing large areas.

Once cultural resources were encountered by one surveyor, the others marked their progress with wire flags or flagging tape, walked to the location of the observed cultural materials, and documented the occurrence; with the exceptions of isolated artifacts, no collections were made during the survey.

Procedures

Individual crew members documented the site as follows: 1) Montgomery took at least two photographs of the site, plus photographs of individual features (if present); he drove in a metal stake and attached an embossable aluminum label identifying the site and marked its location with two or three streamers of pink flagging tape; he also completed the UTSA computerized site forms and conducted a brief reconnaissance of the site, recording notes in his field notebook; 2) Jurgens and Alvey divided the site into two parts, each being responsible for documenting half of the site; they each drew rough sketch maps (distances by paced measurements) indicating areas of concentrated cultural debris and evident features as well as the site's dimensions; they flagged the site's limits with yellow flagging tape and marked obvious tools and features (e.g., hearths and artifact concentration areas) with pink flagging tape; 3) Thoms took detailed notes based on his examination of the site and information provided by other crew members; he also completed the TTU site form and drew a sketch map, which indicated approximate contour lines, site dimensions, location of artifact concentration areas, other features and tools, and the site marker. The process of documenting sites in the above manner and returning to the appropriate starting position generally took from 45-90 minutes, depending upon the nature of the cultural resource.

We were very fortunate to have available copies of the Bureau's detailed 2-inch contour interval topographic maps. The maps were recently compiled especially for the Choke Canyon Reservoir construction project. The copies we used in the field were at a scale of 1 inch equals 800 feet; they were extremely accurate (except in a few instances where vegetation obscured topography) and also indicated major vegetational areas, most roads, trails, *senderos*, fences, and existing buildings. With such detailed maps available we were able to accurately plot sites. However, available copies were limited to two for field work and one for laboratory work. Thoms and Montgomery carried the Bureau maps while Jurgens and Alvey carried USGS 7.5' topographic maps.

Procedural Changes

As previously stated, a major problem was to develop an effective and efficient survey strategy (based on our proposal) that would allow us to complete the survey within two months and still have sufficient time to carry out a surface collection/test excavation program at a representative sample of sites as supplementary investigations. The survey strategy discussed in the preceding section was employed at the outset of our survey. During the first few days of field work the survey strategy resulted in a rate of coverage ranging from 4-8 hectares per person day. While this was effective, it was not very efficient. Our lack of efficiency was attributed to the following conditions: 1) a transect width too narrow; 2) four crew members documenting every site; 3) difficulty in communications among crew members; 4) routine slow progress during initial work days; 5) very thick brush, primarily acacia, which made crawling a part of each day's work; 6) hot and humid weather; and 7) constant apprehension about discovering rattlesnakes (which was justified throughout the survey).

It was necessary to achieve an average rate of coverage of 19 hectares (47 acres) per person day if we were to complete the survey within the allotted time. We soon learned to cope with environmental conditions as well as to understand the general nature of the cultural resources; the result was an increase in our rate of coverage. However, it was necessary to modify the survey technique if we were to achieve the desired rate of coverage. After experimenting with several transect widths, we discovered that a width of 65 m (when coupled with other factors) would yield the desired rate of coverage. We also wanted to know how walking a zigzag pattern in a 65-m transect compared to walking a straight-line pattern. In order to gather information on distances walked using the zigzag technique, each crew member used a pedometer. Distances walked using the pedometer were consistent among all crew members. The zigzag pattern resulted in walking 2 1/2-3 times the straight-line distance of any given transect (straight-line distances were measured on maps).

We continued to work as one group surveying four contiguous transects, but with two-person crews. Using this approach, only two individuals recorded any given site, unless a site was observed in three or more transects. Crews were Thoms/Jurgens and Montgomery/Alvey. Thoms and Montgomery took detailed notes on each site his crew discovered, completed the TTU survey form (including the sketch map), and examined the site to verify data supplied by the field assistants. Jurgens and Alvey flagged the site's limits, as well as potentially diagnostic tools and features. They also placed and labeled the site marker, took photographs, completed the UTSA site survey forms, and recorded brief site specific comments in their field notes. In most cases 30-60 minutes were spent recording individual sites. After three weeks of survey work we acquired two FM transceivers which were carried by Thoms and Montgomery for the remainder of the survey. The transceivers were extremely useful and aided significantly in increasing our rate of coverage. Other aspects of the survey strategy remained as discussed earlier. By the tenth day of survey work the techniques described above (with the exception of the FM transceivers) were fully implemented and were employed throughout the survey. During the survey the rate of coverage varied from 4-40 hectares per person day. As has been noted, vegetation density and surface visibility

varied considerably throughout the study area, and this accounts for most of the variation in the survey rate. In all, 128 person days (i.e., each day a surveyor was in the field more than four hours) were spent surveying 2544 hectares (6285 acres). The overall average survey rate was 20 hectares (49 acres) per person day.

Survey Data

A large number of site specific attributes were monitored during the CRI survey. These data were considered relevant to the research design which has been discussed in the preceding section of this report. Information was documented on TTU and UTSA site survey forms (see Appendix I) as well as in individual field notes. In addition to information specifically requested on site survey forms, we monitored other site attributes which might be considered project specific attributes. These additional attributes were generally listed on site survey forms, but at times they were listed in field notes. Project specific attributes included visual estimates (agreed upon by all crew members examining the site) of overall artifact density per square meter; number of hearths; percentages of heat-fractured rock and chipped stone (the two total 100%); percentages of primary, secondary, and interior flakes (total of 100%); and percentage of undisturbed portion of the site. No collections were made; sketches were made of all observed chipped stone tools and many of the ground stone tools. Low density artifact scatters were described (e.g., location, size, types, and quantity of materials) in field notes and on topographic maps. Isolated artifacts were collected, documented on CRI site survey forms (without a sketch map), and plotted on the topographic map.

Supplementary Investigations

The supplementary field investigations were conducted in a testing program which consisted of both surface and subsurface testing procedures. The term testing is used not in a narrow sense implying excavation, however limited, but in a broad sense of intensively examining a sample of previously observed cultural resources, by surface and/or subsurface means. In this project, there were two phases of field work: phase one, the survey; phase two, the supplementary investigations (testing).

After the intensive survey of the area was completed, a representation sample of sites to undergo supplementary field investigations was drawn. The procedures used in selecting these sites are described in the next major section of this chapter.

Surface Testing Procedures

Surface documentation of archaeological sites has in recent years become an important research tool in archaeology. The utility of several methods of surface collecting and the usefulness of the data in predicting subsurface evidence can be traced back to several important projects from South America (Mayer-Oakes 1970:2-5), the Near East (Redman and Watson 1970), and North America (Binford *et al.* 1970). Beginning at this time, the term intensive

systematic surface collection became a common phrase for describing an important archaeological tool for documenting surface manifestations and predicting subsurface archaeological remains. Refinements in methodology and technique have led to the analysis of surface patterns by nearest neighbor analysis (cf. Whallon 1974), dimensional analysis of variance (cf. Whallon 1973), chi square analysis (cf. Dacey 1974), and factor analysis (cf. Healar 1972; Downer 1977; Gunn and Mahula 1977). Downer (1977) has recently pointed out that certain techniques which seek to define spatial patterning of surface remains from quantitative geography and plant ecology utilize contemporary data, and that mixing of temporally different materials can cause spurious results in archaeological situations. Other recent discussions of site surface sampling are contained within Redman (1975) and Asch (1975).

CRI has made systematic surface collections in several projects. The Canyon Lakes project (Keslin *et al.* ms.) incorporated a proportionately stratified random sample design. Another project involved transect sampling of an extensive Jornada structural site near El Paso, Texas (Portnoy 1977). Various sampling schemes have been employed in our archaeological survey projects (cf. Thoms 1976; Thoms and Proctor 1977).

Surface collection procedures followed by the CRI Choke Canyon project are detailed below. They incorporate a random selection of surface collection units in a fashion which expended the least amount of time and yet insured useful results.

Our testing program provided systematic surface collections at every site scheduled for additional work. Prior to field testing procedures, field maps of all sites to be tested were transferred to gridded paper. This was accomplished with the aid of a Kargl reflecting projector, which enlarged the original field maps. The original field maps were already made on 2-inch contour topographic maps of a scale 1 inch equals 800 feet. The resulting scale on the gridded site maps was such that each grid square on the new map corresponded to 4 m². This was important, because at each site one or more 4-m² grid units were used in the surface collection procedures. Without these maps from the Bureau of Reclamation, the testing procedures would have been more difficult and time consuming.

In the field, the sequence of activities was as follows:

- 1) Move the site marker stake to a map grid point as close to the center of the site as possible;
- 2) Recheck and if necessary redefine the site boundaries and draw them on the map;
- 3) Number every grid unit which is at least halfway within the site boundaries, beginning with the most northwestern grid unit and moving from left to right;
- 4) Estimate the area of the site (in m²) and determine the number of 4-m² grid units necessary to achieve a 1% coverage of the site's surface. If the number of grid units needed to sample 1% of the surface is too large to

handle within our time framework, a lower percentage level is used;

- 5) Use a table of random numbers to select the necessary 4-m² grid units for each site;
- 6) Locate the southeast corner of each 4-m² grid unit with a transit and stadia rod or with the Bandy surface surveyor (Bandy 1977);
- 7) Two-tape in each 4-m² string grid along true north with chaining pins at the four corners; mark the string in 1 m units and collect all artifacts and ecofacts from each 1 m². (This step was later simplified by constructing a portable wooden grid which takes only 5-10 minutes to set up.)

Due to time restraints, the surface collections were performed at low percentage levels. At sites of large areal extent, only 0.25% to 0.50% of the site's surface was systematically collected. At smaller sites, up to 1% of the site's surface was systematically collected.

As time allowed, additional potentially diagnostic tools were recorded and collected outside the collection units. Provenience was recorded by using a transit and tape and the Bandy surface surveyor (*ibid.*). The transit and stadia rod were also used to record provenience of surface artifacts and features which were described in detail and photographed.

Subsurface Testing Procedures

Eleven of the 15 tested sites contained naturally exposed profiles in cutbanks which indicated the depth of cultural deposits and the stratigraphy at the site. At three tested sites, test pits were excavated at appropriate locations to document this information. The locations of test pits were subjectively determined by the archaeologists. The remaining site contained a massive borrow pit (excavated by BOR) which exhibited cultural deposits and site stratigraphy in the existing profiles. Some materials were collected from backdirt piles of BOR borrow area head pits; we refer to these collections as uncontrolled grab samples.

The following sequence of activities was followed in the field for collection of soil samples. The test pits were excavated in arbitrary levels whose thickness was normally 10 cm. All test pits were 1 m² in size. Within each level, a 10 cm² area was left unexcavated until the remainder of the level was completed. This cube was the soil sample for the particular level of the test pit, and its location was the extreme northwest or southwest corner. If a feature was indicated in or near one of these two corners, the other corner was chosen for removal of the soil sample, thus allowing full disclosure of any features. The soil sample cube was prepared after all other level activities (screening, excavating, recording, photographing) had been finished. A clean trowel was used to face all exposed sides of the soil sample before removal. All samples were carefully removed to minimize contamination.

Field notes describing the soil samples and the site's general environmental situation were maintained throughout the project.

Supplementary Investigation Data

The supplementary investigations provided collections of artifacts and eco-facts (e.g., shell, heat-fractured rock, soil samples) that were later subjected to laboratory analysis. Information about hearths and other features was recorded.

Procedures Used in Selecting Sites for Supplementary Investigations

When the intensive survey was completed, 111 sites had been recorded. The next field stage consisted of supplementary investigations. Project needs and resources indicated that about 10% of the sites could be further studied in the field. It was essential that this sample should reflect the entire range of site variability and be representative of the total group of sites. This suggested that the total population of sites be stratified before the 10% sample was drawn, and that the sample be drawn proportionately from each stratum.

During the previous (THC) survey, sites were classified (i.e., the total population [or universe] of sites was stratified) according to their topographic setting. Sites were selected from each class for additional field investigations (Lynn, Fox, and O'Malley 1977). Rather than use only one variable to stratify the population of sites recorded during the CRI survey, we decided to use a large number of both environmental and cultural variables, and to try to do this as objectively as possible.

The archaeological literature describing procedures to sample populations is immense and can be only briefly noted here. The use of research designs based on the principles of probability sampling was established by Rootenberg (1964) and Binford (1964), which led to a wave of archaeological research along these lines. Recent summaries and overviews of archaeological sampling (cf. Flannery 1976; Mueller 1974, 1975) contain detailed information and examples.

Site Variables

After studying the completed TTU and UTSA survey forms and the field notes for the 111 recorded sites, we decided to use 19 variables (site attributes) that we felt could adequately and objectively describe the variability among the sites. These variables and how they were expressed are shown in Table 2.

Site Selection Procedure

The dimensions of variability appear in what is in effect a 111 by 19 matrix, which describes all 111 sites in terms of all 19 variables. This is too cumbersome for effective analysis--we needed a way to reduce these dimensions

TABLE 2. SITE VARIABLES

1. Topographic Setting.

River Floodplain	RFP
River Terrace	RTE
River Valley Wall	RVW
Primary Tributary Floodplain	PTF
Primary Tributary Terrace	PTT
Primary Tributary Valley Wall	PTW
Secondary Tributary Floodplain.	STF
Secondary Tributary Terrace.	STT
Secondary Tributary Valley Wall	STW
Minor Tributary Floodplain	MTF
Minor Tributary Terrace	MTT
Minor Tributary Valley Wall.	MTW
Upland.	UPL

2. Elevation - feet above mean sea level (MSL)

3. Soil Types

Sandy Loam	SLM
Sandy Clay	SCL
Sandy Loam and Sandy Clay plus Gravels	LCG
Calcareous Sandy Clay.	CSC
Calcareous Sandy Loam.	CSL
Calcareous Sandy Loam and Sandy Clay and Gravels.	CSG

TABLE 2. (continued)

Soil Types

Sandy Loam with Gravels	SLG
-----------------------------------	-----

Sandy Clay with Gravels	SCG
-----------------------------------	-----

4. Estimated Distance from Permanent Water

On Site.	01
------------------	----

Within 100 m	02
------------------------	----

100 m - 1 km	03
------------------------	----

Greater than 1 km	04
-----------------------------	----

5. Estimated Distance from Seasonal Water

On Site.	01
------------------	----

100 m	02
-----------------	----

100 m - 1 km	03
------------------------	----

Greater than 1 km	04
-----------------------------	----

6. Estimated Size

100 sq m	01
--------------------	----

150 - 900 sq m	02
--------------------------	----

1050 - 10,500 sq m	03
------------------------------	----

11,000 - 30,000 sq m	04
--------------------------------	----

35,000 - 75,000 sq m	05
--------------------------------	----

100,000 sq m	06
------------------------	----

7. Major Type of Heat-Fractured Rock and Presence of Mussel Shell

Chert	BFT
-----------------	-----

Caliche	BFL
-------------------	-----

Sandstone	BFS
---------------------	-----

TABLE 2. (continued)

Major Type of Heat-Fractured Rock and Presence of Mussel Shell

Chert with Mussel	BTM
Caliche with Mussel.	BLM
Sandstone with Mussel	BSM
Ecofacts Absent	XXX

8. Estimated Flake Type Occurrence

Most Interior	FLI
Most Secondary	FLS
Most Primary	FLP
1/2 Interior 1/2 Secondary	FIS
1/2 Interior 1/2 Primary	FIP
1/2 Secondary 1/2 Primary	FSP

9. Estimated Number of Hearths

None.	01
1 - 5	02
6 - 20	03
21 - 50	04
More than 50	05

10. Estimated Overall Density of Cultural Items

0 - 4 items per sq m	01
5 - 9 per sq m	02
10 - 24 per sq m	03
25 - 49 per sq m	04
50 - 99 per sq m	05
More than 100 per sq m	06

TABLE 2. (continued)

11.	Estimated Percentage of Heat-Fractured Rock	0-100%
	(by 10% intervals)	
12.	Estimated Percentage of Chipped Stone	0-100%
	(by 10% intervals)	
	(Totals of 11. plus 12. must equal 100%)	
13.	Presence of Cores	
	Cores Present	P
	Cores Absent	A
14.	Presence of Thick Bifaces	
	Thick Bifaces Present	P
	Thick Bifaces Absent	A
15.	Presence of Thin Bifaces	
	Thin Bifaces Present	P
	Thin Bifaces Absent	A
16.	Presence of Unifaces	
	Unifaces Present	P
	Unifaces Absent	A
17.	Presence of Ground Stone	
	Ground Stone Present	P
	Ground Stone Absent	A
18.	Presence of Prehistoric Pottery	
	Prehistoric Pottery Present.	P
	Prehistoric Pottery Absent	A

TABLE 2. (continued)

19. Presence of Historic Items

Historic European Materials Present	P
Historic European Materials Absent	A

without losing the range of variability. To do this, a Q-mode factor analysis with principal components was applied to the survey data. We used the Texas Tech University IBM 370 computer and the FACTOR program in the SAS software package (Service 1972). We were assisted by Dr. Stuart H. Pimm of the TTU Biology Department and by programmers and consultants at the TTU Computer Center.

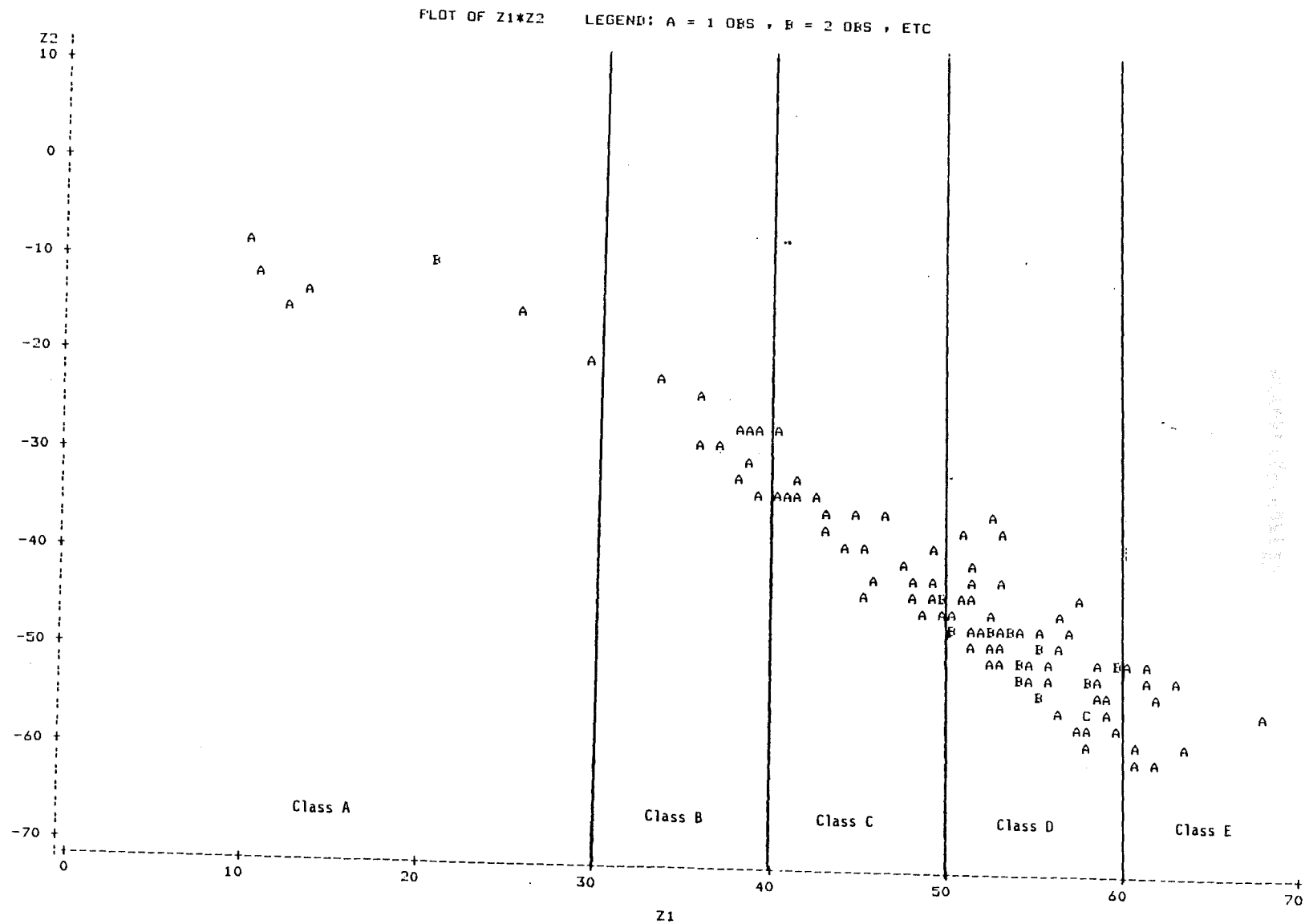
Principal components analysis reduces the dimensions of the variability by producing a small number of factors which represent the majority of the variance in the data set (Doran and Hodson 1975:191). The basic character of the data (sites and site variables) has not been changed; the data have been algebraically transformed to provide a more parsimonious examination of the variation among the sites. The entire range of variation is expressed in a way in which it is more easily visualized and dealt with.

The principal components analysis reduced the matrix of 111 sites by 19 variables into several components. The first two components were used in subsequent procedures because they retained the most variance in the original data. That is, the variation expressed by the 19 variables for each site was transformed into two components which summarized most of the variation. Each site was given a score (called a Z-score) for each of these two components. The sites were plotted on a scattergram (Fig. 7), positioned along the X-axis by their first principal component score (Z1) and along the Y-axis by their second principal component score (Z2).

Site Selection Results

The scattergram (Fig. 7) showed a generally linear relationship with no clear-cut groups or clusters. This linear relationship indicates that the variability among sites is very gradual: difference can be expressed as a series of grades which flow into each other. One way to sample from a linear grouping is to establish arbitrary interval markers along one of the scattergram axes (Dr. Stuart H. Pimm 1977, personal communication). The data were divided into sets along the first component axis (by Z1 scores). Figure 7 shows how five groups were formed. Group A had scores from 0-30; B had scores 30-40; C had scores 40-50; D had scores 50-60; E had scores 60-70. These five groups formed the strata of the total population of sites from which samples could be drawn. The sites in each group are listed in Table 3.

The number of sites in each group was counted. Group A had 8 sites; B had 10; C had 24; D had 59; and E had 10. A 10% sample would consist of a total of 11 sites; these were allocated proportionately to each stratum. Group A had 1 site; B had 1; C had 3; D had 5; and E had 1. These were drawn at random



NOTE: SAS INSTITUTE INC., P.O. BOX 10066, RALEIGH, N.C. 27605
READY

Figure 7 *Grouping the Sites by Topographic Setting and Elevation*

with the following results: 41 LK 152 came from Group A; 41 LK 32 from B; 41 LK 121, 41 LK 183, and 41 LK 199 from C; 41 LK 119, 41 LK 210, 41 LK 159, 41 LK 171, and 41 MC 225 from D; 41 MC 217 from E. These sites would receive supplementary investigation in the field.

It has been demonstrated (cf. Mayer-Oakes and Nash 1965; Flannery 1976; Raab 1977) that if other sites are professionally judged to have unique data potential, they should be added to sites chosen through probability sampling. Four sites, 41 LK 31, 41 MC 201, 41 MC 209, and 41 MC 219, were chosen on this basis and were also scheduled for additional field work, bringing the total to 15 sites. This would have resulted in about a 13% sample of the total population (111) of sites; this percentage did not change appreciably when two more sites were recorded during the second stage of field work, for a total of 113 sites.

TABLE 3. SITES IN EACH GROUP

Group A (9 sites)

41LK123	41LK136	41LK152	41LK197	41MC214
41LK134	41LK140	41LK153	41LK202	

Group B (10 sites)

41LK31	41LK126	41LK148	41LK190	41LK199
41LK32	41LK127	41LK187	41LK198	41MC226

Group C (25 sites)

41LK120	41LK150	41LK170	41LK185	41LK201
41LK121	41LK151	41LK175	41LK186	41MC197
41LK132	41LK163	41LK182	41LK188	41MC199
41LK147	41LK165	41LK183	41LK191	41MC205
41LK149	41LK168	41LK184	41LK195	41MC207

Group D (59 sites)

41LK118	41LK141	41LK162	41LK181	41MC203
41LK119	41LK142	41LK164	41LK189	41MC204
41LK124	41LK143	41LK166	41LK192	41MC206
41LK125	41LK146	41LK167	41LK193	41MC208
41LK128	41LK154	41LK169	41LK194	41MC210
41LK129	41LK155	41LK171	41LK196	41MC211
41LK130	41LK156	41LK172	41LK200	41MC213
41LK131	41LK157	41LK176	41MC196	41MC215
41LK133	41LK158	41LK177	41MC198	41MC216
41LK135	41LK159	41LK178	41MC200	41MC218
41LK137	41LK160	41LK179	41MC201	41MC225
41LK138	41LK161	41LK180	41MC202	

Group E (10 sites)

41LK122	41LK144	41LK173	41MC209	41MC217
41LK139	41LK145	41LK174	41MC212	41MC227

RESULTS OF THE PROJECT

Field and Laboratory Analysis

When the two stages of field work (intensive survey and supplementary investigations) had been completed, all records and collected materials were brought back to the CRI project laboratory at TTU; laboratory analysis and report preparation began.

Information about the 111 sites recorded and the materials observed, but not collected, during the intensive survey (and about the two additional sites recorded during supplementary investigations) was entered on TTU and UTSA survey forms (Appendix I.) and in field notes kept by each crew member. Photos and sketches were also made. Information gained during the survey is presented in Tables 4 and 5 and discussed later in this chapter. Sites are plotted on the survey unit maps (Figs. 3, 4, 5, and 6). The 43 low density artifact scatters located and the five isolated finds collected during the survey are also plotted on these maps. The low density scatters are described in Table 6.

It should be noted that some of the information in Tables 2, 4, and 5 appears as ranges rather than as absolute values. This reflects how it was recorded on the UTSA site survey forms. For example, estimated distances from permanent and seasonal water sources were recorded as being on site, less than 100 m from the site, 100 m to 1 km from the site, or greater than 1 km from the site. It has already been noted (in the preceding chapter in the discussion of survey procedures) that some site attributes listed (in Tables 2, 4, and 5) are based on visual estimates agreed upon by all crew members examining the site.

The supplementary field investigations (surface and/or subsurface testing) of 15 sites yielded site maps and photos; feature forms, drawings, and photos; surface collection unit forms, photos, and collected materials; controlled grab sample records and collected materials; some materials from uncontrolled grab samples from backdirt piles from BOR borrow area head pits; test excavation unit level forms, photos, and excavated materials; and soil and charcoal samples. Specific information about each site is discussed and figures (maps, drawings, photos) noted in the description of each site appear later in this chapter.

The materials collected from each of the 15 sites were treated in various ways. Heat-fractured rock was weighed; mussel and gastropod shells were counted. Lithic artifacts were measured, morphologically described, and separated into like-sized and shaped and other categories (see Table 7). Historic artifacts were described, counted and measured where appropriate, and identified when possible. Other items were appropriately recorded and described. Charcoal samples from sites were sent to UTSA for inclusion in their collection of samples to be radiocarbon tested. Soil samples from sites were sent to Dr. B. L. Allen of the TTU Plant and Soil Science Department for testing.

TABLE 4. CHARACTERISTICS OF ALL RECORDED SITES

Keys to the notation used for topography, soil, distances from permanent and seasonal water, and density of cultural materials appear in Table 2.

Survey units are as follows: 1 - W. W. Walton; 2 - George Morrill; 3 - H. N. Schwartz; 4 - R. T. McDermott; 5 - J. Davidson; and 6 - C. T. Neal.

Vegetational associations are described in the chapter "Environmental Setting."

Site Number	Survey Unit	Veg. Assoc.	Topography	Elev. (ft.)	Soil	Distance from permanent water	Distance from seasonal water	Size (sq m)	Depth (m)	Density
41LK31	3	6	RFP	160	SLM	2	2	2250	3.0	1
41LK32	3	1/6	RFP	165	SLM	3	2	1200	3.0	1
41LK118	1	6	PTT	180	LCG	3	2	150,000	0.5	1
41LK119	1	2/6	PTT	170	LCG	3	2	37,500	1.0	1
41LK120	1	6	RTE	180	LCG	3	3	19,500	0.5	1
41LK121	1	3	RTE	166	LCG	3	2	2975	1.0	1
41LK122	1	6	UPL	190	SLM	3	3	150,000	0.5	1
41LK123	1	3	UPL	200	SLM	3	3	7800	1.5	2
41LK124	1	2/3	STT	166	SLM	4	2	18,000	0.5	1

TABLE 4. (continued)

Site Number	Survey Unit	Veg. Assoc.	Topography	Elev. (ft)	Soil	Distance from permanent water	Distance from seasonal water	Size (sq m)	Depth (m)	Density
41LK125	1	2/3	STT	166	SCL	4	1	6000	0.3	1
41LK126	1	4	UPL	200	SLM	4	3	3150	0.3	2
41LK127	1	2/3	UPL	196	LCG	3	3	11,000	0.5	1
41LK128	1	3	RTE	180	LCG	3	1	350,000	0.5	2
41LK129	1	3	RTE	210	LCG	3	2	16,000	0.2	1
41LK130	1	3/4	STF	200	LCG	4	1	7500	0.2	2
41LK131	1	3	STF	190	LCG	4	1	14,400	0.3	1
41LK132	1	2/3	STT	170	SLM	4	2	4000	1.0	1
41LK133	1	3	STT	210	LCG	4	2	6750	0.3	3
41LK134	1	3	STT	180	LCG	4	2	3750	0.5	1
41LK135	1	2/4	STT	230	LCG	4	2	3000	0.3	1
41LK136	1	3	STW	190	LCG	4	2	3825	0.3	1

TABLE 4. (continued)

Site Number	Survey Unit	Veg. Assoc.	Topography	Elev. (ft)	Soil	Distance from permanent water	Distance from seasonal water	Size (sq m)	Depth (m)	Density
41LK137	1	3	STF	230	SLM	4	2	7500	0.2	1
41LK138	1	4/5	STF	270	CSL	4	2	400	0.5	1
41LK139	1	5	UPL	270	SLM	4	3	120,000	0.3	1
41LK140	1	5	UPL	253	SLM	4	3	750	0.2	3
41LK141	1	3	STF	230	SCL	4	2	3200	.05	1
41LK142	1	3	STT	230	SLM	4	2	9200	1.0	1
41LK143	1	3	STT	170	SCL	4	2	6000	0.5	1
41LK144	1	3	STW	240	LCG	4	3	6000	0.5	2
41LK145	1	5	STT	230	SCL	4	2	600	0.2	1
41LK146	1	2	STT	210	SCL	4	2	675	0.2	1
41LK147	1	2/3	STT	220	LCG	4	2	7500	1.0	1
41LK148	1	2	STF	100	SCL	4	2	3750	0.5	1
41LK149	1	2	STF	210	SCL	4	2	8000	1.0	1
41LK150	1	3	STW	230	SCL	4	2	225	0.5	2

TABLE 4. (continued)

Site Number	Survey Unit	Veg. Assoc.	Topography	Elev. (ft)	Soil	Distance from permanent water	Distance from seasonal water	Size (sq m)	Depth (m)	Density
41LK151	1	5	UPL	240	SCL	4	3	6600	0.3	1
41LK152	1	5	UPL	270	CSG	4	3	100	0.5	2
41LK153	1	5	PTW	190	LCG	4	3	600	0.5	2
41LK154	1	3	PTF	180	SCL	4	2	2925	0.3	1
41LK155	1	3	PTF	180	SCL	4	1	150	0.5	1
41LK156	1	5	UPL	253	SLM	4	3	42,000	0.2	1
41LK157	3	7	MTW	190	SLM	4	3	600	0.2	1
41LK158	3	6	MTW	200	SLM	4	3	15,000	0.3	1
41LK159	3	7	MTW	188	SLM	4	2	20,000	1.0	1
41LK160	3	7	RTE	176	SLM	4	3	100	0.2	1
41LK161	3	6	MTW	184	SLM	4	2	2100	0.3	1
41LK162	3	6	RTE	194	SLM	4	3	1875	0.3	1
41LK163	3	7	RTE	175	SLM	4	2	2000	0.3	1

TABLE 4. (continued)

Site Number	Survey Unit	Veg. Assoc.	Topography	Elev. (ft)	Soil	Distance from permanent water	Distance from seasonal water	Size (sq m)	Depth (m)	Density
41LK164	3	6	MTW	184	SLM	4	2	300	0.3	1
41LK165	3	3	MTW	195	SLM	4	3	450	0.3	1
41LK166	3	3	MTW	194	SLM	4	3	7200	0.3	1
41LK167	3	6/7	MTW	204	SLM	4	3	100	0.3	1
41LK168	3	7	MTW	182	SLM	4	2	16,650	0.5	1
41LK169	3	3/6	UPL	200	SLM	4	3	200	0.3	1
41LK170	3	7	UPL	190	SLM	4	2	5	0.5	1
41LK171	3	7	MTT	185	SLM	4	2	9600	0.3	1
41LK172	3	6	MTT	190	SLM	4	2	5	0.3	1
41LK173	3	7	RVW	220	LCG	4	4	250,000	0.2	1
41LK174	3	7	RVW	225	LCG	4	4	75,000	0.3	1
41LK175	3	7	MTW	202	SLM	4	3	7500	0.5	1
41LK176	3	3/7	RVW	210	LCG	4	2	2500	0.3	1
41LK177	3	7/3	RVW	215	CSL	4	2	200	0.2	1

TABLE 4. (continued)

Site Number	Survey Unit	Veg. Assoc.	Topography	Elev. (ft)	Soil	Distance from permanent water	Distance from seasonal water	Size (sq m)	Depth (m)	Density
41LK178	3	3	RVW	228	LCG	4	1	8100	0.2	1
41LK179	3	7	RVW	208	CSG	4	2	500	0.2	1
41LK180	3	3/7	RVW	228	SLG	4	3	7800	0.2	1
41LK181	3	3/7	RVW	218	CSL	4	1	9900	0.2	1
41LK182	3	7	MTT	194	SLM	4	1	30,000	0.5	2
41LK183	3	7	MTW	188	SLM	4	3	450	0.3	1
41LK184	3	7	MTW	184	SLM	4	2	17,000	0.3	1
41LK185	3	7	MTW	180	SLM	4	2	2400	0.3	2
41LK186	3	3	MTW	195	SLM	4	3	3500	0.5	1
41LK187	4	3	MTT	210	SLG	4	2	2000	0.2	1
41LK188	4	3	MTT	200	CSG	4	3	25	0.2	1
41LK189	4	3	MTT	195	LCG	4	3	8000	0.2	1
41LK190	4	3	MTT	203	SLM	4	3	2400	0.2	1

TABLE 4. (continued)

Site Number	Survey Unit	Veg. Assoc.	Topography	Elev. (ft)	Soil	Distance from permanent water	Distance from seasonal water	Size (sq m)	Depth (m)	Density
41LK191	4	3	UPL	218	SLM	4	3	5500	0.3	1
41LK192	4	3	RVW	231	SLM	4	2	9900	0.2	1
41LK193	5	3	RVW	230	SCL	4	2	16,000	0.2	1
41LK194	5	3/7	MTT	208	CSL	4	3	30,000	0.5	2
41LK195	3	8	RFP	168	SCL	3	3	4000	1.5	1
41LK196	3	8	RFP	170	SCL	3	3	9900	1.5	1
41LK197	3	3	RFP	165	SLM	3	2	8750	0.25	3
41LK198	3	6/7	RFP	165	SLM	4	1	11,000	1.5	1
41LK199	3	6	RTE	180	SLG	3	2	56,250	1.5	1
41LK200	3	7	MTF	164	SCL	4	3	12,000	0.3	1
41LK201	3	1/8	RFP	165	SLM	4	1	24,900	1.5	1
41LK202	3	1	RFP	160	SLM	1	1	500	0.50	1

TABLE 4. (continued)

Site Number	Survey Unit	Veg. Assoc.	Topography	Elev. (ft)	Soil	Distance from permanent water	Distance from seasonal water	Size (sq m)	Depth (m)	Density
41MC196	2	7	PTT	200	SLM	2	2	385,000	1.0	1
41MC197	2	3	STT	230	SLM	3	1	1400	1.0	1
41MC198	2	3	STF	220	SCL	4	1	3000	0.2	1
41MC199	2	2/3	STF	220	SLM	4	1	900	1.0	1
41MC200	2	2	STT	220	LCG	3	1	20,000	1.0	1
41MC201	2	2/3	STT	210	SLM	2	2	50,000	1.0	2
41MC202	2	2/3	STT	215	SLM	3	2	60,000	1.0	2
41MC203	2	7	PTT	210	SLM	2	2	262,500	1.0	2
41MC204	2	3	PTT	205	SLM	2	2	15,750	1.0	2
41MC205	2	3	STT	220	SLM	4	1	2800	0.3	2
41MC206	2	3	PTT	205	LCG	2	1	200	0.3	2
41MC207	2	2/3	PTT	210	SLM	2	1	4200	1.0	1
41MC208	2	3	STT	230	LCG	3	1	7500	0.3	1
41MC209	2	2/3	STT	230	CSG	2	1	120,000	0.3	3

TABLE 4. (continued)

Site Number	Survey Unit	Veg. Assoc.	Topography	Elev. (ft)	Soil	Distance from permanent water	Distance from seasonal water	Size (sq m)	Depth (m)	Density
41MC210	2	3	PTT	225	SLM	3	2	1050	0.3	1
41MC211	2	7	PTT	230	SLM	3	3	38,400	0.2	1
41MC212	2	3	PTT	231	LCG	3	1	40,000	0.3	2
41MC213	2	3	STT	230	LCG	3	1	10,500	0.5	2
41MC214	2	3	UPL	225	LCG	2	2	35,000	0.25	1
41MC215	2	3	PTT	210	SLM	2	1	7200	0.5	2
41MC216	2	3/2	STT	230	LCG	3	2	400	0.2	1
41MC217	2	3	STT	230	SLM	3	2	1200	0.3	1
41MC218	2	2/3	PTT	210	LCG	2	2	9100	1.0	2
41MC225	6	6	PTT	230	SLM	3	3	100	1.0	1
41MC226	6	6	RTE	230	SLG	3	3	12,000	0.5	1
41MC227	6	6	RTE	221	SLG	3	3	25	0.2	1

TABLE 5. CULTURAL MATERIALS AT ALL RECORDED SITES

Keys to the notations used in this table appear in Table 2. P = Present; A = Absent.

Site Number	HFR /M	Flakes	# Hearths	% HFR	% CS	Cores	Thick Bifaces	Thin Bifaces	Uni-faces	Ground Stone	Abo Pottery	Historic Items
41LK31	BTM	FLI	2	30	70	P	A	P	A	A	A	A
41LK32	BTM	FLI	2	40	60	P	A	A	A	A	A	A
41LK118	BTM	FLS	4	60	40	P	A	P	A	A	A	A
41LK119	BTM	FLS	3	70	30	P	P	A	A	A	A	A
41LK120	BTM	FLS	3	60	40	P	P	A	P	A	A	A
41LK121	BTM	FLS	2	50	50	A	A	P	A	A	A	A
41LK122	BTM	FLI	4	90	10	P	A	A	A	A	A	A
41LK123	XXX	XXX	2	0	0	A	A	A	A	A	A	P
41LK124	BFT	FLS	4	70	30	A	A	P	A	A	A	A
41LK125	BFT	FLS	3	80	20	P	A	A	A	A	A	A
41LK126	BTM	FLS	2	40	60	A	A	P	A	A	A	A

TABLE 5. (continued)

Site Number	HFR /M ²	Flakes	# Hearths	% HFR	% CS	Cores	Thick Bifaces	Thin Bifaces	Uni-faces	Ground Stone	Abo Pottery	Historic Items
41LK127	BTM	FLP	2	30	70	P	P	A	A	A	A	A
41LK128	BTM	FLS	5	60	40	P	P	P	A	P	A	A
41LK129	BTM	FLS	2	70	30	P	A	A	A	A	A	A
41LK130	BFT	FLP	2	70	30	P	A	A	A	A	A	A
41LK131	BFT	FLS	2	70	30	P	A	A	A	A	A	A
41LK132	BFT	FLI	2	60	40	A	A	P	A	A	A	A
41LK133	BTM	FLS	3	60	40	P	P	P	A	P	A	A
41LK134	XXX	FLS	1	0	100	P	P	A	A	A	A	A
41LK135	BFT	FLS	2	70	30	P	A	A	A	A	A	A
41LK136	XXX	FLS	1	0	100	P	A	A	A	A	A	A
41LK137	BFT	FLP	2	70	30	P	A	A	A	A	A	A
41LK138	BFT	FLP	2	70	30	P	A	A	A	A	A	A
41LK139	BFT	FLS	4	80	20	P	A	A	A	A	A	A

TABLE 5. (continued)

Site Number	HFR /M	Flakes	# Hearths	% HFR	% CS	Cores	Thick Bifaces	Thin Bifaces	Uni-faces	Ground Stone	Abo Pottery	Historic Items
41LK140	XXX	XXX	1	0	0	A	A	A	A	A	A	P
41LK141	BFT	FLS	2	70	30	P	A	P	A	A	A	A
41LK142	BFT	FLS	3	60	40	P	P	P	A	A	A	A
41LK143	BTM	FLS	2	70	30	P	P	A	A	A	A	A
41LK144	BTM	FLS	3	90	10	P	A	A	A	A	A	A
41LK145	BFT	FLS	2	90	10	A	A	A	A	A	A	A
41LK146	BFT	FLP	2	80	20	A	P	A	A	A	A	A
41LK147	BFT	FLS	2	40	60	P	A	A	A	A	A	A
41LK148	BFT	FIS	2	40	60	P	A	A	A	A	A	A
41LK149	BFT	FLS	2	50	50	A	P	A	P	A	A	A
41LK150	BFT	FLS	2	40	60	P	P	P	A	A	A	A
41LK151	BFT	FLS	2	60	40	P	A	A	A	A	A	A
41LK152	BFT	FLP	2	10	90	P	P	A	A	A	A	A

TABLE 5. (continued)

Site Number	HFR /M	Flakes	# Hearths	% HFR	% CS	Cores	Thick Bifaces	Thin Bifaces	Uni- faces	Ground Stone	Abo Pottery	Historic Items
41LK153	BFT	FLP	2	10	90	P	P	A	A	A	A	A
41LK154	BFT	FLS	2	90	10	A	A	A	A	A	A	A
41LK155	BFT	FLS	2	80	20	A	A	A	A	A	A	A
41LK156	BFT	FLS	3	70	30	P	A	A	A	A	A	A
41LK157	BFT	FLI	2	80	20	P	A	A	A	A	A	A
41LK158	BFT	FLI	3	70	30	P	A	P	A	A	A	A
41LK159	BTM	FLS	3	80	20	P	A	P	A	A	A	P
41LK160	BFT	FLS	2	90	10	A	A	A	A	A	A	A
41LK161	BFT	FLS	2	80	20	P	A	A	A	A	A	A
41LK162	BFT	FLI	2	90	10	P	A	A	A	A	A	A
41LK163	BFL	FLI	2	50	50	A	A	A	A	A	A	P
41LK164	BFT	FLS	2	90	10	A	A	A	A	A	A	A
41LK165	BFT	FLI	2	70	30	A	A	A	P	A	A	A
41LK166	BFT	FLI	2	70	30	A	A	A	P	A	A	A

TABLE 5. (continued)

Site Number	HFR /M	Flakes	# Hearths	% HFR	% CS	Cores	Thick Bifaces	Thin Bifaces	Uni- faces	Ground Stone	Abo Pottery	Historic Items
41LK167	BFT	FLI	2	90	10	P	A	P	A	A	A	A
41LK168	BFT	FLI	2	70	30	P	A	A	A	A	A	P
41LK169	BFL	FLI	2	90	10	A	A	A	A	A	A	A
41LK170	BFL	FLI	2	70	30	A	A	A	A	A	A	A
41LK171	BLM	FLS	3	80	20	P	A	P	A	A	A	A
41LK172	BFT	FLS	2	90	10	A	A	A	A	A	A	A
41LK173	BFT	FLS	5	80	20	P	P	P	A	A	A	A
41LK174	BFT	FLS	5	80	20	P	P	P	A	A	A	A
41LK175	BFT	FLI	3	60	40	P	P	A	A	A	A	A
41LK176	BFT	FLI	4	70	30	P	P	P	P	P	P	A
41LK177	BFT	FLP	2	70	30	P	A	A	A	A	A	A
41LK178	BFT	FLI	2	80	20	P	P	A	A	P	A	A
41LK179	BFT	FLS	2	70	30	P	P	A	A	A	A	A

TABLE 5. (continued)

Site Number	HFR /M	Flakes	# Hearths	% HFR	% CS	Cores	Thick Bifaces	Thin Bifaces	Uni-faces	Ground Stone	Abo Pottery	Historic Items
41LK180	BLM	FLI	2	80	20	P	P	A	A	P	A	A
41LK181	BFT	FLS	2	80	20	A	P	P	A	P	A	A
41LK182	BFT	FLS	4	50	50	P	P	P	P	P	A	A
41LK183	BFT	FLI	2	60	40	P	A	A	P	A	A	A
41LK184	BFT	FLI	3	60	40	P	A	A	A	A	A	A
41LK185	BFT	FLS	2	50	50	P	A	P	A	P	A	A
41LK186	BFT	FLS	2	50	50	P	A	P	A	A	A	A
41LK187	BFT	FLS	2	30	70	P	P	A	A	A	A	A
41LK188	BFT	FLI	1	60	40	A	A	A	A	A	A	A
41LK189	BFT	FLI	2	70	30	P	A	A	A	A	A	A
41LK190	BFT	FLI	2	40	60	A	A	A	A	A	A	A
41LK191	BTM	FLI	3	50	50	A	A	P	P	A	A	A
41LK192	BFL	FLI	3	60	40	P	P	P	P	P	A	A
41LK193	BFT	FIS	5	70	30	P	A	P	A	P	A	A

TABLE 5. (continued)

Site Number	HFR /M	Flakes	# Hearths	% HFR	% CS	Cores	Thick Bifaces	Thin Bifaces	Uni-faces	Ground Stone	Abo Pottery	Historic Items
41LK194	BLM	FLS	3	70	30	P	A	P	A	A	A	A
41LK195	BTM	FLI	2	70	30	A	A	P	A	A	A	A
41LK196	BFT	FLI	2	90	10	P	A	P	A	A	A	A
41LK197	XXX	XXX	1	0	0	A	A	A	A	A	A	P
41LK198	BTM	FLI	3	40	60	P	A	P	A	A	A	A
41LK199	BFT	FLI	2	40	60	P	A	P	A	A	A	P
41LK200	BFT	FLI	2	90	10	P	A	A	A	A	A	A
41LK201	BTM	FLI	4	40	60	P	A	P	A	P	A	A
41LK202	XXX	XXX	1	0	0	A	A	A	A	A	A	P
41MC196	BTM	FLI	5	60	40	P	P	P	P	P	A	A
41MC197	BFS	FLS	2	60	40	P	A	A	A	A	A	A
41MC198	BFT	FLS	2	70	30	A	A	A	A	A	A	A
41MC199	BFT	FLP	2	60	40	P	A	A	A	A	A	A

TABLE 5. (continued)

Site Number	HFR /M	Flakes	# Hearths	% HFR	% CS	Cores	Thick Bifaces	Thin Bifaces	Uni- faces	Ground Stone	Abo Pottery	Historic Items
41MC200	BFT	FLS	3	70	30	P	A	A	A	A	A	A
41MC201	BFS	FLI	5	80	20	P	A	A	A	A	A	A
41MC202	BFT	FLI	3	70	30	P	A	A	A	A	A	A
41MC203	BFT	FLI	5	70	30	P	P	P	P	P	A	A
41MC204	BFT	FLI	4	80	20	P	A	P	A	A	A	A
41MC205	BFT	FLS	2	40	60	P	P	P	A	A	A	A
41MC206	BTM	FLS	2	70	30	P	A	A	A	P	A	A
41MC207	BFT	FLS	3	60	40	P	A	A	A	A	A	A
41MC208	BFT	FLI	3	80	20	P	A	A	A	A	A	A
41MC209	BSM	FLI	5	90	10	P	P	P	P	P	A	A
41MC210	BFT	FLS	2	70	30	P	A	A	A	A	A	A
41MC211	BFS	FLS	3	70	30	P	P	A	A	A	A	A
41MC212	BFT	FLS	5	80	20	P	P	P	P	A	A	A
41MC213	BFT	FLS	3	70	30	P	P	P	A	A	A	A

TABLE 5. (continued)

Site Number	HFR /M	Flakes	# Hearths	% HFR	% CS	Cores	Thick Bifaces	Thin Bifaces	Uni- faces	Ground Stone	Abo Pottery	Historic Items
41MC214	XXX	XXX	1	0	0	A	A	A	A	A	A	P
41MC215	BFS	FLS	4	80	20	P	P	P	A	A	A	A
41MC216	BFT	FLS	2	80	20	P	A	A	A	A	A	A
41MC217	BFT	FLS	2	90	10	P	A	A	A	A	A	A
41MC218	BFS	FLI	3	60	40	P	P	P	A	P	A	A
41MC225	BFS	FLI	3	70	30	A	A	A	A	P	A	A
41MC226	BFT	FLI	2	30	70	P	P	P	A	A	A	A
41MC227	BFT	FLI	2	90	10	P	A	A	A	P	A	A

TABLE 6. LOW DENSITY ARTIFACT SCATTERS (LDS)

Number	Topography	Associated Sites	Size	Description
1	gravel ridge	41LK119	450 x 280 m	cortex flakes; cores
2	ridge ends and slopes	41LK129	575 x 250 m	heat-fractured rock; chipped stone debitage
3	gravel covered ridges	41LK130	675 x 250 m	quarry debris incl. cores, cortex flakes
4	gravel ridge tops and slopes	41LK140 41LK156	2750 x 325 m	very thin scatter; heat-fractured rock
5	ridge tops and slopes	41LK151 41LK152	950 x 450 m	quarry debris incl. tested cores and cortex flakes
6	gravel covered ridge slopes	41MC196	280 x 200 m	chipped stone quarry debris
7	gravel covered ridge slopes	41MC196 LDS 6	625 x 125 m	chipped stone quarry debris
8	north slope of gravel covered ridge overlooking secondary tributary	41MC198	1000 x 150 m	chipped stone quarry debris
9	south slope as in LDS 8	41MC198	500 x 100 m	chipped stone quarry debris

TABLE 6. (continued)

Number	Topography	Associated Sites	Size	Description
10	along secondary tributary	41MC197	175 x 75 m	heat-fractured rock; chipped stone debitage
11	gravel bar-like feature in floodplain of Opossum creek	41MC196 41MC206	475 x 200 m	chipped stone quarry debris
12	eroded secondary tributary terrace	41MC210	125 x 125 m	heat-fractured sandstone; a few pieces of chipped stone debitage
13	gravel ridge top and slopes	41MC214	275 x 250 m	chipped stone quarry debris
14	gravel ridge top and slopes overlooking Opossum creek and a secondary tributary	41MC206	700 x 275 m	chipped stone quarry debris; some heat-fractured rock
15	cleared field of bermuda grass	41LK158	475 x 250 m	heat-fractured rock; chipped stone debitage
16	top of a low ridge	41LK163 41LK165	250 x 250 m	heat-fractured chert; some chipped stone debitage
17	cleared area on a low ridge top	41LK167	275 x 75 m	heat-fractured rock; chipped stone debris
18	bermuda grass pasture	41LK169	900 x 425 m	heat-fractured chert and caliche; chipped stone debris; core; thick biface

TABLE 6. (continued)

Number	Topography	Associated Sites	Size	Description
19	minor tributary terrace	41LK171	10 x 10 m	heat-fractured caliche
20	low ridge extending from south wall of Frio river valley	41LK173	1050 x 375 m	quarry debris
21	near minor tributary	41LK176	225 x 125 m	heat-fractured rock; some chipped stone debitage
22	base of south wall of Frio river valley	41LK177 41LK181		heat-fractured chert and caliche; some chipped stone debitage
23	lower slopes of south wall of Frio river valley	41LK159 41LK173 41LK174	900 x 400 m	heat-fractured rock; chipped stone debitage; thick biface; core
24	near minor tributary	41LK182	150 x 125 m	heat-fractured rock; chipped stone debitage
25	south wall of Frio river valley, extending north	41LK187 41LK188	925 x 550 m	heat-fractured rock; chipped stone debitage
26	high ridge extending from south wall of Frio river valley	41LK191	925 x 600 m	quarry debris incl. cores, thick bifaces, cortex flakes; some heat-fractured rock; some interior flakes

TABLE 6. (continued)

Number	Topography	Associated Sites	Size	Description
27	south wall of Frio river valley		850 x 450 m	quarry debris; some heat-fractured rock
28	south wall of Frio river valley	41LK193	150 x 100 m	quarry debris; some heat-fractured rock
29	near minor tributary	41LK193	75 x 75 m	heat-fractured rock; chipped stone debitage
30	along minor tributary	41LK193	175 x 125 m	heat-fractured rock; chipped stone debitage
31	along minor tributary, below south wall of Frio river valley	41LK193 41LK194	125 x 75 m	heat-fractured rock; chipped stone debitage
32	along and below south wall of Frio river valley	41LK194	400 x 150 m	heat-fractured rock; chipped stone debitage
33	adjacent to meander scar in south part of flood- plain of Frio river	41LK195	500 x 175 m	heat-fractured chert and caliche; cores; flakes
34	adjacent to meander scar in south part of flood- plain of Frio river	41LK196	375 x 175 m	heat-fractured chert and caliche; flakes; cores

TABLE 6. (continued)

Number	Topography	Associated Sites	Size	Description
35	south part of Frio river floodplain	41LK197 (near 41LK37 recorded by Coastal Bend A.S.)	625 x 200 m	heat-fractured caliche and sandstone
36	adjacent to meander scar lake in south part of Frio river floodplain	41LK197	350 x 150 m	heat-fractured chert; chipped stone debitage
37	edge of meander scar in Frio river floodplain	41LK159	50 x 40 m	heat-fractured chert; flakes; mussel shells; incised sandstone
38	sandy low ridge south of the Frio river floodplain	41LK199	200 x 100 m	heat-fractured rock; chipped stone debitage; large sandstone chunks
39	along south bank of Frio river	41LK31 41LK202	150 x 50 m	sandstone chunks
40	low ridge extending into south part of Frio river floodplain	41LK199	300 x 150 m	heat-fractured rock; chipped stone debitage
41	gravel ridge slopes, adjacent to southern part of Frio river floodplain	41LK200	175 x 100 m	quarry debris

TABLE 6. (continued)

Number	Topography	Associated Sites	Size	Description
42	low gravel ridge and its slopes	41LK199	350 x 75 m	heat-fractured rock; chipped stone debitage
43	south part of Frio river floodplain	41LK201	400 x 250 m	heat-fractured rock; chipped stone; mussel shell

TABLE 7. GENERAL CLASSIFICATION OF COLLECTED ABORIGINAL MATERIALS

I. Lithic Materials (3463 specimens)

A. Chipped Stone (1337)

1. Cores (120)
 - a. Tested Cores (23)
 - b. Unidirectional Cores (26)
 - c. Multidirectional, Prepared Platform Cores (58)
 - d. Secondary Cores (13)
2. Trimmed Artifacts (44)
 - a. Trimmed Cobbles (10)
 - b. Trimmed Flakes (21)
 - (1) Unifacially Trimmed (14)
 - (2) Bifacially Trimmed (7)
 - c. Trimmed Chips (13)
3. Unifacial Artifacts (7)
 - a. Complete Unifaces (3)
 - b. Incomplete Unifaces (4)
4. Bifacial Artifacts (109)
 - a. Thick Bifaces (49)
 - (1) Ovate/Ovoid (19)
 - (2) Rounded End (14)
 - (3) Beveled End (2)
 - (4) Round (8)
 - (5) Small (6)
 - b. Thin Bifaces (41)
 - (1) Wide (9)
 - (2) Trianguloid (8)
 - (3) Trianguloid Beveled (5)
 - (4) Rectanguloid (3)
 - (5) Elongated (5)
 - (6) Concave Base (2)
 - (7) Rounded End (4)
 - (8) Pointed End (5)
 - c. Projectile Pointlike Bifaces (10)
 - (1) *Dart* (1)
 - (2) *Edgewood/Enson* (3)
 - (3) *Gary* (1)
 - (4) *Frio* (1)
 - (5) *Pedernales* (2)
 - (6) *Angostura* (1)
 - (7) *Perdiz* (1)
 - d. Miscellaneous Bifaces (10)
5. Debitage (1056)
 - a. Flakes (571)
 - b. Chips (457)
 - c. Shatter (29)

TABLE 7. (continued)

- B. Ground Stone (16)
 - 1. Grinding Stones (4)
 - 2. Grinding Slabs (5)
 - 3. Incised (4)
 - 4. Indeterminate (3)
- C. Hammerstones (5)
- D. Heat-Fractured Rock (2049)
- E. Other Lithic Material
 - 1. Split Cobbles (10)
 - 2. Altered Gravels (4)
 - 3. Petrified Wood (5)
 - 4. Unaltered Sandstone (19)
 - 5. Unaltered Gravels and Cobbles (18)
- II. Other Materials
 - A. Ceramics (1)
 - B. Burned Clay (7)
 - C. Faunal Remains
 - 1. Bone (15)
 - 2. Mussel Shell (84)
 - 3. Gastropod Shell (324)
 - D. Miscellaneous (4)

Two basic questions were asked about the soil samples: 1) Do chemical soil constituents such as pH and phosphorus indicate prehistoric cultural activity? (cf. Ahler 1971; Gunn and Mahula 1977) and 2) What were the depositional histories at the tested sites? Four chemical components of soils were quantified during the laboratory analyses. They were hydrogen-ion level (pH), percentage of organic matter (OM), percentage of calcium carbonate (CaCO_3), and the concentration (in parts per million) of total phosphate (P_2O_5). Results are presented and discussed in the site descriptions.

Lithic manufacturing processes were suggested. Observations resulting from microscopic study of edge damage, using (Ahler 1971) and Tringham *et al.* (1974) as guides, are presented. Readers should consult Tringham *et al.* (1974) for interpretations of the edge damage and use-wear data presented in this report. In order to test the comparability of published edge damage descriptions to our project materials, we conducted some brief experiments. Cherts from south Texas were chipped into bifaces and used to cut and scrape soft wood; in all cases the edge damage (under microscopic examination) was similar to that described by Tringham (*ibid.*). Flakes were also used for cutting and scraping soft wood; like results were obtained. Each of the experimental tools was used 100 times to cut or scrape.

The remainder of this chapter will present the results of the project as follows. First, the materials collected during the supplementary field investigations and analyzed in the laboratory will be described. Second, the 15 sites from which these materials were collected will be described. Third, information gained from all cultural resources documented in the study area will be presented and discussed in an attempt to synthesize the most significant descriptive information. Most of the collected materials are the products and by-products of aboriginal activities in the Choke Canyon Reservoir area. Most of these items are of stone, bone, or shell. Table 7 presents our general classification scheme and numbers of items in each category.

Lithic Materials (3463 specimens)

The most common lithic resource material in the reservoir area is a grainy brown or gray chert, occurring as cobbles. The grains are easily seen without the aid of a microscope; the color generally varies from a light tan to a dark gray; inclusions frequently occur. Finer grained and different colored local cherts are present but less common. Sometimes these cherts have a reddish or pinkish color, a waxy or greasy luster, and often numerous tiny fracture lines and spalls; these materials have probably been modified by heat (Hester and Collins 1974:221). Described specimens are of these local cherts unless otherwise noted. Where heat treating occurred, it is noted.

In our analysis, lithic materials are first differentiated by the major type of modification they have undergone, i e., chipped, ground, and heat-fractured.

Chipped Stone (1337 specimens)

In general, we have taken a traditional approach and divided chipped stone artifacts into morpho-technological classes. A similar approach was taken by Lynn, Fox, and O'Malley (1977) in their description of artifacts previously recovered from the reservoir area.

Artifact outline shape is described in conventional terms, as is cross section. Transverse cross sections are used unless otherwise stated. Edge angles are arbitrarily defined: low edge angles are less than 40°.

Basic categories used for chipped stone artifacts are cores, trimmed artifacts, unifaces, bifaces (including projectile points), and debitage (including flakes, chips, and shatter). Some of these categories are subdivided further on the basis of attributes such as size, shape, platform, and cortex. The range of sizes for each subcategory is given in the descriptions.

Most artifact categories are illustrated by a photograph of at least one specimen. The artifacts were coated with ammonium chloride before photographing in order to allow effective photography of details of flake scars.

CORES (120 specimens; Table 8)

Cores are lithic materials which have had one or more flakes removed through the intentional human application of force. Lithic raw materials used as cores must fracture conchoidally to produce the desired end results. Such materials (e.g., chert) are abundant and easily obtained within the Choke Canyon Reservoir area.

The following classification and description of cores is based on the number of flake removals, the direction of the flake removals, the type of platforms used for the detachment of flakes, and the size of the core.

Tested Cores (23 specimens)

These artifacts were flaked only a few times and then discarded. After initial exploration by flaking, they were presumably deemed unsuitable for further reduction activities. Shape is ovoid. Flakes were removed from unprepared (cortex) platforms.

Of the collected tested cores, 76.2% were recovered from the surface of one site, 41 LK 152. This particular site probably functioned as a quarry area, where the initial core reduction activities were performed with regularity.

Specimens 1-6: Six specimens (Fig. 8,a) exhibit a single flake removal. Most of the flake scars are quite large with prominent negative bulbs of force remaining on the core. Size ranges are: length 98.00-200.00 mm, width 77.05-145.00 mm, thickness 45.80-115.00 mm, weight 396.4-3005.1 gm.

Specimens 7-23: Seventeen specimens (Fig. 8,b) exhibit two to four flake removals. Three specimens indicate heat treatment. Size ranges are: length 62.15-175.00 mm, width 54.75-116.75 mm, thickness 31.10-102.70 mm, weight 216.3-1777.7 gm.

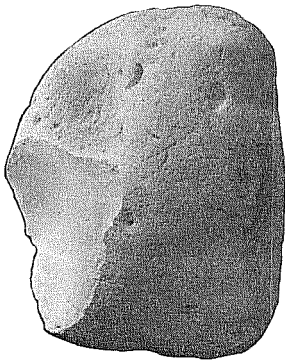
Unidirectional Cores (26 specimens)

Cortex Platform (14 specimens)

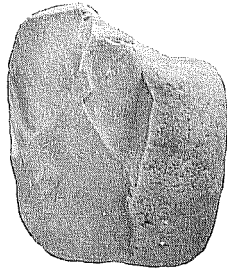
These cores (Fig. 8,e) are generally tabular in shape and oval in outline. Flakes were struck primarily in one direction, using a cortex-covered edge as a platform for the flake removals. The result of such a reduction process is a pyramid-shaped core, with the point of the pyramid being the flake termination area. This point may still exhibit the original cortex of the core. The base of the pyramid will be the flat face of the core which is still covered with cortex, whose edges were used as platforms for flake removals.

Most of these specimens have undergone a symmetrical reduction sequence. Flakes have been removed from the cortex-covered edge at almost all possible points along the core edge. Several specimens exhibit flake scars which run up the cortex face of the core. These few flake scars (generally one or two per core) are not considered to be the primary intended flake removal, since so few flake scars are involved. Two specimens exhibit large flake scars on one face which indicate previous and now obscured attempts to flake the core from another

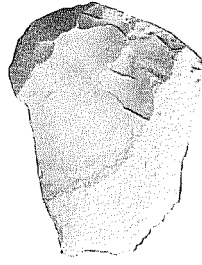
Figure 8. *Lithic Artifacts: Cores, Trimmed Cobbles, Flakes, and Chips.*
a, tested core, Specimens 1-6; b, tested core, Specimens 7-23; c, secondary core; d, unidirectional core, prepared platform; e, unidirectional core, cortex platform; f, multidirectional core, prepared platform, Specimens 1-18; g, multidirectional core, prepared platform, Specimens 19-41; h, multidirectional core, prepared platform, Specimens 42-58; i, trimmed cobble, Specimens 8-10; j, trimmed cobble, Specimens 1-3; k, trimmed cobble, Specimens 4-7; l, unifacially trimmed flake, Specimens 1-3; m, unifacially trimmed flake, Specimens 4-5; n, unifacially trimmed flake, Specimens 6-13; o, unifacially trimmed flake, Specimen 14; p, bifacially trimmed flake; q, trimmed chip, Specimens 1-9; r, trimmed chip, Specimens 10-13.



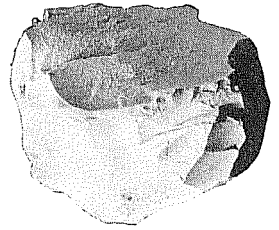
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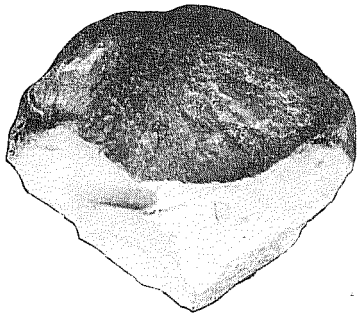
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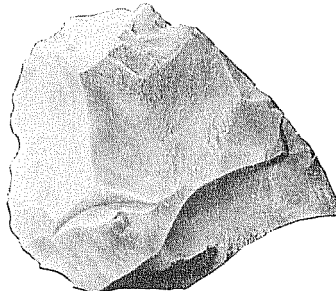
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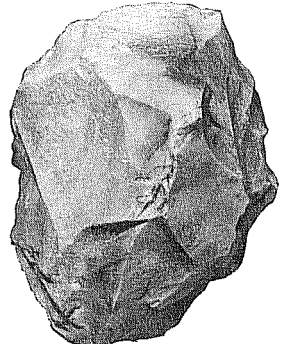
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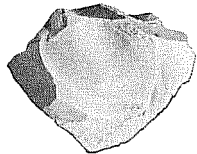
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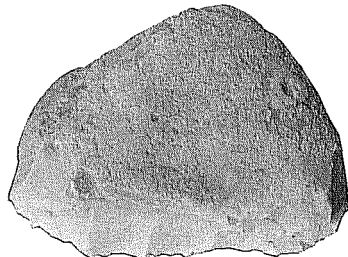
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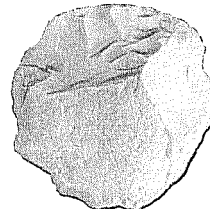
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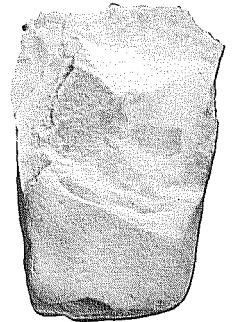
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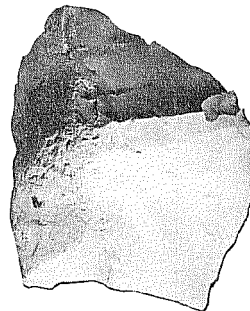
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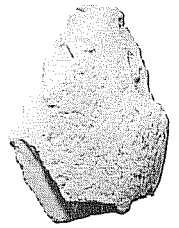
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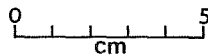


TABLE 8. CORES

Site Number	Tested	Unidirectional Cortex Platform	Unidirectional Prepared Platform	Multidirectional Prepared Platform	Secondary
41LK31	1	1	1		
41LK32	2		1	1	2
41LK121	1	2	1	5	1
41LK152	18	4	3	10	4
41LK159				7	
41LK171				6	1
41LK181		3		7	2
41LK183			1	3	
41MC199		2		1	1
41MC201		2	4	9	2
41MC209	1			5	
41MC210				1	
41MC214					
41MC217			1	2	
41MC225				1	

direction. One specimen retains old cortex at the flake termination point on the (generally) noncortex face of the core. This cortex is unlike the cortex on the opposite face, and may indicate that a split cobble was utilized as a core. One specimen appears to have been heat treated and exhibits a battered end. It probably also functioned as a hammerstone. Heat treatment may have caused the yellowish red color of another specimen. Size ranges are: length 49.50-124.85 mm, width 34.75-101.95 mm, thickness 16.85-68.05 mm, weight 28.8-1034.7 gm.

Prepared Platform (12 specimens)

These cores (Fig. 8,d) are generally nodular and exhibit irregular outlines. All of these cores retain a large flake scar which provided a prepared platform for the subsequent unidirectional removal of flakes. In most specimens, the flake removals and the platform flake scar are almost perpendicular to each other. Several of the larger specimens have more than one platform preparation flake scar. Most of the specimens included in this core category retain at least 50% of the original cortex. One specimen is petrified wood. Size ranges are: length 28.25-112.40 mm, width 26.90-84.05 mm, thickness 26.00-69.05 mm, weight 30.0-706.4 gm.

Multidirectional Prepared Platform Cores (58 specimens)

These are characterized by the removal of flakes in at least two different directions. Flake removals were made from platforms which had been prepared by the prior removal of at least one large flake. A few specimens also use unprepared platforms in addition to prepared platforms, but these occurrences are relatively infrequent.

Specimens 1-18: Eighteen specimens (Fig. 8,b) have been reduced by means of flake removals in two different directions, using (for the most part) prepared platforms. Both tabular and ovate forms were recorded. The amount of cortex remaining on these cores ranges from about 50% to about 10%. One specimen is flaked primarily in one direction, but flaking in another direction occurs frequently enough to consider it as a bidirectional prepared platform core. One specimen was of petrified wood. Size ranges are: length 65.50-111.30 mm, width 40.30-100.80 mm, thickness 21.95-87.10 mm, weight 87.2-931.6 gm.

Specimens 19-41: Twenty-two specimens are characterized by flake removals in more than two distinct directions. The vast majority of these flake removals are made from platforms which have been prepared by the previous removal of one or more flakes. Cortex remaining on these items ranges from about 50% to about 20%. There is extensive variability in size, shape, and color. Both ovoid and tabular shapes occur in this subcategory, with oval, rectangular, and irregular outlines. One specimen is of petrified wood. Two specimens have been heat treated. Size ranges are: length 52.60-119.5 mm, width 35.50-91.70 mm, thickness 22.85-87.20 mm, weight 59.9-941.4 gm.

Specimens 42-58: Another 17 specimens (Fig. 8,h) also exhibit flake removals from more than two distinct directions. Previous flake removals (one or more) provide the platform for subsequent flake removals. The size is small relative

to all cores from all other categories. Cortex covers less than 40% of the surface on most of these cores. Both tabular and ovoid shapes occur with outlines ranging from irregular to oval. Two specimens were heat treated. The small size, lack of cortex, and multidirectional nature of these items indicate that they probably represent the end result of the lithic reduction sequence (then discarded). Size ranges are: length 34.65-82.00 mm, width 27.60-45.50 mm, thickness 15.90-35.25 mm, weight 17.6-89.2 gm.

Secondary Cores (13 specimens)

We followed Schaafsma's (1977:183) concept of secondary core which defined these artifacts (Fig. 8,c) as ". . . large flakes, from which smaller pieces of debitage have been removed. They display a large positive bulb of percussion (force) and one or more smaller, negative debitage scars." Thought of in another way, these items are large pieces of cores which have themselves been detached from larger cores. While these core fragments retain some negative flake scars from previous core reduction activities, one side of the artifact is marked by a positive bulb of force and flake striking platform which indicate where these secondary cores were removed.

Eight items appear to have been heat treated. Cortex remaining on the specimens was most extensive on the secondary cores which have not been heat treated. The amount of cortex on these items varies from 50% to about 10%, with the majority of specimens retaining cortex on about 30%. Secondary cores which do exhibit signs of heat treatment generally retain about 20% cortex on their remaining faces. This value ranges from 40% to 10%. Size ranges are: length 37.70-72.10 mm, width 22.30-56.60 mm, thickness 13.75-36.95 mm, weight 13.00-158.0 gm.

TRIMMED ARTIFACTS (44 specimens; Table 9)

Trimmed Cobbles (10 specimens)

These are tabular cobbles which have been marginally flaked (or trimmed) along one or more edges and upon one or both faces. All retain cortex on one or both faces.

Both primary and secondary flake removal scars can be seen on the worked portions of these artifacts. Enough of the original cobble exists to allow identification of the cobbles general shape and size.

Specimens 1-3: On three trimmed cobbles (Fig. 8,j), unifacial trimming has formed steep edge angles along one edge of these artifacts. One specimen is oval in shape and biconvex in cross section; one specimen is trianguloid in shape and rectangular in cross section; one specimen is irregular in outline and plano-convex in cross section. Microscopic examination revealed step fracture scars (terminating abruptly in a right angle break) and a few scalar flake scars (from scalelike micro-flakes) on the extreme edge of the worked faces; the reverse faces also exhibited a few step fracture scars. These wear patterns also showed medium abrasions on small protrusions. These trimmed cobbles are morphologically similar to the Group III core tools described by

TABLE 9. TRIMMED ARTIFACTS

Site Number	Cobbles	Flakes		Chips
		Unifacially trimmed	Bifacially trimmed	
41LK31	1			1
41LK32	1	4		5
41LK121	1	1		
41LK152	2	3	4	1
41LK159	1	2	1	1
41LK171	1	1		
41LK181	1		1	1
41LK183				
41MC199				
41MC201	2	2		2
41MC209	1		1	1
41MC210				
41MC214				
41MC217		1		
41MC225				

Lynn, Fox, and O'Malley (1977:49). Size ranges are: length 55.60-115.10 mm, width 53.90-94.60 mm, thickness 18.00-39.95 mm, weight 61.0-383.8 gm.

Specimens 4-7: Four of the trimmed cobbles (Fig. 8,k) also exhibit unidirectional and unifacial primary and secondary flake removals from one edge of the artifact, forming generally steep edge angles at the worked edge. Prior to these flake removals, however, the cobble was split to form a prepared platform for flake removals.

One specimen is irregular in outline and plano-convex in cross section. Another specimen is oval in outline and biconvex in cross section on one end. The biconvex end is the remnant of the original cobble, since the longitudinal splitting of this specimen experienced a hinge fracture (right angle break just before flake termination) before reaching the end of the cobble.

Two additional specimens are roughly rectanguloid and irregular in outline. Cross sections are biconvex on one and flat on the other. One of these specimens is of heat-treated petrified wood.

The chert specimen retains evidence of attempts to longitudinally split a tabular cobble. The altered end has then been trimmed by primary and secondary flaking to remove generally short, wide flakes and create a relatively steep edge angle. Size ranges are: length 72.75-120.20 mm, width 39.70-75.05 mm, thickness 14.40-33.60 mm, weight 43.5-217.4 gm.

Specimens 8-10: Three trimmed cobble (Fig. 8,i) specimens are tabular cobbles which have been flaked primarily in one direction on one face and then flaked a few times on the other face. For the most part, these artifacts have a steep edge angle where the edge has been flaked predominantly in one direction with primary and secondary flake removals.

Two artifacts are generally trianguloid in overall shape and plano-convex in cross section. One is roughly ovoid in outline and wedgelike in cross section. Size ranges are: length 74.15-127.20 mm, width 42.00-76.60 mm, thickness 27.80-30.20 mm, weight 101.1-346.8 gm.

Trimmed Flakes (21 specimens)

These are flakes that have undergone only marginal flaking; neither face of the artifact is completely covered by flake scars. They exhibit flaking on the perimeter at various locations. Either unifacial or bifacial flaking may occur, although bifacial flaking patterns on trimmed flakes probably could obscure the original flake's bulb of force and platform (and this would make it a chip). Our collection of trimmed flakes contained only two bifacial specimens.

The categories described below are based upon morphological characteristics. Since all of these artifacts are made from flakes, they exhibit a positive bulb of force and a platform. Morphological categories of trimmed flakes are determined by the location of the worked edges relative to the original flake's proximal end (i.e., the end with the bulb of force and platform). This morphological distinction was preceded by the determination of whether the flake was bifacially or unifacially trimmed (trimmed on both faces or just one face).

Unifacially Trimmed (14 specimens)

These trimmed flakes have undergone flaking on only one face of the flake. Almost all of them have been flaked on the dorsal surface of the flake.

Specimens 1-3: Three unifacially trimmed flakes (Fig. 8,l) have been trimmed on the original flake's distal end and on two lateral edges. One specimen is a hard-hammer flake that is irregularly oval in outline and plano-convex in cross section. The distal end of this artifact has been trimmed by primary and secondary flakes that have created a relatively steep edge angle.

A second specimen is made on a large, roughly triangular, hard-hammer flake. Most of the dorsal surface retains cortex. Areas of trimming have been subject to primary and secondary flake removal and microscopic edge damage. Some incidental ventral face flakes have been removed, and these were taken from one lateral edge only.

The other specimen has no cortex and may have been subjected to heat treatment. It is irregular in shape. No edge wear, except very light abrasion, was noted on the ventral surface edges of this artifact. The dorsal surface edges reveal predominantly step fracture scars with some scalar flake scars. The lateral edges also are denticulated, while the end edge is not denticulated. Size ranges are: length 34.55-91.05 mm, width 30.90-68.60 mm, thickness 7.60-25.10 mm, weight 6.1-131.2 gm.

Another example of this kind of uniface was recorded (but not collected) at site 41 LK 31.

Specimens 4-5: Two unifacially trimmed specimens (Fig. 8,m) exhibit unifacial flake removals from the distal end of the original flake and on one lateral edge. The specimens retain a large amount of cortex on the dorsal surface, are oval in outline, and plano-convex in cross section. The specimens are made from hard-hammer percussion flakes.

Microscopic examination of the artifacts revealed predominantly scalar flake scars and some step fractures on the dorsal face of the worked edges but no apparent edge damage on the ventral face of the worked edges. Some protrusions were rounded and abrasion was light over the working edges. Sizes are: length 54.20 and 81.65 mm, width 38.10 and 44.65 mm, thickness 10.25 and 25.50 mm, weight 24.0 and 102.6 gm.

Field notes from the 1977 Choke Canyon Reservoir survey indicate that an example of this subcategory of trimmed flakes also occurred at site 41 LK 31.

Specimens 6-13: A group of 8 unifacially trimmed flakes (Fig. 8,n) exhibits only one working edge: a lateral edge of the original flake. Little or no cortex is evident on the dorsal face. Two specimens were probably heat treated.

Three specimens exhibit microscopic edge damage in the form of scalar flake scars on the dorsal face of the lateral edge. It should be noted that the distal ends of these unifacially trimmed flakes have all been broken (either snapped or hinged). Four specimens exhibit no apparent edge damage while the

edge of one specimen is lightly abraded. Size ranges are: length 24.40-54.05 mm, width 17.25-44.55 mm, thickness 5.50-16.40 mm, weight 2.3-47.3 gm.

Field notes indicate that another trimmed flake was observed at site 41 LK 31, but it was not collected.

Specimen 14: This flake (Fig. 8,o) has been worked only on the distal end of the original flake. The end of this flake is relatively broad, so a long working edge could have been made. Cortex appears on the dorsal surface. The artifact is ovoid in shape; its cross section is plano-convex. It is 55.00 mm long, 38.65 mm wide, 14.05 mm thick, and weighs 29.1 gm.

Bifacially Trimmed (7 specimens)

These items are (Fig. 8,p) generally ovoid to trianguloid in plan view, plano-convex in cross section, and are generally made from hard-hammer percussion flakes. Both faces of the flake have been worked either on the distal end of the flake and on at least one lateral edge, or on both ends and one lateral edge, or on both lateral edges. Two specimens have probably been heat treated.

Microscopic examination of one specimen revealed a steep edge covered primarily with step fracture scars and a few scalar scars. All scars were on the dorsal surface.

One specimen is worked primarily on the dorsal surface at the distal end of the original flake. This specimen retains extensive step fracture scars, a few scalar scars, and abrasion on the dorsal face on this end. One lateral edge of this artifact has been worked (by secondary flaking) on the ventral face and edge damage is not apparent.

Bifacial trimming has occurred on the distal end of one specimen, while unifacial trimming is limited to one lateral edge. Abrasion and step fractures abound on the dorsal face of the unifacially worked lateral edge, although a few scalar scars were also observed. Extreme abrasion was observed on the bifacially worked end and on the other lateral edge. Conditions such as stream action may be responsible for the abrasion and may possibly be responsible for the limited nature of the bifacial retouch.

One specimen has been bifacially trimmed on both lateral edges. This flake is quite large and has been detached from a large core and trimmed in a few limited areas. A few localized areas of heavy abrasion were noted with microscopic examination, along with bifacial scalar flake scars. Step scars are not common.

The bifacially trimmed lateral edge of one specimen has not been used, but this specimen's distal edge has been unifacially trimmed and the dorsal face edge is extremely rounded and covered with primarily step fracture scars and a few scalar flake scars. No edge wear damage was apparent on the ventral face of this unifacially trimmed edge.

The remaining bifacially trimmed flake exhibited two different types of use-wear and may have been a multipurpose tool. One lateral edge had scalar flake scars

on both faces of the edge. Both ends have also been used after being unifacially trimmed to form relatively steep edge angles. The proximal end is also unifacially trimmed and has slight abrasion and scalar flake scars as well as some step fracture scars on the ventral face. Size ranges are: length 46.45-90.55 mm, width 36.10-67.35 mm, thickness 10.15-34.15 mm, weight 22.1-146.6 gm.

Trimmed Chips (13 specimens)

Trimmed chips are identical to trimmed flakes except that the striking platform of the flake is not present on chips. Trimming on these artifacts takes the form of primary and secondary flake removals on some portion of the chip's perimeter, and the flaking does not cover one or both faces of the chip. Artifact trimming may be either on one face (unifacial) or on two faces (bifacial).

Specimens 1-9: Nine of the trimmed chip specimens (Fig. 8,q) have had primary and secondary flakes removed from one face of the chip, and can be referred to as unifacially trimmed chips. All are generally irregular in shape except for one specimen which is roughly rectangular, and another specimen which is semi-circular in outline. All of the specimens (except for one) are roughly plano-convex in cross section. The exception is biconvex in cross section. Except in three specimens, cortex almost completely covers the dorsal surface of the unifacially trimmed chips. Heavy patina covers one specimen. Grainy inclusions were observed in the chert of one artifact. Heat treatment is evident in two specimens and possibly another.

Primary and secondary flake scars are most pronounced on two specimens, and these artifacts also exhibited the steepest edge angles. In comparison, the remaining seven artifacts have fewer primary and secondary flake scars, and these are located in much smaller areas of the edge of the chips. Their edge angles are low except in one specimen which has a high edge angle. These latter artifacts are also much smaller in overall size. Microscopic examination of the two smallest specimens shows that the retouched edges also provide evidence of scalar flake scars and step fracture scars. These scars also extend along edges which have not undergone previous flaking in either primary or secondary flake form. The scalar flake scars and the step fracture scars extended on both faces of the edges involved, especially away from the loci of primary and secondary flaking. Light edge abrasion also exists near the microscopic edge scars.

One artifact exhibits a heavily abraded edge, primarily with scalar scars, and another exhibits only light edge abrasion. Heavy abrasion and rounding, numerous step fracture scars and a few scalar scars occur continuously along the trimmed edge, and these scars are located on the dorsal face of the worked edge.

One specimen is probably a multipurpose tool. The trimmed edge's dorsal face is lightly abraded and contains a few scalar flake scars. The other edge, which is untrimmed, exhibits deep scalar flake scars on both faces of the edge.

The other three uniafacially trimmed chips were also examined microscopically. One specimen exhibited a few scalar flake scars and mostly step fracture scars along the trimmed edge. These scars, which were readily apparent, were concentrated in several loci along the edge and were confined to the dorsal face of the edge. The other artifact does not have a very flat ventral surface (when compared to the previously described artifact) and exhibits different micro-wear along the retouched edge. Heavy abrasion, coupled with predominantly step fracture scars, is concentrated at various edge locations and upon both faces. A generally denticulated edge was also observed.

An additional uniafacially trimmed chip is a large, generally oval piece whose unworked face is completely covered with cortex. This item exhibits a plano-convex cross section. The striking platform and bulb of force have been obliterated. Only localized and infrequent primary and secondary flakes have been removed from the thin edges of this specimen. These flakes have been taken from the cortex-free face of the chip and generally terminate in hinge fractures. All edges of the chip were examined with a microscope to view any possible edge use-wear. However, no identifiable edge wear was noted. Size ranges are: length 21.60-94.80 mm, width 19.60-64.85 mm, thickness 3.60-33.15 mm, weight 1.4-153.9 gm.

Other sites in Choke Canyon Reservoir that were recorded in 1977 and contained examples of uniafacially trimmed chips were 41 LK 139 and 41 LK 174.

Specimens 10-13: These trimmed chips (Fig. 8,r) are distinguished by the bifacial removal of primary and secondary flakes (retouch) along their edges. One specimen is large and retains some cortex on both faces. This item is irregular in outline and roughly plano-convex in cross section. Both primary and secondary flakes have been removed from both faces of one edge of this chip. Microscopic edge wear analysis revealed little or no sign of damage of any form which could be indicative of the tool's use. This was one of the cases where no positive and regular evidence of use-wear could be identified on the edge of an artifact.

Three other specimens are (respectively) circular, roughly oval, and irregular in shape; all are plano-convex in cross section. Edge trimming on one specimen consists of primary and secondary flakes. Two edges have undergone hinge fracture and have not been trimmed, and one face has been more extensively trimmed than the other. Edge angles are not particularly steep. Microscopic examination of the trimmed edges reveals predominantly scalar flake scars with occasional step fracture scars. These scars are located primarily on the dorsal face (not the flat face) of the edge, and there is abrasion of this same face edge.

One artifact exhibits two steep edges which have been trimmed by deep, wide, and large primary and secondary flake removals from both faces, with the steep face having most of the flake removals. One edge has been hinge fractured. Microscopic use-wear was observed on all edges. The two edges which have been bifacially trimmed revealed heavy pitting and abrasion, especially at protrusion points. Step fracture scars also appear on both faces of these edges, but most of these scars appear on the face opposite the flatter (ventral) face. The fractured end of this artifact also exhibits micro-use wear. Both faces of the edge are rounded and abraded, and a few step fractures were recorded on one face.

The remaining bifacially trimmed chip has alternately beveled edges and one trimmed end. While no bulb of force or platform was recognized on the ventral (flat) surface of this artifact, a point of extreme battering was noted on the untrimmed end. This may be the remnant of a bipolar flaking technique for flake removal from a core (Sollberger and Patterson 1976). The trimmed edges and one end have been formed by removal of short, wide primary and secondary flakes. One edge may have been further trimmed by pressure flaking. Both the trimmed edges and end revealed extensive abrasion and step fracture scars on one face of the edge (or end). Size ranges are: length 51.70-93.20 mm, width 45.05-67.25 mm, thickness 11.95-32.65 mm, weight 33.0-169.1 gm.

UNIFACIAL ARTIFACTS (7 specimens; Table 10)

This section will provide a brief description of unifacial artifacts, i.e., those artifacts which have been completely (or almost completely) flaked on one face. If a flake or chip was incompletely flaked on one face, then it was termed a unifacially trimmed artifact. Almost all of the items categorized as unifacial tools have been manufactured from flakes, and the relatively flat unmodified flake ventral surface also exists as the ventral surface for these artifacts.

Unifacial tool description and categorization follow Frkuska and Frkuska's (1977) discussion and classification scheme from the Hop Hill site in central Texas. These investigations utilized Crabtree's (1972:97) definition of a unifacial artifact, which is similar to the general definition indicated in the beginning of this section. Their definition also includes what we termed "unifacially trimmed flakes and chips"; this probably allows them a larger sample size for analysis. Our orientation is similar to Frkuska and Frkuska's, as we will report a series of metric and nonmetric measurements and observations to isolate "the definitive quality of a specific uniface or subgroup that makes it different from another specific uniface or subgroup" (Frkuska and Frkuska 1977:189). Morphological and technological description will allow comparisons with similar artifact forms from previous archaeological studies from adjoining geographic areas (Weir 1976; Gunn and Mahula 1977) as well as from previous archaeological studies in the Choke Canyon Reservoir area (primarily Lynn, Fox, and O'Malley 1977).

Complete Unifaces (3 specimens)

Specimens 1-2: These specimens (Fig. 9,a) exhibit unifacial flake removals along all artifact edges. Both artifacts are trianguloid in shape and plano-convex in cross section. The dorsal surface of one specimen still retains a small amount of cortex, while the dorsal surface of the other specimen is completely free of cortex.

Both specimens are made from flakes and both retain steep edge angles on all edges. The steep edge angles are formed by both primary and secondary trimming along the extent of the artifact's perimeter.

Each unifacial artifact was examined microscopically at low power magnification of 10X and 20X. All edges of the perimeter were examined on both the dorsal and ventral sides. The lateral edges of one specimen exhibit scalar flake

Figure 9. *Lithic Artifacts: Unifaces and Bifaces*. a, complete uniface, Specimens 1-2; b, complete uniface, Specimen 3; c, incomplete uniface, Specimens 1-2; d, incomplete uniface, Specimens 3-4; e, thick biface, ovate/ovoid, Specimens 1-3; f, thick biface, ovate/ovoid, Specimens 4-12; g, thick biface, ovate/ovoid, Specimen 13-19; h, thick biface, round; i, thick biface, rounded end, Specimens 1-4; j, thick biface, rounded end, Specimens 5-7; k, thick biface, rounded end, Specimens 8-9; l, thick biface, rounded end, Specimens 10-11; m, thick biface, rounded end, Specimens 12-14; n, thick biface, beveled end; o, thick biface, small, end fragment; p, thick biface, small, medial fragment; q, thin biface, wide, base fragment; r, thin biface, wide, medial fragment; s, thin biface, wide, tip fragment.



a



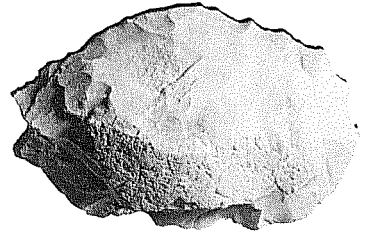
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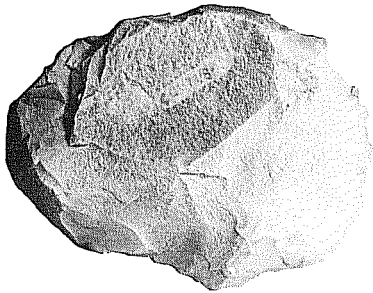
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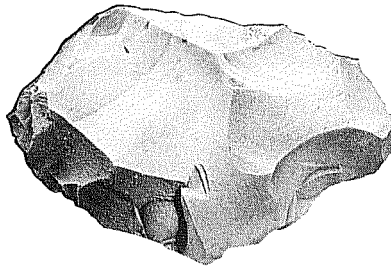
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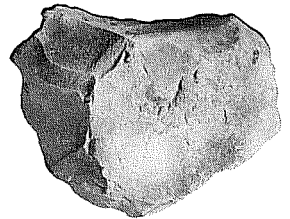
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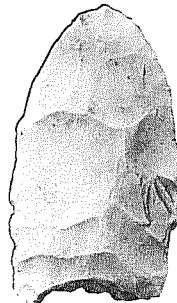
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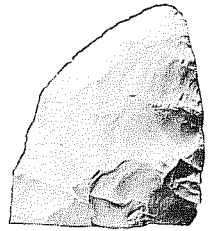
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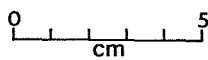


TABLE 10. UNIFACIAL ARTIFACTS

Site Number	Complete	Incomplete
41LK31	0	0
41LK32	0	0
41LK121	0	0
41LK152	0	0
41LK159	1	1
41LK171	1	0
41LK181	0	0
41LK183	0	1
41MC199	0	0
41MC201	0	0
41MC209	1	1
41MC210	0	0
41MC214	0	0
41MC217	0	0
41MC225	0	0
Isolated Find #5	0	1

scars along with occasional step scars. These scars are located primarily on the dorsal face of the artifact. One lateral edge has a portion which exhibits predominantly step scars on both the dorsal and ventral surface. The ends of this specimen possess micro-wear edge damage in the form of primarily scalar flake scars with some step fractures. Edge damage occurs on both faces of the ends. Examination of the other artifact revealed similar patterns of micro-wear edge damage. Both artifacts have had secondary flaking on one face to shape the perimeters into a relatively straight edge. Sizes are: length 71.10 and 72.65 mm, width 43.05 and 45.45 mm, thickness 12.30 and 18.40 mm, weight 42.0 and 59.4 gm.

Specimen 3: This specimen (Fig 9,b) is a finished and complete uniface made from a flake. Cortex exists near the platform end of the uniface and along one lateral edge. The ventral side of this artifact still bears a negative bulb of force. This artifact has a generally ovoid shape and plano-convex cross section and retains high edge angles on its worked edges.

Microscopic examination reveals numerous step fractures and some scalar fractures, all of which are located on the dorsal face of the artifact. The general lack of micro-flake scars on the ventral surface combined with the type of edge micro-damage on the dorsal face probably indicate that this artifact was used for transverse action (scraping) of hard material (such as bone or antler), with the ventral face of the artifact being held closest to the material being scraped. The size is: length 55.75 mm, width 54.10 mm, thickness 20.80 mm, weight 61.2 gm.

Incomplete Unifaces (4 specimens)

Specimens 1-2: These uniface fragments (Fig. 9,c) are triangular in shape, plano-convex in cross section, and have suffered a hinge fracture at one point along the perimeter of the artifact. Both items have relatively straight edges and evidence of secondary flake removals to shape the artifact. Both of these items retain no cortex, appear to have been heat treated, and were manufactured from flakes.

Microscopic edge damage in both cases is confined primarily to the dorsal face of the artifacts. Some sheen was observed on the ventral surfaces. The edge of the dorsal face of one artifact shows primarily scalar flake scars with an occasional step fracture as well as abrasion. Edge angles are not very steep. This artifact's perimeter also was well abraded. The fractured edge is untouched. The other specimen exhibited dorsal edge wear in the form of predominantly step fractures, some scalar fractures, and obvious abrasion. Steep edge angles are present on this artifact. The fractured edge has not been modified. Sizes are: length 26.55 and 48.40 mm, width 32.65 and 42.05 mm, thickness 8.10 and 10.15 mm, weight 5.4 and 21.7 gm.

Specimens 3-4: These items (Fig. 9,d) are irregular in overall shape, plano-convex in cross section, and retain an edge that has been shaped. One specimen has probably been heat treated. Both specimens have been made from flakes, and both retain evidence of secondary flaking and straight edges.

One specimen exhibits dorsal face edge wear in the form of both scalar and step fracture scars, in generally the same frequency. Ventral face edge wear is much less than the dorsal face, but numerous scalar and step fracture scars also occur on the ventral face edge. The other specimen exhibits predominantly dorsal edge wear, with scalar flake scars being more numerous than step fracture scars. Both specimens within this category present localized areas of light to medium abrasion. Sizes are: length 36.60 and 47.90 mm, width 30.05 and 30.20 mm, thickness 6.05 and 10.00 mm, weight 6.2 and 12.8 gm.

BIFACIAL ARTIFACTS (109 specimens)

Bifaces are chipped stone tools with flake scars on both faces (Crabtree 1972:38). They are manufactured by reducing a cobble or a flake. During the manufacturing process flakes are removed from both faces using the same edge as a platform. As such, the edge of the biface generally describes a plane (Gunn and Ivey 1977:163). Bifaces generally have flake scars over at least one-half of both faces. However, in cases where cobbles (nodular or tabular) exhibit bifacial flaking along one or more edges, and the flake scars cover a considerable portion of the faces, we classify the artifacts as bifaces.

Bifaces are placed into categories based primarily on visual inspection of their general shape or morphology and technology or the appearance of the flake scars and the method of manufacture. Morphological nomenclature is used for each category. In many cases, categories are divided into subcategories based on finer morphological and technological divisions, e.g., bifaces less than 1.25 cm thick are termed thin. Function or type of edge damage on the tool is also used to subdivide categories.

Bifaces have been grouped into categories exhibiting similar characteristics or attributes for several reasons. This approach facilitates description and allows for comparison with bifaces from different areas, as well as with those recovered during other Choke Canyon studies. Biface categories in this study are generally comparable to those previously recovered from the Choke Canyon area and reported by Lynn, Fox, and O'Malley (1977), to those from the Hop Hill site in central Texas (Gunn and Ivey 1977), and to those included in the description of central Texas Archaic tool kits by Weir (1976). In some cases comparisons are made with accepted artifact types such as those put forth by Hester, Gilbow, and Albee (1973).

Thick Bifaces (49 specimens; Table 11)

Ovate/Ovoid (19 specimens)

These bifaces are made from large tabular to slightly rounded cobbles or large flakes. We call them ovate (subrectangular) or ovoid (subtriangular) in shape. These bifaces characteristically exhibit cortex on one or both faces, but cortex generally covers less than 40% of the surface. The worked edges are convex and extend along well over 50% of the potential edge. Large percussion flakes, primarily with feathered terminations (tapered to a fine edge) but also some hinge terminations, were bifacially removed from the edge. Similar bifaces were observed at 34 of the 113 sites. All are biconvex in cross section with

TABLE 11. THICK BIFACES

Site Number	Ovate/Ovoid	Rounded end	Beveled end	Round	Small
41LK31	1			1	
41LK32					
41LK121				1	
41LK152	2				
41LK159	1				1
41LK171				1	2
41LK181	2	5		3	1
41LK183					
41MC199					
41MC201	8	4		1	1
41MC209	2	3	2	1	1
41MC210	1	1			
41MC214					
41MC217		1			
41MC225					

relatively high edge angles and sinuous edges. One specimen is of petrified palmwood. Six specimens were heat treated. Thick ovate/ovoid bifaces resemble "Oval and Ovate Bifaces" described by Gunn and Ivey (1977:177-179), "Group I Thick Bifaces" described by Lynn, Fox, and O'Malley (1977:61-63), and Weir's "Ovate Biface Cores" (1976:74-75). Bifaces in this category functioned primarily as cores, but some were used as tools, mainly for cutting and/or scraping materials such as wood or perhaps bone. These items may also have been subject to further reduction producing thinner bifacial tools.

Specimens 1-3: In these specimens (Fig. 9,e), flakes have been removed from the entire circumference, leaving cortex only on the interior of one face. They appear to be made from cobbles in that there are no obvious previous flake scars suggesting reduction of a large flake. Edges of these bifaces do not exhibit use-wear. Edge damage is primarily in the form of unifacial step fractures. This suggests that edge damage resulted from the intentional removal of flakes from the biface edge. These bifaces were probably used as cores with flakes being the desired product, or they may have been intended for further reduction to produce a thin biface tool. Size ranges are: length 92.45-105.00 mm, width 52.15-59.50 mm, thickness 30.55-33.20 mm, weight 136.8-163.3 gm.

Specimens 4-12: These specimens (Fig. 9,f) exhibit cortex on both faces and small portions of the potential biface edge. They are made on cobbles. Edges are sinuous except where cortex remains. Small portions of the edge are unifacially flaked; other small portions exhibit cortex. These bifaces exhibit edge damage which is the result of the intentional detachment of flakes. Four have only this type of edge damage. Three specimens exhibit localized bifacial use-wear evidenced by scalar and step scars, but with a predominance of scalar scars on both faces. Two other specimens and one of those with longitudinal use-wear evidence transverse action in the form of both step and scalar scars along significant portions of the biface edge. Size ranges are: length 84.75-113.10 mm, width 52.15-81.45 mm, thickness 26.20-54.05 mm, weight 100.2-406.7 gm.

Specimens 13-19: These bifaces (Fig. 9,g) exhibit cortex on the edge and/or one face. They appear to have been made on large flakes as suggested by the presence of a platform or large flake scars on one face that could not have originated on the biface edge. Edges are characteristically sinuous being bifacially flaked, excepting small areas where cortex remains on one face at the edge. These bifaces exhibit edge damage from the intentional removal of large flakes. Five of these bifaces exhibit no readily detectable use-wear. One evidences slight transverse action use-wear consisting primarily of scalar scars with far fewer step scars, all of which are well worn. This wear pattern occurs at several places, but on one face only. The remaining specimen exhibits extremely abraded bifacial scalar scars and some step scars. Size ranges are: length 83.20-116.95 mm, width 40.00-74.20 mm, thickness 23.90-36.25 mm, weight 99.1-236.8 gm.

Rounded End (14 specimens)

Bifaces in this category appear to be made from thick ovate/ovoid bifaces (as evidenced by the biconvex cross section) and from large flakes (as evidenced by portions of large flake scars that could not have originated from an earlier

biface edge). Cross sections tend to be extremely biconvex, but some are almost plano-convex. Manufacture is by percussion, probably using a soft hammer. There is no evidence of fine trimming or pressure flaking. Edges are slightly sinuous to almost straight. Flake scars characteristically exhibit feathered terminations, but there are also numerous hinge terminations, especially on the coarser grained artifacts. Edge angles tend to be low. In three cases a small patch of cortex remains; two are on an edge and one is on a face. Edge angles are relatively high on specimens with cortex.

One artifact is of a dark brown glossy chertlike material which may have been heat treated. Three other artifacts also appear heat treated.

Only one specimen in the sample is considered to be complete, and a second specimen may have been reworked into a complete but stubby version. The complete specimen is similar to the bifacial *Clear Fork* gouges (Hester, Gilbow, and Albee 1973; Lynn, Fox, and O'Malley 1977:63, 67; Weir 1976:65), except that rounded end thick bifaces tend to be biconvex as opposed to plano-convex in cross section. "Group II, Form 3 Thick Bifaces" (Lynn, Fox, and O'Malley 1977: 63, 65, 69) are virtually identical to artifacts in this class. While most of rounded end, thick bifaces are fragments with rounded ends, their general shape and manufacturing techniques are very similar. In longitudinal cross section these specimens are thinnest at the rounded end and thicken toward the opposite end. Similar specimens were observed at sites 41 MC 196, 41 LK 139, 41 LK 154, 41 LK 176, and 41 LK 182.

Specimens 1-4: These bifaces (Fig. 9,i) are trianguloid and exhibit a distinctive base. The base exhibits a higher edge angle than the lateral edges and is characterized by the removal of one large flake using the medial portion of one face as the platform. The result is a slightly indented base, and in three of the four cases smaller flakes have been removed from the edges of the base. It is suggested that these specimens were broken (probably during use), leaving a snapped end which was reworked primarily in an edge angle considerably less than a right angle (i.e., the angle of the snap). Use-wear is evident and similar on all specimens. Characteristically, wear takes the form of mostly scalar scars and fewer step fractures. Both types of scars are well worn (i.e., abraded), giving the appearance of a rounded edge. Use-wear tends to be bifacial on one lateral edge, unifacial on the other, and unifacial on portions of the base edge. Size ranges are: length 49.00-64.95 mm, width 37.70-51.25 mm, thickness 14.55-21.85 mm, weight 31.0-50.2 gm.

Specimens 5-7: These bifaces (Fig. 9,j) have medial snap fractures and their shape is trianguloid. The base ends have not been flaked. Use-wear is identical to that indicated for Specimens 1-4, except that none occurs on the bases. Size range is: width 40.65-48.50 mm.

Specimens 8-9: These bifaces (Fig. 9,k) consist of base ends with portions of the lateral edges. Both have a medial hinge fracture. Use-wear on these artifacts is similar to that in Specimens 1-7, but tends to be bifacial on both lateral edges and unifacial on the base of one specimen. The base of the other specimen and one lateral edge are extremely battered, resulting in many step fractures. The step fractures are confined to one face. We suggest that perhaps the latter tool did some light chopping, possibly of a medium material or even hard material such as bone. Sizes are: width 40.20 and 51.20 mm.

Specimens 10-11: These are two complete specimens, (Fig. 9,l) one of which is very short and may have been reworked. The bases of both artifacts are worked from one face to form a high edge angle. The lateral edges and the rounded end have a much lower edge angle. Edges exhibit use-wear similar to artifacts in the other specimen groups, but they tend to be bifacial on the lateral edges and rounded end. The base end has unifacial use-wear with a much higher incidence of step fractures. Sizes are: length 47.10 and 79.00 mm, width 34.80 and 41.10 mm, thickness 14.25 and 17.15 mm, weight 25.7 and 65.7 gm.

Specimens 12-14: These bifaces (Fig. 9,m) are significantly larger than the other rounded end, thick bifaces. One is made from petrified palmwood. One (of chert) appears to be heat treated. No cortex remains on these bifaces. Two are biconvex in cross section. Two exhibit medial hinge fractures with the causal blow being struck from the missing end. One exhibits a snap fracture (the petrified palmwood). In longitudinal cross section, thickness increases from the end to the medial fracture. Edges are more sinuous than those of the smaller rounded end, thick bifaces. Edge angles are low. Flaking is by percussion and flake scars have mostly feathered terminations (some are hinge terminations). Secondary flaking has occurred on all specimens. This category is like "Group I, Form 6 Thick Bifaces" described by Lynn, Fox, and O'Malley (1977:59, 62, 64).

All three specimens exhibit edges evidencing use. Use-wear takes the form of relatively large scalar and step scars, with the former being predominant. While abrasion of these scars is apparent, it is significantly less than in the smaller rounded end, thick bifaces. Use-wear is bifacial and more evident on the rounded end than on the lateral edges. Size ranges are: width 50.75-61.75 mm, thickness 13.20-20.10 mm.

Beveled End (2 specimens)

These bifacially worked bifaces (Fig. 9,n) are thicker than 12 mm and are trianguloid to subtrianguloid in outline. One end is roughly pointed, while the opposite end exhibits a convex to straight steep bit formed by extensive unifacial primary and secondary flaking. Lateral edges are straight to slightly concave. Cross section of these thick bifaces are always plano-convex, which indicates a strong possibility that these items were manufactured from flakes. The most extensive flaking has occurred on the dorsal surface of the original flake and has removed all traces of cortex. All perimeter edges, except the bit edge, of these two artifacts have been bifacially flaked. The bit edge of these artifacts has been steeply flaked primarily on one face. One specimen may have been heat treated.

These bifaces are most similar to the "Group II, Form 1" thick bifaces described by Lynn, Fox, and O'Malley (1977:59, 63, 67) from the previous survey of the Choke Canyon Reservoir. Morphologically similar specimens from adjoining areas have been recorded as "Group II, Form 1" thick bifaces from Cuero I Reservoir (Fox *et al.* 1974:40) and from Nuevo Leon, Mexico (Epstein 1969:34-43). They also resemble our rounded end, thick bifaces.

Microscopic examination for edge wear and damage on one specimen indicated extensive abrasion and numerous step fracture scars on the dorsal face of the

lateral edges. The pointed end has been blunted and extreme abrasion and step fracture scars occur on the ventral face. The bit end showed much less abrasion and numerous scalar flake scars; a few step fracture scars are located primarily on the dorsal face of this edge.

Similar examination of the other artifact presented a different picture. The bit end was lightly rounded, and the lateral edges exhibited highly localized abrasion and step scar fractures at the loci of deliberate larger flake removals. Slight abrasion was noted on the pointed end of the artifact. As a whole, use-wear was not apparent and the edges were denticulated. Sizes are: length 46.30 and 43.40 mm, width 39.75 and 30.05 mm, thickness 14.00 and 12.15 mm, weight 18.9 and 18.6 gm.

Inspection of field notes from our survey indicates that similar gougelike thick bifaces were observed at 41 LK 127 (2 specimens), 41 LK 132, 41 LK 175, 41 LK 191, 41 LK 192, 41 MC 196, and 41 MC 205. The collected specimens described above were both from one site, 41 MC 209. In general, the gougelike thick bifaces recorded in the field were relatively thinner but larger in overall size with some dorsal cortex.

Round (8 specimens)

These bifaces (Fig. 9,h) are made on small, round to slightly tabular cobbles. They are generally biconvex in cross section, but one end forms a point and the other end is rounded. Approximately half of both faces and half of the potential biface edge have cortex. The worked edges are characteristically curved and extend along approximately half of the potential biface edge. Large flakes (probably hard-hammer percussion), primarily with feathered terminations (but also some hinge terminations) were bifacially removed from the edge. Generally fewer than five flakes were struck from each face. Edge angles are high. All eight specimens are complete. One appears to be heat treated. This class of artifacts is similar to "Group I Core Tools" described by Lynn, Fox, and O'Malley (1977:49), to "End Bifaces, Oblique and Curved Choppers" described by Gunn and Ivey (1977:173), and to Weir's (1976:65, 74) "Lateral-cortex Bifaces and Ovate-biface Cores."

Five of the thick round bifaces do not exhibit significant use-wear but have edges that are battered at the loci of various flake detachments. Small step fractures occur primarily on the edge near negative bulbs. This type of edge condition is probably the result of intentional flake detachment. Three specimens exhibit minimal bifacial use-wear along small portions of the edge. Worn specimens tend to be smaller than unworn specimens. Use-wear takes the form of scalar and step scars on both faces. Abrasion is also evident on the tiny flake scars, especially along the edges. Size ranges are: length 56.80-74.25 mm, width 49.05-75.50 mm, thickness 26.00-51.20 mm, weight 101.1-333.1 gm.

Small (6 specimens)

These bifaces (Fig. 9,o,p) are smaller versions of thick ovate/ovoid bifaces; however, only one example retains cortex (present on one face only). All

examples are extremely biconvex in cross section. None of the items is complete, but judging from the various fragments, shapes were ovate and ovoid with some specimens being rather elongated. Four are end fragments (Fig. 9,o), and two are medial fragments (Fig. 9,p). Fractures are both hinged and snapped. Lateral edges are characteristically convex, but some are straight and end edges are both rounded and pointed. Specimens exhibit only limited secondary percussion flaking, and edges are sinuous. Edge angles are high. One specimen is of dark brown petrified wood; large percussion flake scars with feathered and hinged terminations cover both faces. Three bifaces (chert) appear to be heat treated. Small, thick bifaces resemble "Group I, Form 10" and to a lesser degree "Group I, Form 7" thick bifaces described by Lynn, Fox, and O'Malley (1977:62, 63, 65).

All of these bifaces have edges which are battered at the loci of various flake detachments. In general, edges have a very angular appearance, especially where flakes were detached. This type of edge condition probably results from intentional flaking. However, minimal use-wear is evident on all specimens. The petrified wood specimen (an end fragment) exhibits primarily scalar scars and some step scars, all of which are abraded and appear to be well rounded. The wear pattern is intermittently unifacial, but alternates between faces. Another end fragment exhibits bifacial use-wear in the form of deep scalar and step scars which are slightly abraded. The pattern is rather continuous along lateral edges. The largest end fragment is made from a very fine grain, glossy (heat-treated) material and exhibits an extremely irregular edge. Most of the edge fails to show use-wear, but a few protrusions do exhibit unifacial scalar scars which are slightly abraded. This suggests that the tool has been resharpened. The remaining artifacts (two medial and one end fragment) exhibit mostly step scars but some scalar scars. The pattern is intermittent and unifacial. It is confined to one face of any given lateral edge, but tends to occur on alternate faces of the lateral edges. Size ranges are: width 30.25-36.00 mm, thickness 12.35-21.50 mm.

Thin Bifaces (41 specimens; Table 12)

Wide (9 specimens)

These specimens are three pointed end or tip fragments (Fig. 9,s), three medial fragments (Fig. 9,r), and three square end or base fragments (Fig. 9,q). All specimens exhibit medial snaps or hinge fractures. These different fragment types are placed in one category because the biconvex cross section, thickness, and width of the specimens, as well as manufacturing technology, are similar. Field drawings of complete bifaces with similar characteristics indicate that these bifaces are basically triangular in plan view. Lateral edges are roughly parallel, tapering rapidly to a point at one end, and contracting slightly to form the base end, which is straight to slightly concave. Edge angles are low. Specimens exhibit bifacial secondary trimming along most or all of the worked edges. Edges tend to be somewhat sinuous, indicating a lack of fine trimming. Secondary trimming was probably accomplished through percussion flaking, perhaps with a soft hammer. Cortex is not present on these bifaces. Six were heat treated. This type of biface occurred frequently at survey-recorded sites. Similar artifacts were observed at sites 41 LK 124, 41 LK 149, 41 LK 185, 41 LK 191, 41 LK 201, 41 MC 196, 41 MC 204, and 41 MC 226 (2 specimens). Wide,

TABLE 12. THIN BIFACES

Site Number	Wide	Trianguloid	Trianguloid beveled	Rectanguloid	Elongated	Concave base	Rounded end	Pointed end
41LK31		1						
41LK32	2	2						1
41LK121								
41LK152								
41LK159	2	1			1		3	3
41LK171	1	1	1					
41LK181		1	2		2	1		1
41LK183				1				
41MC199								
41MC201	2	1	3		2	1	1	
41MC209	2							
41MC210								
41MC214								
41MC217								
41MC225								
Isolated Find #3		1						

thin bifaces are almost identical to "Triangular, Form 7" and "Lanceolate, Form 1" bifaces described and illustrated by Lynn, Fox, and O'Malley (1977:72-75).

These bifaces exhibit similar use-wear, but it varies from minimal to extensive. In some cases the edge is highly abraded. While wear is present on both faces of the edge, it tends to be more evident on one face. It is interesting to note that mussel shells occurred at most sites where this type of biface was observed; perhaps it was associated with processing freshwater mussels. Size ranges are: width 38.45-50.35 mm, thickness 8.10-10.15 mm.

Trianguloid (8 specimens)

This category contains fragments of thin bifaces (Fig. 10,d) which were probably trianguloid in plan view. Four of the specimens are obviously trianguloid and are missing one corner. Three items are tip end only and are placed in this category because they are technologically and morphologically similar to the specimens missing only one corner. The tip only specimens are larger than those that are more complete. One edge fragment is included for the same reason. Edges are convex to straight, and bases, when present, are straight to convex.

These bifaces are made on flakes as indicated by the curved (concave-convex) appearance of the longitudinal section, by the presence of large flake scars which could not have originated at the biface edge, and by the cross sections which tend to be plano-convex. Secondary flaking tends to occur on both faces, but two specimens exhibit secondary flaking on only one face. Edges tend to be relatively straight, but on those specimens with little secondary flaking, edges are sinuous. The edge angle is low. Flaking is by percussion and flake scars tend to have feathered terminations, but many exhibit hinge terminations. None of the items retains cortex. Seven specimens appear heat treated. Thin trianguloid bifaces approximate "Triangular, Form 1" and "Pointed End Fragments" described by Lynn, Fox, and O'Malley (1977:74, 75, 83, 84). Similar specimens were also observed at sites 41 LK 133, 41 LK 158, 41 LK 166, 41 LK 173, 41 LK 176, and 41 LK 195.

Use-wear evident on thin triangular bifaces is varied. Two specimens exhibit use-wear similar to that of thin triangular beveled bifaces (see below), and a similar function is suggested. Two items (one with a corner missing, and the edge fragment) exhibit edges with scalar scars overlain by numerous step scars; abrasion is evident, but limited in scope. The pattern occurs along most of one face of the edge with the opposite face being abraded or rounded with an occasional scalar scar. All three tip only fragments exhibit use-wear similar to that described above, but on both faces and intermittently along lateral edges. The remaining specimen (a corner missing item) exhibits intermittent scalar scars which are slightly abraded or rounded. Artifacts in this category are heterogeneous in morphology and perhaps even more so in function. Size ranges are: length 42.40-61.10 mm, width 28.00-48.00 mm, thickness 7.05-12.55 mm, weight 8.5-19.9 gm.

Trianguloid Beveled (5 specimens)

Bifaces (Fig. 10,a,b) in this category are generally termed *Tortugas* (Suhm and Jelks 1962:249-250). They are trianguloid in plan view and have straight to slightly convex edges. The base is also straight to slightly convex. Cross sections are biconvex, with the lateral edge characteristically exhibiting bifacial beveling. Maximum thickness is in the medial portion of the biface. Base ends are thinned and feathered (one specimen exhibits a bifacially beveled base; it may have been broken and subsequently resharpener). The tip end tends to be almost diamond shaped in cross section, and all tips are missing. Four of the specimens exhibit a hinge fracture as if the causal force came from the tip end. The fifth specimen exhibits a snap fracture. This suggests that the tip was subjected to extensive use and was often broken while in use. All items exhibit bifacial secondary trimming resulting in relatively straight as opposed to sinuous edges. In plan view the edges are uneven almost to the point of slight serrations. All appear heat treated. Similar specimens were observed at sites 41 LK 124 (2 specimens), 41 LK 139, and 41 LK 158.

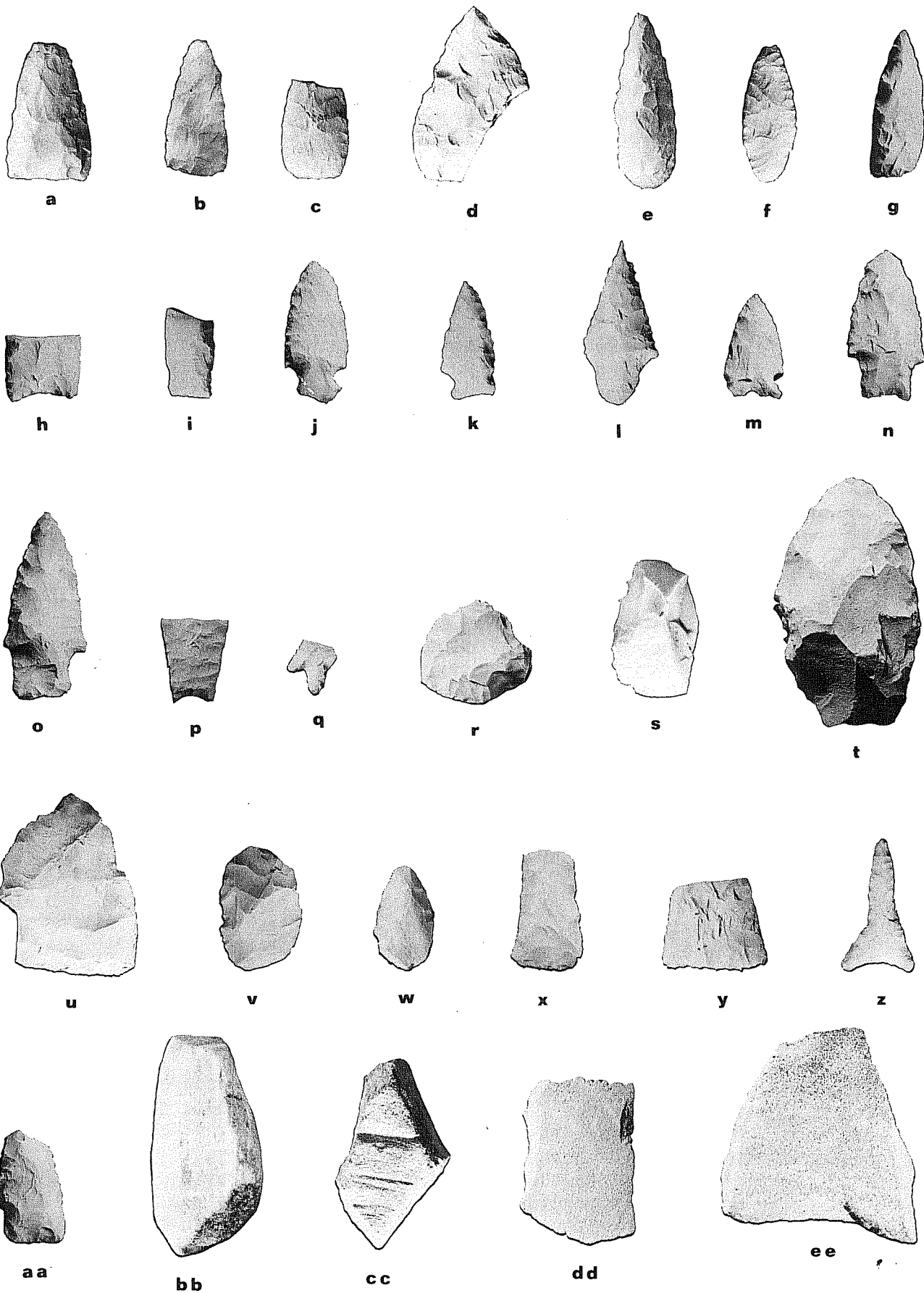
All specimens in this category have readily evident use-wear. The use-wear is remarkably uniform among the specimens. Use-wear is bifacial and exhibits extensive step scars and scalar scars. Step scars are predominant on one face; scalar scars are predominant on the opposite face. Both types of scars occur on both faces and along the lateral edges from tip to base, being more concentrated near the tip. Scars are highly abraded, resulting in the very rounded appearance of the edge. Use-wear is heaviest on the protrusions, and the edge appears crushed at various places between protrusions. Use-wear is also evident on the base, but tends to appear as sporadic unifacial scalar scars. Size ranges are: length 37.00-58.00 mm, width 22.70-31.40 mm, thickness 7.25-9.65 mm, weight 5.9-13.6 gm.

Rectanguloid (3 specimens)

These bifaces (Fig. 10,c) are probably made on flakes, judging from the twisted appearance of one artifact and the plano-convex cross section of another. However, two specimens exhibit a biconvex cross section. All three specimens are end or base fragments, and all exhibit a hinged medial fracture. Lateral edges are relatively straight and contract slightly near the base. The basal edges are convex. Secondary flaking is apparent on all specimens and all exhibit some fine or tertiary, perhaps pressure flaking. As a result, edge angles are low, and edges tend to be relatively straight as opposed to sinuous. One specimen is of petrified wood. Two specimens (chert) are heat treated. Thin rectangular bifaces closely resemble "Triangular, Form 7" thin bifaces described by Lynn, Fox, and O'Malley (1977:76-77).

Use-wear is evident on all specimens. It takes the form primarily of numerous scalar scars, occasionally overlain by step scars. Scars are abraded, especially on the small protrusions. The pattern is bifacial and relatively continuous along both lateral edges of all three bifaces. Two specimens exhibit the same bifacial wear on the base, but the petrified wood item exhibits only unifacial wear on its base. Similar specimens were observed at 41 LK 182 and 41 LK 194. Size ranges are: width 23.25-31.10 mm, thickness 6.10-8.20 mm.

Figure 10. *Lithic Artifacts: Various Bifaces and Ground Stone.* a, thin biface, trianguloid beveled, *Tortugas*-like; b, thin biface, trianguloid beveled, *Tortugas*-like; c, thin biface, rectanguloid; d, thin biface, trianguloid; e, thin biface, elongated, Specimens 1-2, *Abasolo*-like; f, thin biface, elongated, Specimens 3-4, *Desmuke*-like; g, thin biface, elongated, Specimen 5, *Refugio*-like; h, thin biface, concave base, *Plainview*-like; i, *Darl*; j, *Edgewood/Enson*; k, *Edgewood/Enson*; l, *Gary*; m, *Frio*; n, *Pedernales*; o, *Pedernales*; p, *Angostura*; q, *Perdiz*; r, miscellaneous biface, Specimen 1; s, miscellaneous biface, Specimen 7; t, miscellaneous biface, Specimen 4; u, miscellaneous biface, Specimen 8; v, miscellaneous biface, Specimen 2; w, miscellaneous biface, Specimen 3; x, miscellaneous biface, Specimen 5; y, miscellaneous biface, Specimen 6; z, miscellaneous biface, Specimen 9; aa, miscellaneous biface, Specimen 10; bb, ground stone, grinding stone (*mano*); cc, ground stone, incised; dd, ground stone, grinding stone, incised; ee, ground stone, grinding slab (*metate*).



0 5
cm

Elongated (5 specimens)

Bifaces in this category are long and narrow. All exhibit a pointed end (tip) and a contracting base that is either pointed or very convex. Two similar specimens were observed at sites 41 LK 124 and 41 MC 213.

Specimens 1-2: These items (Fig. 10,e) appear to have been made on flakes, judging from the curved appearance of the longitudinal sections. In cross section they are biconvex, but one face is more convex than the other. Both exhibit secondary flaking. Most of the flaking is percussion, but some flake scars may be from pressure flaking. Edges retain a sinuous appearance. Flake scars exhibit feathered and hinge terminations. Flakes tend to terminate along the medial axis of both faces, resulting in a medial ridge on one face and an almost beveled appearance on the other face. Lateral edges are slightly convex and exhibit high edge angles. Both specimens exhibit markedly convex bases with edge angles smaller than those on the lateral edges. One lateral edge of the base is indented, giving the appearance of a slight single shoulder. These bifaces are like "Pointed/Ovate, Form 1" thin bifaces described by Lynn, Fox, and O'Malley (1977:71, 73) and, as they noted, the bifaces are also like the *Abasolo* projectile point (Suhm and Jelks 1962:165-166).

Use-wear is not readily apparent on these specimens. Sizes are: length 53.40 and 64.75 mm, width 20.50 and 22.15 mm, thickness 9.30 and 12.60 mm, weight 9.7 and 16.6 gm.

Specimens 3-4: These items (Fig. 10,f) appear to be made on flakes, judging from the curved appearance of the longitudinal sections. They are biconvex in cross section, with one face being more convex than the other. Both specimens exhibit fine pressure flaking which covers most of both faces. On one specimen, flake scars are parallel and extend from both edges to the medial axis. The edge angle is low and edges are sinuous. Both specimens have a contracting base which comes to a point on one specimen and is extremely convex on the other. The transition from blade to base is evident on both artifacts. Both appear heat treated. These bifaces are like "Contracting-Stem, Form 3" thin bifaces described by Lynn, Fox, and O'Malley (1977:76, 79) and, as they noted, these bifaces are also like the *Desmuke* projectile point (Suhm and Jelks 1962:181-182).

Bifacial wear is heavy on the lateral edges of the blade portion of both artifacts. It takes the form of extensive and deep scalar scars overlain by step scars, with these scars and the edge of the bifaces being heavily abraded. In some places, the edge appears crushed. The pattern is relatively continuous along the entire edge, but is heaviest near the tip end. Sizes are: length 40.20 and 54.00 mm, width 19.05 and 20.40 mm, thickness 6.50 and 6.85 mm, weight 5.4 and 7.5 gm.

Specimen 5: This specimen (Fig. 10,g) is markedly plano-convex in both sections and was made on a flake, as is indicated by portions of a large flake scar on one face. The convex face is beveled on both edges and the base is thinned. Blade edge angles are high and the base has a low edge angle. Secondary percussion flaking is evident on the convex face as is some pressure flaking. The flat faces exhibit only marginal trimming except near the tip where flake scars cover the entire face. Edges are slightly more sinuous than those of Specimens 3 and 4. The specimen appears heat treated. This specimen resembles the

"Pointed/Ovate, Form 2" thin biface described by Lynn, Fox, and O'Malley (1977: 71, 73). As these authors noted, such bifaces are similar to the *Refugio* projectile point (Suhm and Jelks 1962:241-242).

Use-wear on the lateral edges is like that on Specimens 3 and 4 and a similar function is suggested. However, the tip end is extremely abraded, and step scars are confined to both edges of one face. This pattern does not conform to any type of action described by Tringham *et al.* (1974), but it does suggest drill wear to us. Size is: length 54.30 mm, width 19.10 mm, thickness 7.25 mm, weight 8.7 gm.

Concave Base (2 specimens)

These two items (Fig. 10,h) consist of base ends only and exhibit medial hinge fractures. Cross sections are biconvex. One specimen is made from common grainy brown chert, and the other is from a fine-grained brown chert which appears heat treated. The faces of both artifacts exhibit evidence of secondary percussion flaking and some pressure flaking. Flake scars exhibit mostly feathered terminations but some are hinged. Lateral edges are straight and basically parallel. The base is concave. All flaked edges are relatively straight as opposed to sinuous and edge angles are low. Basal thinning is evident on both specimens. The specimens are similar in shape to *Plainview* projectile points (Suhm and Jelks 1962:240-241). Both specimens evidence some grinding of the lateral edges near the base, a trait which is characteristic of *Plainview* points. In general, flaking is rougher than that associated with *Plainview* points.

As stated above, both specimens evidenced some edge grinding, but it is more evident on the specimen made of common grainy brown chert. In general, the edge damage is bifacial and well-worn step scars predominate. In addition to the bifacial wear, the specimen made from fine-grained brown chert exhibits unifacial step scars on alternate faces near the break. The step scars and the biface edge are well rounded. Sizes are: width 27.35 and 27.60 mm, thickness 6.05 and 8.05 mm.

Rounded End (4 specimens)

This is a catchall category for small rounded end fragments of thin bifaces of unknown shape. Similar specimens were observed at 41 LK 133, 41 LK 144, 41 MC 203, and 41 MC 205. Two exhibit snap fractures and two are hinge fractured. Three are made from common brown grainy chert, and one is from a pink fine-grained chert that is heat treated. Manufacture is by percussion. Three of the specimens have relatively straight edges, suggesting secondary flaking; one specimen exhibits sinuous edges. The edge angles tend to be low.

One specimen exhibits primarily unifacial use-wear in the form of scalar scars overlain by step scars, both of which are well rounded. The other three artifacts exhibit a similar wear pattern, but one which is bifacial; abrasion or rounding of the flake scars and edges is more evident.

Pointed End (5 specimens)

This category is a residual one for the pointed ends of thin bifaces. All items exhibit a medial hinge or snap fracture. These artifacts probably represent the tip ends of artifacts commonly considered to be projectile points. One of the specimens was broken in such a manner as to have removed only the stem, leaving the entire blade. The base end retains evidence of notching at both corners. Two artifacts are made from common grainy brown chert, one is from a fine-grained brown chert that appears heat treated, another is from a very red grainy chert which appears heat treated, and the remaining one is from a very fine-grained translucent white chertlike material. All items exhibit secondary percussion flaking over most of both faces, and two have small flake scars that are probably the result of pressure flaking. Two specimens exhibit alternately beveled edges, and one is beveled or at least steeply trimmed on both edges of one face. These items are biconvex in cross section and have a high edge angle. The other two specimens are also biconvex in cross section, but one face is more convex than the other. They have low edge angles.

One specimen exhibits use-wear primarily in the form of scalar scars that are removed bifacially at high angles. Some flake scars are overlain by step scars. Abrasion is minimal. Use-wear occurs intermittently along most of both edges, but is most apparent near the medial fracture. Cutting of medium or hard materials is the suggested function. Use-wear on another specimen takes the form of a well-abraded edge and an occasional scalar scar, with abraded areas being more concentrated on one face than the other. Large step scars also occur adjacent to edges but seem to be the result of deliberate attempts to remove flakes. Use-wear suggests longitudinal action on medium or soft materials, with the tool being held at an angle (about 90°) to the surface being cut. The three specimens with beveled edges exhibit similar use-wear, which takes the form of steep step scars and some scalar scars concentrated on the beveled face; some abrading is noted near the edge; the opposite face is more abraded. Only one specimen exhibits this pattern on the tip end.

Projectile Pointlike Bifaces (10 specimens; Table 13)

Chipped stone artifacts which are thought to have been attached to the end of shafts and intended to pierce and dispatch prey when projected have been termed arrowheads (Wilson 1898), arrow points, and spearheads (*ibid.*). By convention, the above artifacts are now most commonly referred to as projectile points. From a morphological standpoint, the term projectile point has been defined as "a bilaterally symmetrical, bifacially flaked stone tool consisting of two distinct parts: a distally pointed blade, and a haft element usually distinguished from the blade, by its assumed preparation for hafting by means of edge grinding, notching, lateral constriction or other modification" (Ahler 1971:6). Despite the fact that there are "those artifacts which an archeologist would consistently classify as 'projectile points' on the basis of size and shape" (*ibid.*), there are also questionable artifacts. For example, it has been noted of *Kinney* points that "it is quite possible that the longest and broadest specimens (or even all of them) are knives rather than projectile points" (Suhm and Jelks 1962:201). These questionable artifacts are those which lack notching, stems, or obvious basal grinding (such as that which occurs on Paleo-Indian points). They were described in earlier sections of this chapter and include *Abasolo*, *Desmuke*, *Plainview*, *Refugio*, and *Tortugas*.

TABLE 13. PROJECTILE POINTLIKE AND MISCELLANEOUS BIFACES

Site Number	Projectile pointlike	Miscellaneous
41LK31		H
41LK32		D
41LK121		
41LK152		A, B
41LK159	1 <i>Edgewood/Enson</i>	
41LK171	1 <i>Edgewood/Enson</i>	E
41LK181	1 <i>Frio</i> , 1 <i>Gary</i> , 1 <i>Perdiz</i>	
41LK183		
41MC199		
41MC201	1 <i>Pedernales</i>	F, I
41MC209	1 <i>Dart</i> , 1 <i>Pedernales</i>	C, G
41MC210		
41MC214	1 <i>Angostura</i>	
41MC217		
41MC225		
Isolated Find #2		J
Isolated Find #4	1 <i>Edgewood/Enson</i>	

Bifaces which are notched, stemmed, or exhibit obvious basal grinding are termed projectile points, and are briefly described as being like established projectile point types, i.e., *Pedernales*-like or *Angostura*-like. It should also be noted that we use the term projectile point in a descriptive sense (as opposed to functional) in the same manner as we employ the term thin triangular biface. As previously noted, this is what we mean whenever we use type names in this report, although names are usually given without the "-like" appendage.

Darl (1 specimen)

This specimen (Fig. 10,i) easily fits the description of the *Darl* point (Suhm and Jelks 1962:179-188). The right edge of both faces is beveled, slight shoulders are present, and the stem is parallel sided. The specimen is made from a fine-grained reddish brown, heat-treated chert and is missing the distal end of the blade. Use-wear is evident on the blade portion only. It takes the form of numerous well-abraded step scars that appear to be confined primarily to the edge and a small portion of the beveled face. Abrasion is apparent on the extreme perimeter of both faces, but more so on the edge of the biface, especially on small protrusions. This wear pattern is similar to that produced by intentional grinding of the edge as if to prepare the edge for additional flaking (Sheets 1973:217-218). It also resembles use-wear resulting from scraping bone or antler (Tringham *et al.* 1974:191). The specimen is from site 41 MC 209. Size is: maximum width 17.9 mm; minimum stem width 15.2 mm (length and weight not given due to incompleteness).

Edgewood/Enson (3 specimens)

These specimens (Fig. 10,j,k) exhibit mixed characteristics similar to both *Edgewood* and *Enson* types and, as has been noted, these two types could be combined (Suhm and Jelks 1962:183-184, 189-190). One specimen is made from a light gray grainy chert. It is wide and thin, with convex edges which have an almost serrated appearance. Both basal corners are missing. Use-wear is bifacial and consists primarily of abrasions; the tip is especially well rounded. This specimen is from 41 LK 171 and measures 46 mm in length, 29 mm in maximum width, 21.5 mm in minimum step width, and 6.55 mm in thickness; it weighs 9.4 gm.

One specimen (Fig. 10,j) is made from a light gray fine-grained chert. All four lateral edges are steeply trimmed, resulting in a beveled appearance. One lateral edge appears to have been broken and reworked. The edge condition is like that of the *Darl* projectile point. This specimen is an isolated find (number I-4). Size is: length 42.2 mm, maximum width 19.75, minimum stem width 13.25 mm, thickness 7.6 mm, weight 6.7 gm.

One specimen (Fig. 10,k) is made from a fine-grained pink chert that was probably heat treated. It is biconvex in cross section with a relatively high edge angle. The blade edges are convex and finely serrated. Use-wear is not readily observable. Edges are clean and sharp in appearance; the tool was probably not used after the edge was serrated. The specimen is from 41 LK 59. Size is: length 52 mm, maximum width 23.45 mm, minimum stem width 13.05 mm, weight 10.0 gm. Similar specimens were also observed at 41 LK 128, 41 LK 176, 41 LK 182, and 41 LK 187.

Gary (1 specimen)

This specimen (Fig. 10,l) easily fits the description of the *Gary* point (Suhm and Jelks 1962:197-198) although it is well beyond the geographical range of the type. It is made from the common grainy brown chert. Edge use-wear is not readily evident on most of the blade. Rather, edges are clean and sharp in appearance as if the tool had not been used. However, the tip does exhibit use-wear in the form of many small step scars that are primarily unifacial on one edge and bifacial on the other edge. The scars, faces, edges, and tip are well abraded. This type of use-wear is similar to that resulting from boring (drilling) action, but striations were not noted (Tringham *et al.* 1974:188, 192). The specimen is from site 41 LK 181. Size is: length 58.90 mm, maximum width 27.70 mm, minimum stem width 15.5 mm, thickness 7 mm, weight 9.0 gm. It is very similar to the "Contracting-Stem, Form 4, Thin Biface" described by Lynn, Fox, and O'Malley (1977:78-79).

Frio (1 specimen)

This specimen (Fig. 10,m) is like the *Frio* point as described by Suhm and Jelks (1962:195-196), including the U-shaped notch in the center of the base. It is made from a fine-grained pinkish chert which is probably heat treated. One corner of the base is missing. Use-wear is present on the blade edges in the form of well-abraded step and scalar scars distributed evenly along the edge. Abrasion increases near the tip. The pattern of use-wear is bifacial along one edge and unifacial on the other. This specimen is from 41 LK 181. Size is: length 38.15 mm, maximum width 22.15 mm, minimum stem width 17.25 mm, thickness 6.2 mm, weight 5.5 gm.

Pedernales (2 specimens)

These specimens (Fig. 10,n,o) most closely resemble the *Pedernales* point described by Suhm and Jelks (1962:235-236). One specimen (Fig. 10,n) is made from a fine-grained gray chert. Both the lateral and basal edges appear to be ground, as described by Ahler (1971:39). Use-wear is readily observable on only one lateral edge of the blade. It takes the form primarily of steep scalar scars, some of which are overlain by step scars on one face. This specimen is from 41 MC 209. Size is: length 55.05 mm, maximum width 28.1 mm, minimum stem width 17.95, thickness 8.1 mm, weight 11.3 gm.

The second specimen (Fig. 10,o) is complete and made from a reddish brown medium-grained quartzitelike material that was probably heat treated. Grinding of the stem edges is not evident on this specimen, and it is markedly biconvex in cross section. Use-wear is not readily observable on this item. It is from the excavated hearth at site 41 LK 201. Size is: length 66.95 mm, maximum width 29.8 mm, minimum stem width 21.4 mm, thickness 11.95 mm, weight 20.2 gm. A similar specimen was also observed at 41 MC 203.

Angostura (1 specimen)

This specimen (Fig. 10,p) is the base end of an *Angostura* point as described by Suhm and Jelks (1962:167-168). It is made from a very fine-grained gray

chert. Lateral and basal edges of the base have been ground. Flaking is predominantly in the form of bifacial, parallel flake scars which meet along the medial axis. The specimen was collected from the backdirt of an animal burrow at site 41 MC 214. Size is: width at the fracture 24.55 mm, width at the base 15.10 mm, thickness at the fracture 5.5 mm.

Perdiz (1 specimen)

This *Perdiz* arrow point (Suhm and Jelks 1962:283-284) is made from a fine-grained tan chert and is missing one barb and most of the blade (Fig. 10,q). The specimen is one of the two obvious arrow points recorded or collected during the survey and it is from site 41 LK 181. Minimum stem width is the only complete measurement and is 6.35 mm. A *Scallorn* point was observed at 41 LK 128.

Miscellaneous Bifaces (10 specimens; Table 13)

Items in this category are similar only in that they are bifacially flaked and do not readily fit into one of the other categories. They are individually described.

Specimen 1: This artifact (Fig. 10,r) appears to be made on a large flake, and some percussion flake scars are evident on both faces. It is circular in shape and made from a fine-grained gray chert. Its surfaces are lightly patinated and no cortex remains. It is plano-convex in cross section. Pressure flakes have been unifacially removed from portions of one edge. Edges are relatively straight and the edge angle is low. Use-wear is evident on the one edge exhibiting pressure flaking. It is bifacial and has steep scalar and step fractures which are extremely abraded. Step scars are predominant on one face. The edge is abraded and a few areas have a crushed appearance. This specimen was collected from site 41 LK 159. Size is: length 42.55 mm, width 36.9 mm, thickness 8.7 mm, weight 15.1 gm.

Specimen 2: This is a small oval biface (Fig. 10,v) made from a fine-grained light brown chert. Both faces are covered with short percussion flake scars which result in relatively thin edges with a much thicker midportion. The edge on one side of the medial axis is very sinuous and the other edge is rather straight. The specimen is complete except for a small portion of one end which exhibits a hinge fracture. Use-wear, other than slight edge abrasion, is not readily evident on this artifact; it may be an exhausted bifacial core. The artifact is from site 41 LK 159. Size is: length 47.15 mm, width 31.0 mm, thickness 13.35 mm, weight 18.7 gm. A similar artifact was observed at 41 MC 196.

Specimen 3: This biface (Fig. 10,w) is tear shaped and made on a flake of a light gray translucent chertlike material. One face is incompletely covered with percussion flake scars. The tip and one edge of the other face exhibit percussion flake scars. Some pressure flakes were also removed from both faces. The edge angle is low and the cross section is plano-convex. The specimen is complete. Bifacial use-wear is evident on all edges except the base. It takes the form of relatively continuous scalar scars, a few of which are overlain by step scars present in about equal numbers on both faces. The artifact is from site 41 MC 209. Size is: length 38.2 mm, width 21.7 mm, thickness 7.2 mm,

weight 5.7 gm. Similar specimens were observed at sites 41 MC 209, 41 LK 185 (2 specimens), and 41 LK 191.

Specimen 4: Percussion flaking has removed all cortex on this thick oval biface (Fig. 10,t) made from the common grainy brown chert. The artifact is biconvex in cross section. The edge angle is relatively high and edges are sinuous. This specimen is similar to the rounded end, thick bifaces, Specimens 1-2 and Specimens 10-11, except that the base (blunt end) is unifacially, not bifacially, flaked. Use-wear takes the form of scalar scars, some of which are overlain by step scars. These scars are distributed along both edges but are more evident in some areas. Both the scars and the biface edge are abraded. The pattern is unifacial on one lateral edge and bifacial on the other lateral edge. Use-wear was not noted on the base edge. This specimen is from site 41 LK 32. Size is: length 88.2 mm, width 50.6 mm, thickness 27.5 mm, weight 112.3 gm.

Specimen 5: The artifact (Fig. 10,x) is rectanguloid in shape and made from a fine-grained brown chert. It is incomplete, missing what was probably the tip. The medial fracture is hinged. Both percussion and pressure flakes are evident. The base end is thinned, but the artifact thickens abruptly and the blade portion is beveled from both edges on one face; the other face is flat. The artifact is markedly plano-convex in cross section. Edges are straight as opposed to sinuous. One lateral edge is straight in plan view, and the other is concave; the base is convex. Use-wear is evident on the lateral edge and on the base edge. Both edges of the beveled face exhibit extensive, steep scalar scars, some of which are overlain by step scars. Abrasion is also extensive on the scars and on the edge. Lateral edges of the flat face are also well abraded and exhibit an occasional scalar scar. The base end exhibits bifacial wear primarily in the form of steep scalar scars that are equally distributed on both faces. The scars and the edge are well abraded. This type of wear pattern suggests that the lateral edges were subject to transverse action such as scraping and the base edge was used to cut. The specimen is from site 41 LK 181. Size is: length incomplete, width 26.8 mm, thickness 9.3 mm, weight 12.8 gm.

Specimen 6: This artifact (Fig. 10,y) is the base end of a probable triangular-shaped thin biface. The medial fracture is hinged. It differs from thin trianguloid bifaces in that it exhibits extensive pressure flaking, especially on one face. It is made from a fine-grained dark brown chert that may be heat treated. Edges are straight as opposed to sinuous. The edge angle is low and the artifact has a biconvex cross section. In plan view all edges are straight. Use-wear is not readily evident on this specimen. The edge is extremely angular in appearance, and this damage may have occurred during final trimming. This specimen is from site 41 MC 201. Size is: length incomplete, width 38.35 mm, thickness 9.3 mm, weight 10.0 gm.

Specimen 7: This specimen (Fig. 10,s) is a squarish corner fragment of what was probably a large thick biface. The specimen exhibits one hinge and one snap fracture. It is made from a fine-grained brown chert that may have been heat treated. Percussion flaking has produced relatively straight edges with a high angle. The specimen has a biconvex cross section. One edge is slightly convex in plan view; the other is straight. Use-wear is apparent on both flaked edges. This specimen is from site 41 MC 209. All measurements are of incomplete dimensions: length 32.45 mm, width 49.8 mm, thickness 19.5 mm, weight 30.39 gm.

Specimen 8: A large trianguloid specimen (Fig. 10,u) with portions of both corners missing is made from a fine-grained dark brown chert that was heat treated. One face exhibits short secondary percussion flake scars which extend from one edge to the other. The specimen exhibits rather low edge angles and is biconvex in cross section. Use-wear is not apparent on this specimen. Rather, the face near the edge of the side exhibiting smaller flake scars is very angular, and the opposite face near the edge lacks damage except at the negative bulb. This pattern is probably the result of the manufacturing process. The artifact is from site 41 LK 31. Size is: length 66.25 mm, width (incomplete) 51.45 mm, thickness 15.25 mm, weight 51.9 gm. Similar bifaces were observed at sites 41 LK 31, 41 LK 132, and 41 LK 199.

Specimen 9: This is a complete T-shaped drill (Fig. 10,z) made from a fine-grained pink chert that was heat treated. Edges are bifacially worked, as indicated by the presence of small flake scars. The base end is biconvex in cross section and exhibits a low edge angle. The blade or bit is diamond shaped in cross section and thus exhibits a high edge angle. Use-wear is most apparent on the bit, where highly abraded unifacial step scars occur on opposite edges but alternate faces. Near the tip, the pattern changes and step scars occur on both edges of one face. Heavy abrasion is present not only on edges but also on both faces of the bit. Some abrasion is also present on the edges and face of the base end. It seems that this tool may have been used as a perforator. The specimen was collected from site 41 MC 201. Size is: length 50.65 mm, width at base 27.65 mm, width midway on the bit 9.6 mm, thickness 6.10 mm, weight 5.5 gm.

Specimen 10: This artifact (Fig. 10,aa) is probably the base end of a projectile point which has been reworked along one lateral edge and along the end of the blade portion. It is made from a fine-grained tan chert. The stem appears to have been large and rectangular with a slight shoulder. The shouldered side of the artifact exhibits both percussion and pressure flake scars. The reworked edge exhibits percussion flake scars and is more sinuous than the other edge. Use-wear is not readily evident on the lateral edges or the base. The reworked blade end exhibits numerous scalar scars and an abraded edge. The item is an isolated find (number 2). Size is: length 42.2 mm, width 23.45 mm, thickness 7.05 mm, weight 8.4 gm.

DEBITAGE

Flakes (571 specimens; Tables 14*, 15*)

The reduction of isotropic lithic materials by the application of force produces several kinds of debitage. Flakes are one of the most important kinds of debitage, and they can be recognized by numerous characteristics. On the dorsal (outer) surface, flakes can retain cortex and/or scars of previous flake removals (Chapman 1973:311). The ventral (inner) face, which originates from the interior of the core, usually exhibits a smooth surface, positive bulb of force, ripples (or "conchi"), the remnant of a striking platform, and force striations (cf. Chapman 1973; Speth 1972; Schaafsma 1977). The proximal end of the flake is the end that received the force and has the striking platform. Ventral ripple lines radiate outward from the flake's proximal end. Detailed

*Key to Tables 14 and 15 is on page 277.

TABLE 14. FLAKES*

Flakes were not collected from 41MC209 and 41MC214.

Site Number	Total Number of Flakes	FLK	Technotype			IND	6	5	Size				1	Dorsal Surface		
			BFK	BLD	PFK				4	3	2	1		1	2	3
41LK31	39	26	8	3	2	0	0	1	4	22	12	0	0	22	17	
41LK32	102	71	23	4	4	0	0	1	5	64	32	0	1	40	61	
41LK121	7	6	1	0	0	0	0	0	0	2	5	0	2	4	1	
41LK152	22	21	0	1	0	0	0	0	0	5	14	3	3	16	3	
41LK159	63	38	17	0	8	0	0	3	28	32	0	0	1	25	37	
41LK171	18	12	4	0	2	0	0	1	1	9	7	0	0	8	10	
41LK181	35	30	5	0	0	0	0	0	4	24	7	0	2	19	14	
41LK183	8	4	3	0	1	0	0	0	0	5	3	0	1	4	3	
41MC199	7	7	0	0	0	0	0	0	1	5	1	0	3	3	1	
41MC201	240	160	56	4	19	1	0	6	69	135	29	1	4	98	138	
41MC210	15	14	0	0	1	0	0	1	1	9	4	0	3	9	3	
41MC217	7	5	1	1	0	0	0	0	3	2	2	0	1	2	4	
41MC225	8	3	1	0	4	0	0	0	5	2	1	0	0	2	6	

*Key to Table 14 is on page 277.

TABLE 14. (continued)

Site Number	Platform Preparation						Platform Shape				Flake Termination					
	CT	ST	MT	GD	CRS	IND	FLT	CRV	TRI	IND	FET	RUN	FLT	STE	ZTE	IND
41LK31	9	9	14	1	5	1	15	11	12	1	18	0	11	6	1	3
41LK32	14	28	51	0	8	1	34	15	52	1	55	0	19	15	10	3
41LK121	2	3	2	0	0	0	6	0	1	0	2	0	1	3	1	0
41LK152	7	7	4	0	4	0	16	2	3	1	8	0	5	6	2	1
41LK159	6	14	35	0	8	0	21	8	34	0	24	0	20	7	9	3
41LK171	2	4	10	1	1	0	10	3	5	0	3	0	3	4	2	1
41LK181	11	11	12	0	0	1	23	1	10	1	13	1	11	5	2	3
41LK183	1	4	3	0	0	0	4	1	3	0	5	1	1	1	0	0
41MC199	4	2	1	0	0	0	4	1	1	1	3	0	2	1	1	0
41MC201	36	56	123	3	18	4	107	26	99	8	79	3	80	38	29	11
41MC210	3	3	6	0	3	0	6	4	5	0	4	1	2	7	0	1
41MC217	0	2	4	0	1	0	3	1	3	0	5	0	0	1	0	1
41MC225	0	2	6	0	0	0	4	1	3	0	2	0	1	2	1	2

TABLE 14. (continued)

Site Number	FGC	CBC	Material		PTW	QTZ	OTH	Heat Treatment	Complete
			CGC	WTC					
41LK31	14	25	0	0	0	0	0	10	14
41LK32	41	53	6	0	2	0	0	21	55
41LK121	3	3	0	0	0	0	1	1	1
41LK152	8	11	0	0	0	1	2	6	7
41LK159	30	31	1	0	1	0	0	19	17
41LK171	10	8	0	0	0	0	0	3	4
41LK181	17	11	2	3	2	0	0	8	11
41LK183	3	4	0	1	0	0	0	1	3
41MC199	5	0	1	0	1	0	0	2	1
41MC201	121	106	5	0	4	1	3	53	51
41MC210	6	9	0	0	0	0	0	3	6
41MC217	5	2	0	0	0	0	0	1	2
41MC225	6	2	0	0	0	0	0	5	2

TABLE 15. FLAKE UTILIZATION*

Site Number	Total Number of Flakes	Utilized	Location of Utilization					Type of Utilization		
			LAT	PRO	DIS	CON	MLT	TRN	LON	TLG
41LK31	39	12	6	0	3	0	3	12	0	0
41LK32	102	16	8	1	4	0	3	16	0	0
41LK121	7	1	1	0	0	0	0	1	0	0
41LK152	22	10	5	0	2	0	3	5	2	3
41LK159	63	11	6	0	3	0	2	11	0	0
41LK171	18	4	3	0	0	0	1	3	1	0
41LK181	35	4	2	0	2	0	0	4	0	0
41LK183	8	2	1	0	0	0	1	2	0	0
41MC199	7	1	1	0	0	0	0	1	0	0
41MC201	240	54	34	2	12	0	6	51	1	2
41MC210	15	5	4	0	0	0	1	5	0	0
41MC217	7	2	0	0	2	0	0	2	0	0
41MC225	8	1	0	0	1	0	0	1	0	0

*Key to Table 15 is on page 277.

descriptions of flake characteristics may be found in Mayer-Oakes (1973), Chapman (1973), and Speth (1972).

There exist numerous metric and nonmetric observations which can be applied to the analysis of flakes. For example, Reeves (1970) has produced a flake attribute list which covers 53 nonmetric and 25 metric observations. At the Hop Hill site in central Texas, Gunn and Mahula (1977) analyzed flakes according to 42 categories of observation (both metric and nonmetric). Other examples can be given; it is clear that the field of lithic flake technology can be extremely complex and time consuming. Analytical procedures for flakes should be directly related to the overall project research design and its objectives. Gunn and Mahula's (1977:235-255) analytical scheme provides a great deal of descriptive data. Using only some parts of this scheme can provide desirable information with some savings in time. The format used to describe the flakes obtained from the 1977 Choke Canyon project is a greatly condensed version of the Hop Hill flake technology format. In addition to specific provenience information, nine categories of information were recorded for each collected flake.

Each flake was first categorized according to its technotype (*ibid.*:237). Five categories were possible: (unspecialized) flake, bifacing flake, blade, pressure flake, and indeterminant flake.

Gunn and Mahula (1977:237) have described flakes in relation to the overall lithic reduction process:

If assumptions are made relative to the order in which each flaking technique is most probably used in a reduction sequence, the order is sequential from flakes to pressure flakes. Unspecialized flakes are produced in the initial stages of any flaking tasks.

Bifacing flakes retain a remnant of the biface edge from which the flake was struck. They often retain an overhanging lip, but not all lipped flakes are bifacing flakes: The dorsal surface of the flake must exhibit portions of the face of the biface which has been flaked. For the purposes of this report, a blade is a flake which is twice as long as it is wide. Both bifacing flakes and blades occur during the overall lithic reduction process as part of "...refined tool making" (*ibid.*). Pressure flakes are flakes which have been removed from the edge of an artifact "...by pressure with a tool such as an antler tine" (Schaafsma 1977:184). These flakes are characteristically long, thin, and slender, with noticeable ripple marks and irregular edges. Pressure flakes are quite easily broken. Gunn and Mahula (1977) note that pressure flakes occur last in the overall lithic reduction sequence; they are the products of final shaping and finishing as well as resharpening activities. Indeterminant flakes are specimens that could not be readily identified by the analyst.

Flake size is the second recorded category. We used a series of rings of known diameter as a measure of flake size (its largest dimension). The ventral face of the flake was held down on the rings when determining size. Size class intervals (in mm) were the following: 0-4.49, 4.49-10, 10-20, 20-40, 40-80, and greater than 80 mm. A similar measuring procedure has been used by Katz (1976),

Gunn, Mahula, and Sollberger (1976), and Gunn and Mahula (1977). Our intention was to observe the general size characteristics of the flake technotypes.

Dorsal surface cortication is the third flake description category. The dorsal surface may be 1) completely covered with cortex (corticated), 2) partially covered with cortex, and 3) completely lacking in cortex (decorticated). These three states provide a good indication as to the stage of lithic reduction from which the flake has been produced (cf. Lynn, Fox, and O'Malley 1977:51).

The next category of flake description indicates the kind of striking platform that still exists on the proximal end of the flake. Platforms that have not been altered are still covered with cortex. If the striking platform has been altered by the previous removal of a flake, then the platform is termed a single facet platform. Multifaceted platforms have been prepared by the previous removal of two or more flakes on the platform (*ibid.*) Striking platforms are often prepared by rubbing a coarse-grained rock along the striking platform. These ground striking platforms are usually rounded and rough in appearance (Gunn and Mahula 1977:238). The force of the blow to remove a flake may be too great for the striking platform, and it may be crushed or shattered. The last kind of striking platform is an indeterminate platform, when its characteristics are not observable.

The fifth category of flake characteristic describes the shape of the striking platform. This is the outline of the platform when viewed from the side. Gunn and Mahula (*ibid.*) describe the three kinds of platform shapes and why they are important to record:

The platforms of normal flakes and bifacing flakes are quite distinct in many cases. The reason is apparent when the relationship of the two types of flakes to their respective parent masses is examined. A core is something of a block from which a flake is removed. The angle between the outer face and the platform is about 90° or a little less. A biface, on the other hand, is a lenticular mass where edge angle becomes a striking platform. The result is a triangular platform.

A curved platform shape can be found on flakes removed either from a core or a platform (Gunn and Mahula 1977:238). We experienced difficulty in distinguishing among platform shapes' although we recorded them as well as we could, we do not consider platform shape to be a reliable indication of whether a flake was detached from a core or a biface.

The sixth flake descriptive category flake termination has also been strongly influenced by Gunn and Mahula (*ibid.*:239-240). Five kinds of flake end (distal) terminations can be recognized: feathered, flat, s-termination, z-termination, and runoff. Normal termination is seen as feathered, where the flake gradually tapers to a fine edge at the distal end. If the fracture front encounters the end of the parent material before tapering to a feather, the termination is a runoff. Broken terminations are classified by holding the flake with the ventral face down and with the break to the right. If the break protrudes at the top, it is termed an s-termination; if it protrudes more at the bottom, it

is a z-termination. A flat termination is self-explanatory. Gunn and Mahula (1977:240) suggest that study of terminations may help to differentiate intentionally made terminations from those caused by manufacturing accidents.

Flake utilization is the next descriptive category. All flake edges were macroscopically examined for characteristic edge damage resulting from use-wear. If utilization (use-wear) did occur on a flake, the placement of the wear was indicated: it could occur on lateral edges (sides of the flake), at the proximal or distal end, at a corner or juncture of the lateral edges and either end of the flake, or it could occur at multiple locations.

The eighth category of flake description is lithic material. Seven lithic types were based on observation in Choke Canyon during the field survey. An H was added to the material type code if there was evidence of heat treatment (cf. Hester and Collins 1974). We use the term common brown chert to describe the medium-grained gray to reddish brown chert which is most common in the reservoir area. Coarse-grained cherts are the same basic material, but with larger, more easily detectable grains. Fine-grained chert is also the same basic material as common brown chert, but the grains are not macroscopically detectable. Other material types are a white translucent chertlike material, quartzite, petrified wood, and other (miscellaneous).

Completeness is the last category used to describe flakes in our analysis. A flake is considered complete if it has a striking platform and feathered terminations on sides and ends. Any lateral, distal, or partial proximal snaps or terminations on a flake render it incomplete.

During the project, 571 flakes were collected from the tested sites and subsequently analyzed. Included are flakes from controlled and uncontrolled grab samples, surface collection units, and test pits.

Several general statements can be made regarding the flake collection as a whole. Interior flakes constitute the majority (52.2%); secondary cortex flakes make up 44.1%.

The flake technotype category provides some indication of whether a flake was detached from a core or a biface. If we consider the technotypes of unspecialized flakes (119 specimens) and bifacing flakes (297 specimens), then we can suggest that most of the flakes were probably removed from cores as opposed to bifaces. Almost half (47.5%) of all the flakes exhibit a multifacet prepared platform; 25.4% of the flakes exhibit a single facet prepared platform. Only 16.6% of the flakes have a cortex platform, indicating that the vast majority of flakes were removed from a prepared platform. Flake size categories reflect a bell curve, with 55.1% of the flakes being between 20 and 40 mm in size, 20.5% between 40 and 80 mm, and 21.4% between 10 and 20 mm. Very large flakes (greater than 80 mm) constitute only 0.7% of the sample while very small flakes (4.49-10 mm) represent 2.3% of the flakes. Common brown (medium grain) chert and fine-grained brown chert constitute 92.3% of the sample. Of the flakes, 22.4% show evidence of utilization.

Of the flakes that show evidence of utilization (128), 57.8% showed use-wear on lateral edges, 23.5% on distal edges, 3.1% on proximal edges, and 15.6% on multiple locations. Transverse action (scraping) was probably done with 93.0% of

the utilized flakes, longitudinal (cutting) action with 3.1%, and both types of action with 3.9%.

Chips (457 specimens; Tables 16*, 17*)

Chips are simply fragments of flakes which have had their proximal ends removed. These items retain flake characteristics, except that they lack a striking platform. Each item identified as a chip had the following information recorded: catalog number, specific provenience, type, size, general material type, heat treating, completeness, and utilization (edge wear).

Chip types are defined as follows: primary chips have dorsal surfaces completely covered with cortex, secondary chips have dorsal surfaces partially covered with cortex, and interior chips have no cortex on their dorsal surfaces. The amount of dorsal cortex on a chip is related to the stages of the lithic reduction process (cf. Lynn, Fox, and O'Malley 1977:52).

Chip size was determined by using the same graded rings used in the flake analysis; chip material types are also the same. A chip is considered incomplete if it has terminations or snaps on either lateral edge or at the distal end.

During the testing phase of the CRI survey, 457 chips were collected and subsequently analyzed. The majority (68.5%) are interior chips, as was the case for flakes. Primary cortex chips are lowest in frequency (3.9%), and secondary cortex chips represent 27.6% of the total. The vast majority of chips are between 10 mm and 40 mm in their maximum dimension. In general, chip attributes are similar to those observed for flakes, but there is a notable exception. Only 5.5% of the chips are classified as utilized, while 22.4% of the flakes are utilized. This suggests that flakes were more favored as a tool than were chips.

Twenty-five utilized chips were recorded from six sites in Choke Canyon. Two of these are primary cortex chips, eight are secondary cortex chips, and the remaining 15 are interior chips. Almost half of the collected specimens are from site 41 MC 201. Our data indicate that the vast majority of longitudinally utilized chips exhibit use-wear on a lateral edge.

Shatter (29 specimens; Table 18)

We have chosen to modify Schaafsma's (1977:183) term shatter to describe items, which are irregular pieces or chunks, lacking all evidence of being flakes or chips, but which are assumed to have been made by the deliberate application of force upon a core or cobble. The definition used by Schaafsma combines chips with shatter, while we have separated these two items into different categories.

The 29 shatter specimens collected during the 1977 survey are generally large (some smaller specimens were collected), chunky, and irregular in shape. Modified faces are angular and smooth or very irregular and rough. One specimen is a fine-grained petrified palmwood while the remaining are chert. Two

*Key to Tables 16 and 17 is on page 277.

TABLE 16. CHIPS*

Chips were not collected from 41MC209 and 41MC214.

Site Number	Total Number of Chips	Type-Dorsal Surface			6	5	Size			1	CRT	Material		OTH	Heat Treat- ment	Com- plete
		1	2	3			4	3	2			WTC	PTW			
41LK31	17	1	5	11	0	0	2	13	2	0	16	1	0	0	9	2
41LK32	29	1	8	20	0	2	5	17	5	0	28	0	1	0	6	22
41LK121	2	0	1	1	0	0	1	1	0	0	2	0	0	0	0	0
41LK152	6	3	3	0	0	0	0	3	2	1	6	0	0	0	0	2
41LK159	74	1	18	55	0	21	28	23	2	0	70	1	2	1	16	25
41LK171	8	0	1	7	0	2	5	1	0	0	8	0	0	0	2	1
41LK181	16	0	6	10	0	0	8	8	0	0	16	0	0	0	3	5
41LK183	4	0	2	2	0	2	1	1	0	0	4	0	0	0	0	1
41MC199	11	1	3	7	0	0	4	6	1	0	10	0	1	0	3	4
41MC201	261	9	69	183	0	7	121	112	21	0	258	2	0	1	19	60
41MC210	10	1	4	5	0	1	5	4	0	0	10	0	0	0	0	2
41MC217	11	1	5	5	0	0	6	3	2	0	11	0	0	0	1	9
41MC225	8	0	1	7	0	1	5	2	0	0	6	0	0	2	1	0

*Key to Table 16 is on page 277.

TABLE 17. CHIP UTILIZATION*

Site Number	Total Number of Chips	Utilized	Location of Utilization					Type of Utilization		
			LAT	PRO	DIS	CON	MLT	TRN	LON	TLG
41LK31	17	1	1					1		
41LK32	29	3	1		1		1	2	1	
41LK121	2	0								
41LK152	6	1			1			1		
41LK159	74	6	4		2			3	3	
41LK171	8	0								
41LK181	16	1	1					1		
41LK183	4	0								
41MC199	11	0								
41MC201	261	12	8		1		3	8	3	1
41MC210	10	0								
41MC217	11	1	1						1	
41MC225	8	0								

*Key to Table 17 is on page 277.

TABLE 18. LITHIC SHATTER, SPLIT COBBLES, HAMMERSTONES.

Site Number	Lithic shatter	Split cobbles	Hammerstones
41LK31	1		
41LK32	4		
41LK121		1	
41LK152	7	6	2
41LK159	2		2
41LK171	1		
41LK181	2		
41LK183			
41MC199			
41MC201	10	1	
41MC209			
41MC210		1	1
41MC214			
41MC217	2		
41MC225		1	

specimens may have been subjected to heat treatment. Eight of the tested sites contain pieces of lithic shatter.

Ground Stone (16 specimens, Table 19)

All items in this category are made from tabular medium-grained sandstone. Based on the relative curvature of the ground surface, general shape, incising, and completeness, items are placed into one of four subcategories.

GRINDING STONES (4 specimens)

Grinding stones (handstones/manos) exhibit a ground surface that is convex (Fig. 10,bb). They are thought to have been used with grinding slabs to grind or otherwise process vegetal seeds or fibers. One item is a small internal fragment (one that has been fractured on all four edges). Faint striations (probably caused by the grinding slab) are evident on the ground surface. One specimen is complete and wedge shaped in cross section, and trapezoidal in plan view. Size is: length 79.15 mm, width 66 mm, thickness 39.1 mm. Another specimen is complete, ovoid in shape, and ground on one surface; two sides appear to have been shaped by chipping. Size is: length 94.1 mm, width 75.5 mm, thickness 33.9 mm. The last specimen is basically ovoid in shape and shaped by chipping on two sides and on the unground face. Size is: length 125.5 mm, width 116.5 mm, thickness 29.25 mm.

GRINDING SLABS (5 specimens)

Grinding slabs (metates) exhibit a ground surface that is concave or very thick in cross section (Fig. 10,ee). One specimen is a very thick (46.7 mm) edge fragment of a probable grinding slab. Another is a medial fragment of a thick (43.65 mm) bifacial grinding slab. Two specimens fit together to form a portion of a thin (19.5 mm), slightly concave grinding slab which is missing two of its four edges. Faint striations probably caused by a handstone are evident on the ground surface. Another specimen is one end of a thick (50 mm) grinding slab with oval-shaped basins on both faces. One specimen (10,ee) is an edge fragment of a relatively thin (29.1 mm) grinding slab which probably had a ground basin. The only complete grinding slab is long and rectanguloid in shape with elliptical-shaped basins on both surfaces. The basin on one face exhibits faint striations, probably from the action of the mano, as well as several larger and deeper striations which are partially obliterated. This suggests that a harder stone, perhaps a denticulated chert tool, was used to form the initial basin shape. The other face exhibits more of the deep striations, especially on the edge of the basin. Faint striations, probably from handstone action, are also visible. Size is: length 53 cm, width 20 cm, thickness 5 cm.

INCISED (4 specimens)

These items (Fig. 10,cc,dd) exhibit grooves which have been incised into the face or edge of tabular pieces of sandstone. Tools of this nature are thought

TABLE 19. GROUND STONE

Site Number	Grinding stone	Grinding slab	Incised	Indeterminate
41LK31	0...			
41LK32				1
41LK121	0...			
41LK152	0...			
41LK159	0...			
41LK171	0...			
41LK181	1	2	1	
41LK183	0...			
41MC199	0...			
41MC201	3		3	
41MC209		3		
41MC210	0...			
41MC214	0...			
41MC217	0...			
41MC225				2

to have been used to sharpen other tools such as bone awls or needles. Several also exhibit a ground face. One specimen (Fig. 10,cc) is a small corner fragment of a relatively thick (34.77 mm) piece of sandstone. One face is ground flat and also exhibits four roughly parallel straight grooves. Another is also a small and thinner (30.15 mm) corner fragment with one corner-ground face. A single straight groove is incised into the ground face. One specimen (Fig. 10,dd) is a small thin (9.05 mm) rectanguloid fragment with two edges missing. One face is ground (convex) and exhibits faint, perpendicular striations, probably from its use as a grinding stone. However, one unbroken edge exhibits eight grooves and notches incised into the edge; the other unbroken edge exhibits two grooves or notches. Another specimen is complete and does not exhibit a ground flat or curved surface that would suggest a function as a grinding slab or handstone. It is trapezoidal in shape. One end exhibits a groove which appears to have been incised into the sandstone. Near the edge of the other end there is a hole (5.45 mm in diameter) that appears to have been bored at an angle through the face to the edge. The other edge of the same end exhibits a similar phenomenon, but the hole is much smaller and filled with compacted dirt; it may or may not be bored through, from face to edge. However, the incised groove is like those on other incised specimens. Size is: length 63.8 mm, width 40.75 mm, thickness 29.45 mm.

INDETERMINATE (3 specimens)

These pieces are small and exhibit a flat ground surface, but it is not known whether they represent fragments of handstones, grinding slabs, or other kinds of ground stone. One specimen is composed of seven fragments and represents the face and a midsection of a larger piece of ground stone. Another is from the same site (41 MC 225) and same level of the BOR borrow area head pit; it may be part of the above described ground stone item. The last is composed of two fragments. It is a small, relatively thick (33.1 mm) corner fragment exhibiting one flat ground surface. This is probably a grinding stone or mano fragment.

Hammerstones (5 specimens; Table 18)

Five cobbles exhibiting battering at one or more places were termed hammerstones. These artifacts are thought to have been used primarily as hammers in the manufacture of chipped stone tools. They may also have been used for pounding vegetal fibers or seeds. Alternatively, some of the tools in this category may have been intended for cores, but flakes could not be detached in the desired manner and this resulted in a battered edge. Considering the low number of hammerstones in the collection and the ready availability of cobbles suitable for hammerstones (this was observed during the survey and had been previously mentioned in Lynn, Fox, and O'Malley 1977), it is suggested that most cobbles used in hammering activities were subjected to minimal utilization (i.e., used once or twice for a short time) and did not develop substantial surface damage. Surface damage takes the form of numerous overlapping cones and step scars, resulting in an angular, rough texture.

Shape and material vary considerably among tools in this category. Three hammerstones are tabular in cross section. One specimen is ovoid in plan view,

made from a fine-grained dark brown chert, and exhibits battering on one end which resulted in the removal of several flakes. Another is made from common grainy brown chert and is crescent shaped in plan view. It exhibits battering on both ends; the battering at one end resulted in the detachment of flakes from both faces. The third tabular hammerstone specimen is discoid in plan view and made from a coarse-grained purple quartzite. It is the smallest of the hammerstones in the collection, and most of the edge appears to have been battered. Two hammerstones are nodular. The larger hammerstone is egg shaped and made from a coarse-grained gray quartzite. Battering occurs on one end and portions of one face near the battered end. The other specimen is blocky in shape and made from common grainy brown chert. It exhibits battering on one corner of one end and on the edges of the opposite end where battering is concentrated at one corner. Size ranges are: length 50.00-137.00 mm, width 44.50-82.70 mm, thickness 29.15-80.00 mm, weight 71.6-1168.9 gm.

Heat-Fractured Rock (2049 specimens; Table 20)

Heat-fractured rock is herein employed to describe lithic material which is considered to have been used in the construction of hearths. Lynn, Fox, and O'Malley (1977:89) use the term thermally altered stone to describe hearth stone. We use heat-fractured rock as a descriptive term and distinguish it from intentionally thermally altered or heat-treated lithics. The latter process is directly related to chipped stone technology. Heat treating is intended to alter lithic raw material by making it more amenable to chipping or perhaps to produce raw material better suited for specific tasks. House and Smith (1975:75-80) have conducted experiments and successfully distinguished between burned hearth stones and heat-treated chipped stone. Most of the heat-fractured rock from the study area is chert; sandstone is also common. Caliche or argillaceous limestone (Lynn, Fox, and O'Malley 1977:89) occurs much less frequently, and other materials (e.g., quartzite, petrified wood, and siltstone) are observed only rarely. The vast majority of heat-fractured rock was collected from the surface collection units at the tested sites. A small amount (less than 1%) was excavated from test pits and, in a few cases, heat-fractured rock was collected as part of the controlled and uncontrolled grab samples to document the occurrence of a particular material type.

Our descriptions of the major material types are based on observations of relatively intact hearths which are recognizable as concentrations of heat-fractured rock. The most obvious characteristic of heat-fractured rock is the red to dark gray or black color. Chert tends to spall and exhibit many hair-line fractures. Large cobbles tend to break into amorphous, but angular pieces. We have the impression that greater heat and/or prolonged exposure to heat produces smaller and darker colored chunks. Heat-fractured sandstone is generally reddish brown in color. Apparently heat also softens sandstone and causes it to fracture into small rectangular chunks. Smaller pieces, in general, may well be the result of more intense heat or prolonged exposure to heat, as is suggested for heat-fractured chert. Heat-fractured caliche is also very distinctive. It tends to exhibit a light to dark gray color which extends well into the body. Apparently heat also softens caliche; after fracturing (and perhaps with weathering), the pieces tend to be more rounded in appearance than other types of heat-fractured rock.

TABLE 20. HEAT-FRACTURED ROCK*

Site Number	Chert	Sandstone	Caliche	Other	Total weight
41LK31					not collected
41LK32	.064	.003	.013	.023	.103
41LK121	1.383	0	.042	.001	1.426
41LK152	1.751	0	0	0	1.751
41LK159	.826	.055	.209	.126	1.216
41LK171	.037	.017	.151	.042	.247
41LK181	.749	.174	2.062	.751	3.736
41LK183	.124	0	.008	.006	.138
41MC199	2.321	.179	0	.261	2.761
41MC201	7.468	8.523	0	.050	16.041
41MC209					not collected
41MC210	1.311	1.102	0	.062	2.475
41MC214	0	0	0	0	0
41MC217	1.134	.021	0	.145	1.300
41MC225	.001	.043	0	0	.044
Total weight	17.169	10.117	2.435	1.467	31.238

*weight in kg.

Heat-fractured rock comprises the majority (52.6%) of culturally related materials in the Choke Canyon Reservoir area. Since our collection procedures were designed to recover all recognizable cultural items, heat-fractured rock also constitutes the major portion of the collected materials. These items were cataloged according to material type and provenience. All pieces of heat-fractured chert from a particular 1-m² grid (within a 4-m² collection unit) have the same catalog number; heat-fractured sandstone chunks from the same provenience have a different catalog number. Heat-fractured rocks were described and analyzed according to material type, weight, and size. Size was measured by placing the artifacts on a sheet marked with concentric circles. The largest circle which encompassed the rock determined its size. Five categories were established as follows: 1) less than 2 cm; 2) 2-4 cm; 3) 4-8 cm; 4) 8-16 cm; and 5) greater than 16 cm. All items of the same material and from the same provenience were then weighed to the nearest tenth of a gram. Results are presented in Table 20.

Other Lithic Materials

SPLIT COBBLES (10 specimens; Table 18)

A variety (both in size and material) of chert cobbles has been modified by splitting in longitudinal or transverse or both directions. No evidence could be found of bulbs of force or striking platforms on the majority of the specimens. All faces that have not been split are covered with cortex. Faces that have been split are generally straight or angular and have not undergone subsequent modification after being split. Six of the 10 split cobbles were recovered from site 41 LK 152, a quarry site.

ALTERED GRAVELS (4 specimens)

Three pieces of small chert gravel and one piece of quartzite have been altered by the removal of one to three primary and secondary flakes. These flake removals are from one face of each item; the remainder is covered with cortex. The number of flake removals from each item, the small size of the items, and the lack of apparent use-wear all combine to suggest that these gravels have been naturally altered. However, many of the flake scars appear to have negative bulbs of force and/or striking platforms, which suggest cultural alteration.

PETRIFIED WOOD (5 specimens)

Five tabular specimens of petrified wood, generally large in size, were collected. They exhibit large, angular fractures on one or more edges. Examination of the fractured edges failed to produce evidence of a bulb of force or striking platform. Our conclusions are that these items were altered by an unknown method (or methods). All specimens were recovered from site 41 LK 152 (probably a quarry). Obvious artifacts made from petrified wood have already been described in the chipped stone sections.

UNALTERED SANDSTONE (19 specimens)

All items are from site 41 MC 225, test pit number 1. Judging from their color and texture, these small, amorphous pieces of sandstone are probably fragments from the several ground stone artifacts recovered from the test pit at 41 MC 225. The ground stone artifacts were probably broken when the area was mechanically cleared of brush and/or during excavation and screening; alternatively, some of the fractures may be the result of natural weathering. Two of the pieces appear to be stream worn and their occurrence at the site is probably a result of natural forces. One piece was recovered from level 1, 17 pieces from level 2, and one piece is from level 3.

UNALTERED GRAVELS AND COBBLES (18 specimens)

During field operations, these specimens were thought to be cultural artifacts. Most of the items were recovered from 1/4-inch screened material from test pits at sites 41 MC 199 and 41 MC 201. All items were closely examined for evidence of human modification, but these specimens lacked such evidence. Eight sites are represented by our collection of unaltered gravels and cobbles. The vast majority of these chert specimens were very small gravels.

Other Materials*Ceramics (1 specimen)*

One specimen of aboriginal ceramics was observed at 41 LK 176. The sherd is a thin body fragment with a dark gray paste and quartzite temper. The exterior and interior are undecorated and reddish in color.

Burned Clay (7 specimens)

These items are pinkish brown to tan in color and are irregular in size and shape. They are also fragmentary and easily broken. Most of the items were collected from 41 LK 31. One specimen exhibited striation on one edge, but the cause of these striations cannot be determined. We agree with the earlier observations of Lynn, Fox, and O'Malley (1977:89) concerning the nature of burned clay; they attributed the occurrence of some of their burned clay specimens to recent brush-burning activities. As a matter of fact, contemporary circular burned areas (with ash stains) containing burned clay nodules were observed throughout the survey area, and we recorded these in field notes. Each site (41 LK 32, 41 LK 159, and 41 LK 171) from which burned clay was collected also contained recent brush-burning areas.

*Faunal Remains**BONE (15 specimens)*

Bone was collected from five sites, and all were small pieces and fragments. Cultural association of some type can be assigned to bone fragments from three

sites. Two burned bone fragments were recovered from the surface of the historic component at 41 LK 159. Both pieces are small fragments of the articular surface of what was probably a long bone of a medium size animal, perhaps rabbit or chicken. Considering that the bone was burned, it seems reasonable to conclude that it is associated with other historic surface materials, and the animal from which the bone came was probably a food source for the recent historic inhabitants of 41 LK 159.

Bone was also excavated from two sites which are presumably aboriginal and prehistoric in nature. The test pit at site 41 MC 201 yielded one small fragment of unburned bone recovered from a level with heat-fractured rock and charcoal. This fragment is small and thick, and probably is from a large mammal. Because the bone fragment was from a level with hearth materials, it is probably associated with cultural activities, but the fact that the bone is unburned casts some doubt on this suggestion. Burned bone was also recovered from two levels of the test pit at site 41 MC 225. Level 2 produced seven tiny fragments, only one of which was burned; it is similar in nature to the one recovered from 41 MC 201. Level 3 yielded two fragments of burned bone. One is relatively thick and probably from a large animal. The other is a small hollow bone fragment, probably from a small animal. Since other cultural materials (e.g., ground stone, chipped stone, and heat-fractured rock) were recovered from the same levels, these bone fragments probably represent cultural activities, namely processing of at least two kinds of animals.

The uncontrolled grab sample from the backdirt of the Bureau borrow area head pit at 41 LK 31 included a fragment of a partially mineralized bone that may be from a turtle. While cultural materials were recovered from the same backdirt, the relationship of the bone is unknown. Two other bone fragments which appear to be very recent were recovered from the surface and are not associated with cultural activities. One bone is complete and part of the controlled grab sample at 41 LK 121. The bone is a metatarsal of a medium-sized animal. The other bone is from the surface collection unit at 41 LK 32. It is a long bone midsection from a medium-sized animal. The other bone is from the surface collection unit at 41 LK 32. It is a long bone midsection from a medium-sized animal. Cultural association is doubtful for the bone from 41 LK 121 and 41 LK 32 due to its surface provenience and recent (unweathered) appearance.

MUSSEL SHELL (84 specimens; Table 21)

Pieces of mussel shell (*Unio* sp.) were surface collected from eight tested sites during the 1977 survey. The vast majority of these items were fragmentary and often fairly small in size. Nineteen pieces were at least 90% complete, and were classified as whole specimens. These specimens all retained the articular hinge of the mussel and most, if not all, of the remaining oval shell.

The prehistoric inhabitants of the Choke Canyon area undoubtedly utilized river mussels as a food source and extracted them from moist, muddy stream and tributary banks.

Evidence of cultural modification is suggested from the appearance of the mussel shell. A few of the specimens collected and numerous specimens observed in the field have a dull gray color instead of the natural chalky white with a multi-color sheen. Such a color change is taken to be evidence of burning, either

TABLE 21. MUSSEL AND GASTROPOD SHELL

Site Number	Mussel shell (complete and fragments)	Gastropod shell (complete)
41LK31	13	1
41LK32	33	18
41LK121	5	10
41LK152	0	0
41LK159	16	12
41LK171	7	7
41LK181	2	250
41LK183	2	present; not collected
41MC199	0	1
41MC201	0	16
41MC209	present; not collected	present; not collected
41MC210	0	8
41MC214	0	0
41MC217	0	1
41MC225	6	0

to cook the river mussel prior to consumption or to dispose of the river mussel after consumption (i.e., throwing the remains of a meal into the campfire).

Two specimens recorded in the field at 41 LK 128 exhibit another kind of cultural modification. These shells have been altered by grinding one edge of the shell (one specimen) and by boring a hole into the shell (one specimen). The function(s) of these two specimens is not known, but shells made into pendants have been previously reported from the reservoir area (cf. Lynn, Fox, and O'Malley 1977:92).

GASTROPOD SHELL (324 specimens; Table 21)

Analysis of the gastropod samples collected during the 1977 Choke Canyon Reservoir survey was aimed primarily at identifying the genus of the whole individuals represented in our collection. Size of the individuals was also recorded. An overall initial examination indicated that many *Rabdotus* specimens were quite large in comparison to other individuals of the same genus. A size classification was then arbitrarily established for *Rabdotus* specimens, with small specimens being 20 mm or less in length and large specimens being greater than 20 mm in length. Length was recorded by holding each specimen with the aperture face down over a series of rings of known diameter. To be considered as a "whole" specimen, at least 75% of the shell had to be present. Fragmentary specimens were only recorded as existing; they were not counted. All gastropods were recorded by their provenience within one of the 1-m² grids of a 4-m² collection unit at a particular site. Gastropods were collected from sites 41 LK 31, 41 LK 32, 41 LK 121, 41 LK 159, 41 LK 171, 41 LK 181, 41 MC 199, 41 MC 201, 41 MC 210, and 41 MC 217. No gastropods were recorded from 41 LK 152, 41 LK 183, 41 MC 209, 41 MC 214, and 41 MC 225. However, no surface collection units were used at 41 MC 209 and 41 MC 214. Examination of field notes from the survey indicates the presence of gastropods at 41 LK 183 and 41 MC 209. No gastropods were observed at 41 LK 152, 41 MC 214, and 41 MC 225. Two of these sites (41 LK 152 and 41 MC 214) are upland sites, and 41 MC 225 is presently covered in coastal Bermuda grass.

Miscellaneous (3 specimens)

Several other items were recorded and collected. These are unique specimens whose characteristics are described below. No analysis of these items was undertaken. A piece of yellow ochre was collected at 41 LK 32, near a large Bureau of Reclamation borrow pit. Previous archaeological reports (Lynn, Fox, and O'Malley 1977) had not documented the presence of this material in the Choke Canyon Reservoir area.

At 41 MC 201, a fragment of wood was recovered from the third level of test pit 1. Examination of the wood fragment indicated possible initial cellular substitution with minerals, which would be expected with woody substances thought to be several thousand years old.

Another specimen was surface collected from 41 MC 201. It is a piece of soft gypsum, which probably does not occur naturally in the survey area and may have been brought to the site by an aboriginal occupant.

Historic Artifacts

Historic artifacts or materials from the Choke Canyon study area are readily recognizable as being items of nonaboriginal manufacture. For purposes of this report, historic materials are considered to have been made by people of mainly European extraction. It is possible that such historic materials were utilized and in some cases manufactured by Native Americans under the supervision of Europeans (Tunnell and Newcomb 1969; Scurlock and Fox 1977; Fox 1979). However, there is as yet no documented evidence of this occurring in the Choke Canyon area. Aboriginal groups undoubtedly exploited the Choke Canyon area during the Historic Period, but no definite evidence of such activity was recognized.

The objective of the historic materials analysis was multifold. We wanted to be able to date the occupation of the sites and to determine the substantive activities at those sites as well as possible. We also wanted to contribute to the body of information concerning the relationships between specific sites and the historic occupation of the reservoir area as a whole.

Historic artifacts are divided into four major material groups: metal, ceramics, glass, and other materials such as petroleum products and construction mortar. This follows the analytical scheme used by Lynn, Fox, and O'Malley (1977). Within each of the material groups there are smaller subdivisions based primarily on particular material types or on function.

Metal

In the Choke Canyon study area all items made from metal are considered to be historic in age. They are divided into four functional categories: household items (e.g., lock hasp, rake, wagon parts, farm machinery), construction items (e.g., wire, nail, hinge), ammunition (e.g., cartridges), and personal items (e.g., buttons, pens). Metal items were recovered from 41 MC 201, 41 MC 214, and 41 LK 159. Items recovered from these sites generally date during the last half of the 19th and the first half of the 20th centuries.

HOUSEHOLD ITEMS

Nine specimens from what appears to have been a cast-iron wood stove were collected from 41 MC 214. These pieces (three of which fit together) form part of the outer shell and interior of what seems to be one stove, judging from the texture, weight, and thickness (2.65-4.5 mm) of the metal. One small piece with all edges broken exhibits the molded letter "G"; another fragment, also broken on all edges, is embossed with an "N" and a "W" that are separate and appear to be part of two different words. Two other pieces may also be from the same stove, but they are heavier, finer textured and generally thicker than those parts more definitely associated with the stove. One of the heavier pieces is angular in shape, broken on two ends, and has a hole for a stove or machine bolt. The other piece is an edge fragment of a heavy circular item with a beveled edge; the raised, molded figure "N^o 1" occurs on the face. This item may be part of a lid covering one of the stove's burners. Four fragments that may also be pieces of a cast-iron woodburning stove or perhaps some other item were recovered from 41 LK 159. These pieces are similar in thickness

(3.0 3.5 mm), texture, and weight to those recovered from 41 MC 214. One of the fragments is broken on all edges, but portions of two distinct words are embossed on one surface, "ROCKW . . ." and "TENN . . ." suggesting that the item was manufactured in Rockw . . . Tennessee.

A variety of kitchen utensils was collected from 41 MC 214. These were: 1) the handleless half of a cast-iron skillet (about 20 cm in diameter, 5 mm high, and 2.6 mm thick); 2) about one-fifth of a cast-iron Dutch oven with legs (about 26 cm in diameter, 11 cm high, and 6.05 mm thick); 3) about half of a cast-iron tea kettle in two parts (about 23 cm in diameter, with a 15-cm opening in the top, 12 cm deep, and 3.85 mm thick); 4) a small portion of the edge or rim of a cast-iron skillet that was about 8.2 cm high, 3.85 cm thick; and 5) a tin pitcher with soldered seams and handle, about 22 cm high and 14 cm wide near the base.

Tin cans and fragments occurred at 41 MC 214 and 41 LK 159. All tin cans from 41 MC 214 exhibit soldered seams. One retains the "hole-in-top" and three others and their associated fragments exhibit similar characteristics on the overlapping soldered seams and/or a soldered and fitted top and bottom. Judging from the more complete specimens, these cans were about 12 cm high and 10 cm in diameter. Allowing for some distortion, these are probably No. 2 1/2 or 3 cans (Fontana and Greenleaf 1962:73). Two of these tin cans have been modified by making two holes (one near the seam) on opposite sides of one end and adding a ferrous wire handle. Another specimen is similar in size and has a fitted bottom, but the top is rolled and a handle appears to have been soldered to the seams (which are folded). A smaller tin can measuring about 8 cm high and 4.5 cm in diameter exhibits overlapping seams and a fitted bottom, all of which are soldered. The top, however, has an embossed ring which was intended to accommodate a removable lid. One tin can is large, measuring about 24 cm high and 18 cm in diameter; it exhibits overlapping seams. One end is missing and the other was soldered but has been modified (rounded inward) to facilitate attaching a secondary ferrous wire handle. There is also a small nail hole near the top. The remaining tin can collected from 41 MC 214 is a large lard can with overlapping seams and a fitted base, all of which are soldered. Attachments for a wire handle are soldered on opposite seams. This can is unusual in that it was presumably made from seven pieces of metal: two for the sides, as opposed to the more usual one-sided piece; two for the handle attachments; one each for the top (missing) and bottom; and probably a one-piece wire handle. This can is embossed with an oval, within which occur a balance, a star, and the words "ANGLO AMERICAN PACKING & PROVISION CO., TRADE MARK, PURE REFINED LARD." The soldered-seam tin cans, including the "hole-in-top" type, were invented in 1810 and lasted until the 1900s, but seemed to have been most popular in the United States from the 1860s to the early 1900s; by 1922 the modern open-top tin can had come into general acceptance (*ibid.*:68-73). All 49 tin can fragments from 41 LK 159 lack evidence of soldering and appear to be the modern "open-top" tin can.

FARM/RANCH EQUIPMENT

This is in part a catchall category for items which could not be readily identified. Items from 41 MC 214 include 1) a wrought-iron lock hoop; 2) a wrought-iron tine from a rake or pitch fork; 3) a heavy metal (cast-iron) ring measuring

10.6 cm in diameter, 5.2 cm in height, 1 cm thick at one end and .65 cm at the other end (this item may be part of a wagon wheel assembly); and 4) five small, flat, angular pieces of thin, tinlike metal, four of which were perforated during manufacture and one of which exhibits a nail hole. While these items may be pieces of farm machinery, their function is unknown and they might be classified as household items. A similar piece of thin metal exhibiting a metal stud bradded to the flat piece was recovered from 41 LK 159, and its function is also unknown. A tinlike piece that appears to be manufactured to cover the end of a piece of leather (harness or bridle?) was also collected from 41 LK 159. None of these items is readily identifiable.

CONSTRUCTION ITEMS

Three items from 41 MC 214 are placed in this category. One piece of heavy and twisted ribbon wire measuring 1.05 m in length, 1.54 cm in width, and 2.4 mm in thickness was collected from the site. The wire was probably used to construct a fence for livestock. This type of ribbon wire is most similar to Brink-Martelle barbed wire. It consisted of a single strand of round barbed wire stretched longitudinally with a smooth strand of twisted ribbon wire to form a single strand. The Brink-Martelle barbed wire was patented in 1885, but was apparently never widely distributed (McCallum and McCallum 1965:265-266). Except for the lack of attached barbs, which could have fallen or rusted off, the twisted ribbon wire from 41 MC 201 is like the Brink-Twist barbed ribbon wire.

The Brink-Twist wire was patented in 1879 and was seemingly more popular than its successor, the Brink-Martelle type (*ibid.*:255-256). This type of ribbon wire was designed by Jacob and Warren M. Brinckerhoff of Auburn, New York. It was stocked in south Texas hardware stores shortly after 1881 (McCallum and McCallum 1965:149).

The only square nail collected during the entire project came from inside the main structure at 41 MC 214. It is too badly rusted and burned to measure or describe in detail. The remaining item is a rectangular three-hole (each side), wrought-iron door hinge similar to those that can be purchased today at any hardware store.

AMMUNITION

Ammunition was recovered from 41 MC 201, 41 MC 214, and 41 LK 159. A .44 caliber spent cartridge with a headstamp "W.R.A. CO, .44, W.C.F." was recovered from 41 MC 214. This cartridge was used for the Model 1873 Winchester rifle and the Colt single-action revolver manufactured by the Winchester Repeating Arms Company of New Haven, Connecticut (Logan 1959:137). Another spent cartridge was collected from 41 MC 201 (which is within 300 m of 41 MC 214). It lacks a headstamp and is badly damaged but is similar to several .44 caliber cartridges patented between 1869 and 1875 (*ibid.*:90-91, 136-138). Presumably both .44 caliber cartridges could have been fired from the same revolver. A .30 caliber spent rifle cartridge with the headstamp "PETERS, .30 U.S.G." and a stainless steel primer was collected from 41 LK 159. This artifact was made some time after the introduction of the noncorrosive primer in 1927 (Moore 1963:74-75).

PERSONAL ITEMS

Items placed in this category from 41 MC 214 were two small keyhole covers. One is very small, made from thin iron (probably wrought), and shaped to fit into a box (possibly a jewelry box) enclosing the locking mechanism. It exhibits two slightly inset holes, probably for nails or screws, and one keyhole-shaped hole in the center. This artifact may have been for use on a larger box or perhaps a drawer. A well-worn Lincoln penny dated 191? was collected from 41 LK 159, as well as a metal four-hole button measuring 1.74 cm in diameter. The remaining specimen is a nonferrous short, tubelike fitting, that was probably part of a ball-point pen or mechanical pencil. It was collected from 41 LK 159.

Ceramic

Most of the ceramic items collected during the project are small fragments which lack maker's marks and are too small to provide reliable, finely bracketed dates. In order to allow for easy comparability among the various Choke Canyon studies, the type collection established during the Lynn, Fox, and O'Malley (1977) study was used to classify our ceramics. Ceramics are divided into four material categories: 1) terra-cotta, 2) stoneware, 3) earthenware, and 4) porcelain. Ceramic artifacts were collected from only two sites, 41 MC 214 and 41 LK 159. All items which could be assigned a range of dates fall within the last quarter of the 19th century and the first half of the 20th century.

TERRA-COTTA

Terra-cotta is a low-fired, unglazed pottery (Merritt 1971:243) which is generally reddish in color and commonly used for floor and roof tiles. Three pieces of reddish brown terra-cotta that are probably fragments of roofing tiles were collected from 41 LK 159. The one piece large enough to determine its morphology is a medial fragment, with all sides broken. It is rectangular in cross section. One surface is smooth and one is corrugated. The corrugated surface exhibits a series of parallel ribs about 1.5 cm wide and 3 mm high. Ribs are separated by a distance of 7 mm.

STONEWARE

For purposes of this report, stoneware is considered to be a ware which is thicker and has a softer paste than earthenware (it is easily cut or scratched with a knife blade). The paste is usually pinkish or dark gray in color. Stoneware sherds in this collection are primarily from large containers with flat bottoms, such as jugs or storage vessels.

Salt-Glazed Exterior

All sherds in this group are from 41 MC 214. Two wheel-turned sherds which are part of the base and body clearly fall into this group. One of the sherds is slightly burned. They exhibit a very glossy brown-slipped (resembling

Albany) interior and a salt-glazed exterior with an orange peel texture (Schuetz 1969:23-24). The paste is soft and pinkish brown in color. One other body/base sherd is similar in size and shape, but is too badly burned to discern the type of surface treatment. It is similar in shape and thickness to the burned body/base sherd with a brown interior slip and a salt-glazed exterior; it could be part of the same vessel. Three burned body sherds also have the brown-slipped interior and the salt-glazed exterior. Judging from the thickness of the body sherds, they may be from the same vessel as the burned body/base sherd. If so, two vessels are represented in the collection. This type of ware is similar to that described from the Elmendorf kiln near Berg's Mill, Texas. The Elmendorf kiln was producing utility ware from 1885 to 1916 or 1917 (*ibid.*:23). All sherds in this group are from straight-walled vessels. The base sherds are uniform in curvature and indicate that the vessels were flat bottomed and about 17.5 cm in diameter.

Another wheel-turned specimen is burned and has the same provenience as the above sherds. This specimen has a salt-glazed exterior and the interior is similar to that of one of the burned sherds with a brown-slipped interior. The exterior is stamped (in indented letters) with I. SUTT or SUTL. The stamp may be part of the word Suttles. The Suttles kiln operated at La Vernia, Texas, from 1872 to 1910, producing utility wares with a salt-glazed exterior and a terra-cotta colored interior that "looks like an unfired red clay slip" (Schuetz 1969:24). However, considering the fragmentary and burned condition, it can only be suggested that this sherd might have been manufactured at the Suttles kiln.

Bristol-Glazed Exterior

The single body fragment under this heading is from 41 LK 159. It resembles the Bristol glaze (opaque, glossy white to cream colored) (*ibid.*:23) below the shoulder. The shoulder itself is unglazed and above the shoulder is a brown slip which also occurs over the interior portion of the sherd. In comparison (with the specimens in the type collection), it is very much like the Bristol-Glazed Exterior jug which was manufactured by the Western Stoneware Company of Monmouth, Illinois after 1900 (Lynn, Fox, and O'Malley 1977).

Brown Glaze Exterior

One small body sherd is from 41 LK 159. The sherd is thin and exhibits a brown glossy slip on the exterior and a lighter brown or tan slip on the interior. The paste is very soft and pink in color.

Another fragment is a rim/neck sherd with a light brown, almost gold-colored glaze on the exterior and portions of the interior. The lower portion of the interior exhibits a clear glaze. The size and shape of this sherd are similar to those of the ginger beer bottles described by Schuetz (1969:26) which were manufactured in Scotland and were in use from the 1860s to the 1880s.

Alkaline-Glazed Exterior

The rim sherd and one body sherd under this heading are from 41 MC 214. These sherds are identical to those in the type collection and have an alkaline glaze which exhibits the "characteristic green glassy surface and crackling" (Lynn, Fox, and O'Malley 1977:195). The paste and surfaces are enough alike to have come from the same vessel. Based on the curvature of the rim and body sherds, the vessel was a large bowl. Dates were not available for this type of ware.

EARTHENWARE

In this report, earthenware is considered to be a ware that is generally thinner and harder than stoneware. Earthenwares are usually glazed, and with time both faces tend to exhibit significantly more crazing than do stoneware glazes. The paste tends to be white or lighter in color than that of stoneware; it is also harder (difficult to cut or scratch with a knife). Most of the earthenware in this collection represents plates, cups, and saucers.

Solid Glazed

One bowl sherd from 41 MC 214 has a cream-colored or light tan paste. The exterior has a clear glaze on a decorated (embossed) outer surface and a white glaze on the interior surface. The other specimen (two sherds which fit together) is a plate rim sherd from 41 LK 159. It has a white paste and exhibits a green glaze on both surfaces. Like the specimen described by Lynn, Fox, and O'Malley (1977:188), it has a molded rim and as a result appears to be banded because of variations in hue.

Clear, Embossed

Two specimens are described under this heading. One is a vertical handle to a cup or small serving bowl. The other specimen is badly burned but appears to be a horizontal handle from a serving bowl. Both have a white paste and clear glaze. The embossed designs are narrow parallel ridges separated by shallow grooves. These artifacts are from 41 MC 214.

Hand-Painted Geometric

All sherds in this group appear to be from the same large-mouthed jar (about 6 cm in diameter). The paste is white and very hard. A thick clear glaze has been applied to both surfaces. The one rim sherd has a raised lip and is void of designs, as are three of the body sherds. Ten of the body sherds exhibit blue-green lines applied under the glaze. The pieces are too fragmentary to determine the motif, but the general design is one of parallel lines, some of which are connected by diagonal lines. Only one specimen exhibits a curved line. The lines' edges are diffused and the hue varies, even within a given line. Similar sherds have not been reported from the Choke Canyon area, and neither a date nor source of manufacture can be assigned. However, we would guess that the vessel is Mexican in origin.

Clear, Undecorated

All items in this group have a white paste and a clear glaze applied to both surfaces. Three specimens are fragments of plates, and two of these are badly burned. Two are base sherds from plates. One exhibits a small portion of a shield design maker's mark. The other is badly burned, but retains a portion of a shield design maker's mark like that on the unburned specimen. The maker's mark on the burned sherd is also stamped with the word "CHINA." However, we were not able to identify this maker's mark. Another sherd is part of the rim of a heavy serving dish. All of the above sherds as well as two cup fragments are from 41 MC 214.

Three clear glaze, undecorated sherds were collected from 41 LK 159. They appear to be fragments of the same cup.

Porcelain

Porcelain sherds from the collection have a very hard white paste and a clear glaze applied to both surfaces. All porcelain sherds are from 41 LK 159. One sherd is a portion of the base of a saucer. Another sherd exhibits a stamped maker's mark, "MADE IN GERMANY." This type of maker's mark is reported on porcelain manufactured in the the 20th century (Schuetz 1969:22). One of the sherds is a very small piece that could be from any part of a plate, saucer, or cup. Part of a transfer-printed pink rose occurs on the exterior of the remaining porcelain sherd. This sherd is probably part of a cup, judging from its curvature. Considering the thickness, texture, paste, and glaze of the porcelain sherds, all could easily be from the same set.

Glass

A total of 92 glass artifacts were surface collected from two sites, 41 LK 159 and 41 MC 214, plus one isolated find (I-1). The majority of these items were from cylindrical bottles and jars. Our analysis will follow the glass descriptions presented in the earlier Choke Canyon survey report (Lynn, Fox, and O'Malley 1977:196-207, Appendix III), with glass color and morphology being the means for classification and discussion. Distinctive maker's marks will be matched to examples in Toulouse (1971) for potential dating.

The major breakdown of the classification of glass artifacts will begin with a color classification. Within each color category, morphological characteristics will be considered for further classification. Previous occurrences, as reported from the earlier Choke Canyon survey, will also be indicated where appropriate.

CLEAR

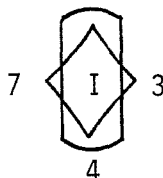
Morphological subdivision of transparent glass ranged from flat windowpane glass to rectangular embossed specimens to curved jar basal fragments and rims. Most of these specimens were recovered from 41 LK 159.

Windowpane

Five fragments of transparent windowpane glass were recorded and collected from 41 LK 159. All specimens have been subjected to heavy natural scratching and wear, and exhibit a light smoky patina. Four of the specimens are quite thick, ranging from 5.50 mm to 6.55 mm in maximum thickness. One example of thin windowpane glass, measuring 2.05 mm in maximum thickness, was also recorded from 41 LK 159. Thickness of the thin specimen is comparable to examples recorded at 41 MC 185 (Lynn, Fox, and O'Malley 1977:204, Appendix III). The thickness range at 41 MC 185 has been compared to windowpane thicknesses at other sites occupied after 1850, in particular the Carrington-Covert House, the late component of Mission Concepción, and Fort Phantom Hill (Roberson 1974; Mallouf ms.; Scurlock and Fox 1977:87). Thick specimens of windowpane glass have not been previously described.

Container

One item from 41 LK 159 is a thick, large basal fragment of a transparent gallon jug or jar. The interior is completely smooth, while the exterior is embossed with a maker's mark and is covered with wavy lines, making it difficult to see through the glass bottom. Portions of the container side remain, and a name, DURAGLAS, appears on one side near the junction of the side and bottom portions. The partial remains of a number, ?628, appear on another side, opposite the name. One seam line exists around the fragment where the bottom and side portions meet, and another seam line encircles the maker's mark and extends up the side past the other seam line to the fracture of the specimen. The maker's mark is:



This mark was used by the Owens-Illinois Glass Company. The number 7 indicates that the Alton, Illinois plant produced this specimen, and the number 3 indicates that the production date was the third one after 1929, or 1931. However, the DURAGLAS seal on the side has been produced only since 1940, according to Toulouse (1971:403). A similar mark (without the DURAGLAS seal) was recorded on a glass basal fragment from 41 MC 175 (Lynn, Fox, and O'Malley 1977:200).

One transparent glass fragment was surface collected from 41 LK 159. A multi-colored sheen patina is apparent on this artifact. The morphology of this specimen suggests that the original container was rectangular; this shape produces straight ridges and panels. This panel fragment is marked with the letters: MORDLIN. No additional markings were observed on this specimen.

Lorrain (1968:44) has noted that lettered panel bottles were initially made around 1867. Lettered panel bottles often contained patent medicines or bitters and were popular the last four decades of the 19th century (Lynn, Fox, and O'Malley 1977:200).

Three unmarked transparent panel glass body fragments were also surface collected from 41 LK 159.

Two thin rim fragments and one thick rim fragment were surface collected from 41 LK 159. All are mold-manufactured transparent glass pieces of wide-mouthed jars. Rim elements of raised ribs running below and parallel to the top of the rim indicate that these fragments were originally canning jars. Lids were clamped down with wire. This attachment is called the bail-latch or lightning stopper and was initiated in 1875. Since most early jars of this type were made of light-colored glass, these clear fragments probably date much later than 1875 (Munsey 1970:146). No additional marks were observed on these specimens.

One example of a transparent body sherd exhibiting rectangular molding was surface collected from 41 LK 159. This specimen is possibly from the broken canning jars just described.

Fourteen body fragments of transparent glass were recovered from 41 LK 159. One transparent glass body fragment was collected from 41 MC 214. All of the fragments collected from 41 LK 159 are slightly curved. Their spatial position (near the canning jar rim fragments) may indicate that these fragments are from the body of one or more canning jars also on the site. There is no patina on these fragments. The fragment from 41 MC 214 is irregular in shape and thickness, and has a slight seam across one side.

AQUAMARINE (2 specimens)

These items were surface collected from 41 MC 214 and are basal bottle fragments. One has an exterior seam running up from the base on the side. Previous work in Choke Canyon recorded aquamarine glass fragments from many sites in the reservoir area (Lynn, Fox, and O'Malley 1977:Appendix III).

The fragments exhibit patination and contain sharp fracture lines along their interiors where the bottom of the bottle has broken. Bases are rounded and smooth. Both fragments are essentially the same thickness and look like they could have been from the same bottle, but do not fit together.

ROSE (1 specimen)

This item exhibits the straight sides of panel bottles, but it has no markings. It was collected from 41 MC 214. This fragment has three sides remaining, and is broken from the area of the panel bottle near the base, where the thickness of the glass increases and the interior surfaces begins to flare in toward the base. A multicolor sheen and patination occur primarily on the exterior bottle surface.

GREEN (17 specimens)

Three green glass body fragments and 14 burned green glass fragments were surface collected from 41 MC 214. No time diagnostic items were observed within

the collected fragments. Previous archaeological survey work noted the presence of various kinds of green glass fragments at Choke Canyon sites 41 LK 66, 41 LK 73, 41 MC 15, 41 MC 74, 41 MC 166, and 41 MC 185.

Three fragments were surface collected from 41 MC 214, outside of the structural remains. Two specimens are thick (averaging 6.40 mm maximum thickness) and dark green; it is almost impossible to see through one of them. The remaining body sherd is much lighter in color and much thinner (about 3.0 mm maximum thickness). All specimens are fragments of a cylindrical bottle. No other marks were observed on them. Natural scratching and abrasion and light patina were also noted on these specimens.

Three burned fragments retain enough morphological characteristics to indicate that they were once rim portions of a green glass container. Intense heat has obliterated all other details of these fragments. All were collected from the interior of the structural remains at 41 MC 214.

Eleven other fragments of burned green glass were recovered from within the structural remains at 41 MC 214. Fire has reduced these items to amorphous lumps; only their color can be determined with any certainty.

PURPLE (2 specimens)

One of these items is a rim fragment and the other is a body fragment; they came from 41 LK 159.

The curvature of the rim indicates that one specimen came from a bowl. Exterior embossing occurs below the rim and lip, but the designs are not diagnostic. An interior and exterior seam runs parallel to the top of the rim, about in the middle of the lip. Ticking occurs immediately below the rim. No other markings appear on this fragment; the interior is smooth. This artifact may be part of a candy bowl or serving dish.

The other specimen is thinner and lighter in color. Intricate floral (?) embossing appears on the exterior of this fragment, while the interior is smooth.

WHITE (4 specimens)

These specimens came from 41 LK 159. Two of them fit together. None can be considered culturally or temporally diagnostic.


Two form a portion of the base of a small white glass jar. This jar had a flat bottom, but the method of closure on the top cannot be determined from these pieces. The white glass is relatively thick and almost opaque, giving a milky appearance to the jar glass. Two exterior ribs line the base of the jar, and two exterior ribs also appear closer to the top of the jar. The interior is completely smooth. Seams were not observed.

Two other specimens are small and thin with slight curvature, and both probably came from the body of a white glass container.

AMBER (39 specimens)

Amber glass fragments were the most numerous among the collection of glass fragments. When combined with clear glass materials, more than 60% of the collection has been categorized. Seven previously recorded historic sites in the Choke Canyon Reservoir area contained examples of amber glass, with 41 MC 185 containing the greatest number and variety of specimens (Lynn, Fox, and O'Malley 1977: Appendix III). Amber glass containers generally hold light-sensitive products (Schuetz 1969:29).

One complete bottle has a narrow mouth, a flaring rim, and has been machine made, since the mold seam runs up the sides and onto the top of the rim. Volume marks (in 50-ml increments) are embossed on one side. Seam marks indicate that this cylindrical bottle was made after 1903 (Lynn, Fox, and O'Malley 1977:197). Given the volume markings on the side, this container probably held medicine for veterinary work, and was probably closed with a rubber or plastic stopper. A wire fragment is still attached around the rim. The bottom is marked as follows:

7  7
1845
3

The bottle was made by the Owens-Illinois Glass Company at Alton, Illinois (Toulouse 1971:265, 403). The additional numbers below the seal make dating uncertain. This specimen was part of isolated find #1.

Another rim fragment was also recorded in the same isolated find as the veterinary medicine bottle described above. This rim is also machine made and is morphologically similar to the rim of the complete specimen, except that it is somewhat larger in overall size, with a larger flared rim and two extra ridges beginning to run down the side of the bottle. It also has a wire fragment attached to its rim, and probably served the same purpose as the complete specimen.

One amber glass rim fragment was surface collected from 41 LK 159. This specimen probably had a narrow mouth, much like a contemporary beer bottle. The rim lip is not prominent, and no seam was observed. A multicolor sheen patina exists on this item.

Isolated find #1 produced two basal specimens of an amber glass bottle. One has the numeral 6 or 9 embossed on the bottle while the other is unmarked. Both have a multicolor sheen. Given their provenience (in association with the veterinary medicine bottle), these items probably came from a veterinary medicine bottle.

PART II

HISTORICAL ARCHAEOLOGICAL RESOURCES OF THE
CHOKE CANYON RESERVOIR AREA IN
McMULLEN AND LIVE OAK COUNTIES, TEXAS

By

Philip A. Bandy

Report of a project carried out by the
Cultural Resources Institute
Texas Tech University

ABSTRACT

During previous surveys of the Choke Canyon Reservoir area in Live Oak and McMullen Counties, Texas, 17 historic sites (structures, refuse areas, cemeteries) had been located and examined. Further work in this area is described in this report and is summarized as follows:

Most of the above sites and 5 newly located ones underwent surface collection and test excavation. Sites were recorded and the collected artifacts described and classified. Suggested chronology and occupation are correlated with the findings of the historical research study (Everett, Part I of this report).

Evidence indicates that the area was most intensively occupied during the second half of the nineteenth century and that the inhabitants were Anglo-American, Black, Mexican, and possibly Mexican-American families. They were dependent on stock raising and strongly affected by the regional economy.

ACKNOWLEDGMENTS

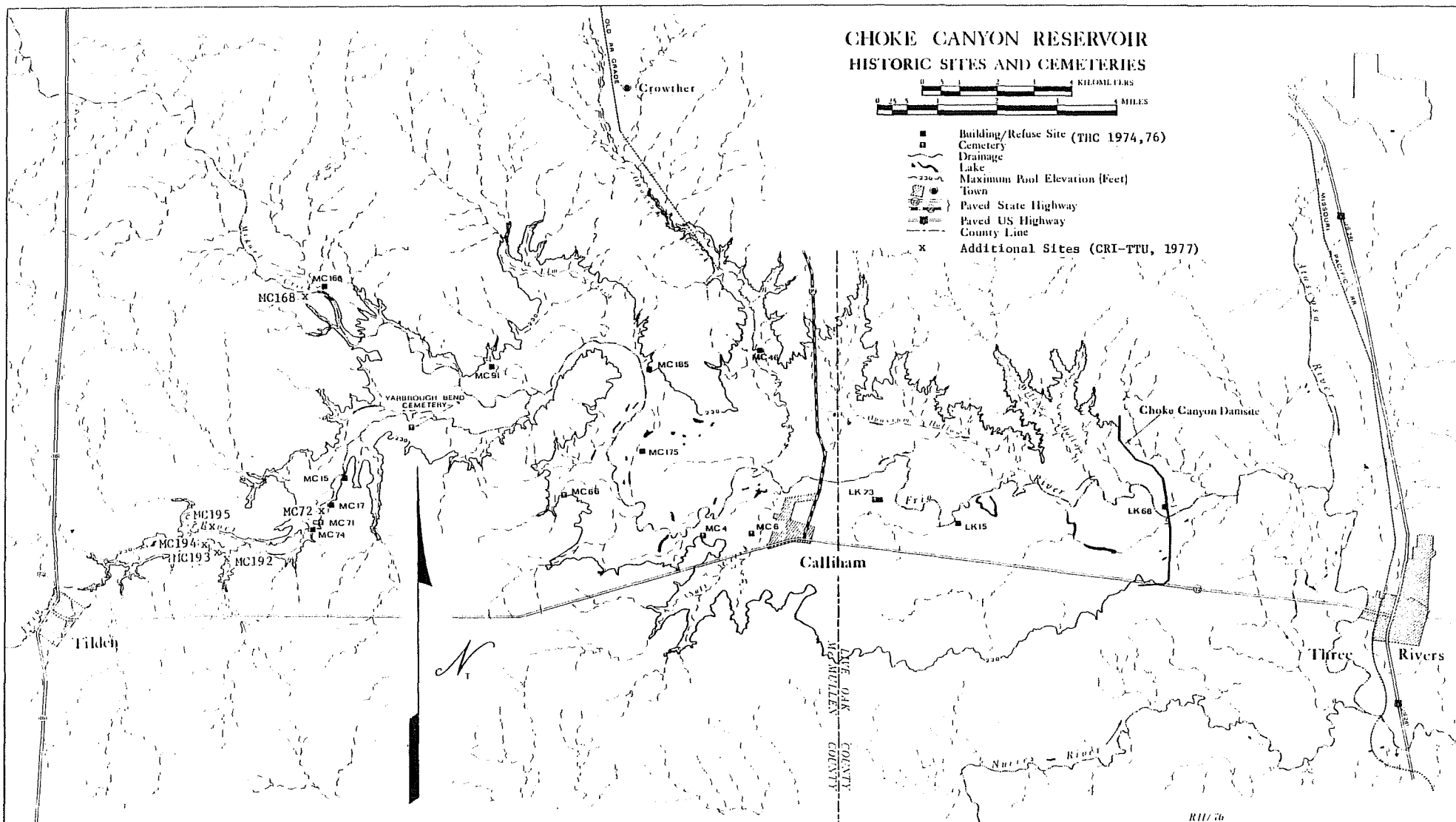
Daniel E. Fox directed the field work for this project; he was assisted by Paul D. Lukowski, William F. Fritts and J. Robert Lee. They wish to thank Max Quintanilla of Tilden, Texas, and his family for their help and hospitality. T. Jeffrey Campbell and George C. Knight assisted the author with the lab studies. Drafting was done by Brook Bowman and Ernest Macher, using the facilities of the Civil Engineering Department, Texas Tech University. Alice W. Portnoy served as project manager during the period of project activity. She also served as editor during the report writing and revising period. As editor she was especially helpful, drastically revising and improving initial draft manuscript prepared by the author. She also prepared the summary and conclusion section. The author is grateful to all of these persons and also to the many others who gave help and encouragement.

INTRODUCTION

This study of the historic archeological site resources of a portion of the Nueces River project is one part of a three-part subcontract project between Texas Tech University and the University of Texas at San Antonio. The subcontract project was carried out during the period from July 1, 1977 to September 1, 1978 by TTU's Cultural Resources Institute. As are the other two parts of the project (history and prehistoric survey), the historic archeology part is based on the Scope of Work requirements of Bureau of Reclamation RFP #50-V0897 and the subsequent proposal and research design submitted to UTSA by CRI (Mayer-Oakes 1977).

Previous archeological and historical research in the Nueces River project area has been very limited until recently. The first reported archeological investigations were conducted by Wakefield in 1968. His investigations were preliminary in nature and scope but reported the historic archeological sites 41MC15 and 41MC17. In 1974, the Texas Historical Commission and Texas Water Development Board collaborated and began surveying the reservoir area (Sorrow, O'Malley and Fox 1974 as cited in Lynn, Fox and O'Malley 1977:1). This field effort was resumed in 1976 by the Texas Historical Commission under contract with the Bureau of Reclamation. A result of that contract was a report (Lynn, Fox and O'Malley 1977) which included findings, initial evaluation and a summary of 17 historic sites. The historic sites comprised 11 historic structures or refuse areas and 6 cemeteries (Fig. 5). In addition, the land ownership history was checked to determine the identity of early inhabitants. It was on the basis of the THC work and recommendations that the Scope of Work for the CRI project (1977-1978) was determined.

Daniel Fox, part of the first (1974) and second (1976) THC teams, directed and carried out the field work for this investigation. Fox worked on 15 historic sites; ten were specified in the Scope of Work, five were newly located. While site 41LK73 on the Johnston ranch was scheduled by the RFP and proposal for a surface collection, access to the site was denied by the owner at the time of field work. Fox test-excavated 7 sites and surface collected 8; Philip Bandy surface collected 1 new historic site (Table 2). Results of their field work are presented in this report. The 6 new historic sites have been added to the THC map (Fig. 5). Study of these data gathered by Fox was carried out by Bandy who also prepared this report. The oral histories, land ownerships, historic records, and government documents were investigated by Dianna Everett and Stephen Head of the TTU-CRI history sub-project. Everett has prepared a separate report dealing with these aspects of the historical record. Tables 2-5 summarize TTU Historic Sites Archeology and Historical Research field work.



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permission of the Texas Historical Commission.

Figure 5. Project Area Map with Sites Located.

TABLE 2. HISTORIC SITES STUDIED, TTU-CRI PROJECT 1977-78.

New sites located	Mapped and surface collected	Tested and surface collected	Covered by historian	
* 41LK123	* 41LK159	41LK66 "Nichols House"	41LK15	41MC71
* 41LK140	41MC46	41MC15	41LK53	41MC72
* 41LK159	41MC91	41MC17	41LK66	41MC74
* 41LK163	41MC166 "Dump Site"	41MC72	41LK73	41MC91
41LK168	41MC168 "Teal Site"	41MC74	41LK159	41MC166
* 41LK197	41MC175	41MC185	41LK168	41MC168
* 41LK199	41MC185	41MC192	41LK197	41MC175
41MC72 "New Site"	41MC193		41LK199	41MC185
41MC192 "Dusek Site"	41MC194		41MC4	41MC192
41MC193 "Bracken Site"	41MC195 (surf. coll. only)		41MC6	41MC193
41MC194 "Horton Site"	* 41MC214		41MC15	41MC194
41MC195 "Teal House"			41MC17	41MC195
* 41MC214			41MC46	41MC214
* Historic component of site located by survey project (Thoms and Montgomery).			41MC55	Yarbrough Bend Cem. (no number)
			41MC66	

TABLE 3. DESCRIPTION OF SITES.

SITE NUMBER AND NAME	PHYSIOGRAPHIC SITUATION	UNDERLYING GEOLOGIC OUTCROP	NEAREST STREAM CHANNEL	DISTANCE (m)-- SITE TO STREAM		PROBABLE WATER SOURCE	NEAREST CONTEMPORANEOUS SITES OR CULTURAL FEATURES
				horiz	vert		
41LK66 Nichols House	valley wall, Frio River	Catahoula formation	Frio R.	244	13	cistern	41LK15, 73, poss. sites on Schwartz Ranch
41MC15	fossil flood plain margin	Lipan member, Fayette form.	Frio R.	12	9	Frio R.	41MC17, 71 cem., Yarbrough Bend Cem.
41MC17	fossil flood plain margin	Lipan member, Fayette form.	Frio R.	34	11	Frio R.	41MC15, 71 cem., 72, 74, Yarbrough Bend Cem.
41MC46	valley wall, Opossum Creek	Whitsett mem., Fayette form.	Opossum Ck.	91	4	dug well	41MC175, 185, poss. sites on Opossum Creek
41MC72 "New" Site	fossil flood plain margin	NA	Frio R.	40	7	Frio R.	41MC15, 17, 71 cem., 74
41MC74	fossil flood plain margin	Lipan member Fayette form.	Frio R.	46	10	Frio R.	41MC15, 17, 71 cem., 72

TABLE 3. (continued)

SITE NUMBER AND NAME	PHYSIOGRAPHIC SITUATION	UNDERLYING GEOLOGIC OUTCROP	NEAREST STREAM CHANNEL	DISTANCE (m)-- SITE TO STREAM		PROBABLE WATER SOURCE	NEAREST CONTEMPORANEOUS SITES OR CULTURAL FEATURES
				horiz	vert		
41MC91	valley wall, Frio R.	Lipan mem., Fayette form.	cut-off channel of San Miguel Ck., Frio R.	*	NA	cistern or well	41MC166, 185, Yarborough Bend sites and cem.
41MC166 "Dump" Site	Pleistocene terrace margin	Lipan member, Fayette form.	San Miguel Creek	20	NA	San Miguel Ck.	41MC15, 91, 168, Yarborough Bend cem.
41MC168 Teal Site	Pleistocene terrace margin	NA	San Miguel Creek	70	NA	San Miguel Ck.	41MC15, 91, 166
41MC175	Pleistocene terrace remnant	Whitsett member, Fayette form.	Frio R.	716	10	cistern	41MC46, 185
41MC185	valley wall, Frio R.	Whitsett and Lipan members, Fayette form.	Frio R.	128	11	Frio R.	41MC46, 175 Byrne cem.
41MC192 Dusek Site	fossil flood plain margin or valley wall		Frio R.	110	19	Frio R. Blackhill H.	41MC17, 71 cem., 72, 74, 193, 194

* 30m old bed, 700m present (S.M.Ck.)

TABLE 3. (continued)

SITE NUMBER AND NAME	PHYSIOGRAPHIC SITUATION	UNDERLYING GEOLOGIC OUTCROP	NEAREST STREAM CHANNEL	DISTANCE (m)-- SITE TO STREAM		PROBABLE WATER SOURCE	NEAREST CONTEMPORANEOUS SITES OR CULTURAL FEATURES
				horiz	vert		
41MC193 Bracken Site	valley wall (upland margin)	NA	Frio R.	155	11	Frio R.	41MC192, 194 poss. sites toward Tilden
41MC194 Horton Site	valley wall (upland margin)	NA	Frio R.	119	NA	Frio R.	41MC71 cem., 74, 192, 193, poss. sites toward Tilden
41MC195 Teal House	NA	NA	Frio R.	NA	NA	Frio R.	NA

NA -- Not Available

TABLE 4. CRI-TTU 1977 FIELD WORK.

SITE NUMBER AND NAME	HORIZONTAL EXTENT (sq m)	CONDITION	TYPE OF WORK DONE	DATES (1977)	AMOUNT OF TIME SPENT (days) by 4-man crew	RECOMMENDATIONS FOR FURTHER FIELD WORK
41LK66 Nichols House	1200	A	1	7/06-7/15	9.5	10 more days
41MC15	500	B	1	8/15-8/18	4.0	6-10 more days
41MC17	1000	C	1	8/01-8/10, 8/17	10.5	6-10 more days
41MC46	1200	D	2	7/19	1.0	0
41MC72 "New" Site	3000	D	1	8/23	0.8	1 more day
41MC74	700	E	1	8/10-8/12	2.5	3 more days
41MC91	800	E	2	7/27	1.0	0
41MC166 "Dump" Site	40	E	2	8/29	0.5	0

TABLE 4. (continued)

SITE NUMBER AND NAME	HORIZONTAL EXTENT (sq m)	CONDITION	TYPE OF WORK DONE	DATES (1977)	AMOUNT OF TIME SPENT (days)	RECOMMENDATIONS FOR FURTHER FIELD WORK
41MC168 Teal Site		D	2	8/29	0.3	1 more day
41MC175	1000	A	2	7/20-7/22	3.0	0
41MC185	1800	E	1	7/25-7/26	2.0	0
41MC192 Dusek Site	1200	C	1	8/19-8/22, 8/24	3.0	10-20 more days
41MC193 Bracken Site	2400	C	2	8/25	0.5	6-10 more days
41MC194 Horton Site	900	C	2	8/25	0.2	1 more day
41MC195 Teal House	1200	E	3	10/26	0.2 (1 man)	0

KEY

A relatively well-preserved
 B some areas preserved
 C partially disturbed by clearing/erosion
 D disturbed by clearing/erosion
 E badly disturbed by clearing, erosion

1 surface collection and intensive testing
 2 surface collection and mapping
 3 surface collection

TABLE 5. SUGGESTED CULTURE/CHRONOLOGY.

SITE NUMBER AND NAME	CULTURAL/CHRONOLOGICAL AFFILIATIONS SUGGESTED BY ARCHEOLOGICAL FIELD WORK AT SITE	CULTURAL/CHRONOLOGICAL AFFILIATIONS SUGGESTED BY HISTORICAL RESEARCH	DIAGNOSTIC SPECIMENS DETERMINED BY LAB ANALYSIS
41LK66 Nichols House	1870s-1930s, poss. to present Anglo-Amer	1858-1954 Anglo-Amer	glass pre-1880 1860-90 nails pre-1900 many, varied 1900-60
41MC15	1850s-70s (80s(?)) Anglo/Mex-Amer	1870s & 80s Anglo-Amer Mex	ceramic 1850-70 1860-1900 nails pre-1900
41MC17	1870s & 80s Anglo/Mex-Amer	1870s & 80s Anglo-Amer Mex	ceramic 1860-1900 pre-1900 1880-1910 glass 1880-1910 nails pre-1900 cartridges 1860-1920
41MC46	late 1860s or early 70s to 1890s Anglo/Mex-Amer	1880(?) to ?	ceramic 1860-90 glass post-1910 tin can post-1880
41MC72 "New" Site	1870s-90s Anglo/Mex-Amer	1870s & 80s Anglo-Amer Mex	ceramics 1850-1880 1860-1900 glass 1860-1900 1880-1915 nails pre-1900

TABLE 5. (continued)

SITE NUMBER AND NAME	CULTURAL/CHRONOLOGICAL AFFILIATIONS SUGGESTED BY ARCHEOLOGICAL FIELD WORK AT SITE	CULTURAL/CHRONOLOGICAL AFFILIATIONS SUGGESTED BY HISTORICAL RESEARCH	DIAGNOSTIC SPECIMENS DETERMINED BY LAB ANALYSIS
41MC74	1850s-80s Anglo/Mex-Amer		ceramics 1840-70 1850-70 1855 1860-70 1860-1900 pre-1900 glass 1860-1900 1880-1910 nails pre-1900 post-1900
41MC91	1870s-1930s (possibly to present) 3 occupations(?) Anglo/Mex-Amer	1860s - recent 1860s Anglo-Amer 1880s Mex, Black	glass 1880-1910 post-1910 nails pre-1900 post-1900 cartridges 1870 to present
41MC166 "Dump" Site	1880s-90s	1882 - (see MC168)	glass 1860-present 1880-1910 nails pre-1900
41MC168 Teal Site	1880s-1910	1882 - 1882-88 Anglo/Amer 1888 Black	ceramics post-1880 glass pre-1880 1880-1900 cartridges 1880 to present

TABLE 5. (continued)

SITE NUMBER AND NAME	CULTURAL/CHRONOLOGICAL AFFILIATIONS SUGGESTED BY ARCHEOLOGICAL FIELD WORK AT SITE	CULTURAL/CHRONOLOGICAL AFFILIATIONS SUGGESTED BY HISTORICAL RESEARCH	DIAGNOSTIC SPECIMENS DETERMINED BY LAB ANALYSIS
41MC175	1880(?)-		glass 1890-1910 nails pre-1900 many, varied 1910 to present
41MC185	late 1860s-80s Anglo/Mex-Amer	1870(?)-	ceramics 1850-1900 1860-1870 glass 1860-1900 1880-1910 nails pre-1900 post-1900 tin cans 1870-90 1870-1900 pre-1920 Mexican ceramics present
41MC192 Dusek Site	1850s-80s Anglo/Mex-Amer	1860s-80s Anglo-Amer	ceramics 1850-70 1850-1900 1860-70 1860-1900 glass 1860-1900 1880-1900 nails pre-1900 post-1900 tin cans pre-1900 pre-1920 gun part 1830-70 coin (Mex) 1870 Mexican ceramics present

TABLE 5. (continued)

SITE NUMBER AND NAME	CULTURAL/CHRONOLOGICAL AFFILIATIONS SUGGESTED BY ARCHEOLOGICAL FIELD WORK AT SITE	CULTURAL/CHRONOLOGICAL AFFILIATIONS SUGGESTED BY HISTORICAL RESEARCH	DIAGNOSTIC SPECIMENS DETERMINED BY LAB ANALYSIS
41MC193 Bracken Site	late 1860s or early 1870s-1880s Anglo/Mex-Amer	1860s-80s Anglo-Amer	ceramics 1850-1900 glass 1860-1900 1880-1900 nails pre-1900 tin can pre-1900 gun part 1860-1890
41MC194	late 1860s-80s Anglo/Mex-Amer	1860s-80s Anglo-Amer	
41MC195 Teal House		1878 - Anglo-Amer	ceramics 1860-90 nails pre-1900 cartridge 1870-90

The surveying of previously unsurveyed Nueces River project land by the Texas Tech survey team (directed by Alston Thoms and John Montgomery) recorded 7 more new sites with historic components (Table 2), 2 of which were surface collected and are described in their report. The intensive mapping, testing, and evaluation team from UTSA also encountered several more previously unreported historic sites.

The research design for the project was spelled out by Fox in the Texas Tech University proposal (later modified). The project may be viewed as a problem in frontier economy. Everett has in her report a discussion of theories on frontier economy operation, development, and structure. She demonstrates that the project area fits one theory or model which describes first, the development of towns or economic centers in a regional network, then second, the "filling-in" of the local economic matrix.

Frontier economy has been considered in a regional context, but details of local economy need further study. Based on what we know of the regional and local economy, the local people were bound by the regional and national economic system and were a primary resource base utilized, manipulated, and controlled by this system. We know that several major shifts in the regional economy had marked influence on the project area in terms of the way resources were utilized and what products were produced. For example, when the cattle market went bad, people shifted to raising turkeys and sheep, and then shifted back to cattle when the market improved.

Collection, analysis and interpretation of data, both historical and archeological, are resulting in increased understanding of regional history and of frontier economy generally.

FIELD WORK

The field work, during summer of 1977, was a Phase I investigation of the historic structure/artifact scatter sites. The activities were directed toward a systematic evaluation of these sites by using both surface and subsurface recovery procedures. The intensity of examination was determined in part by the nature of each site, especially its potential to be chronologically dated. In general, each site was examined for the presence and nature of architectural features, and the time period of occupation based on datable artifacts. These data were recorded on detailed plane table/alidade-produced contour maps and diagrams or floor plans, when applicable.

Surface Collections

The artifacts scattered on the surface were collected by several procedures. The larger, more intact, and intensively examined sites were collected with more rigorous controls than smaller, more disturbed sites. Many marginally significant sites were sampled by a "grab sample" procedure of picking up items which might give clues to age of the site. The exact provenience of these specimens was not recorded other than being from a particular site. The sites which were systematically surface collected were either divided into areas or sections and all artifacts collected by these general proveniences, or each artifact or cluster of artifacts was individually plotted on the site map. Sites which were divided into sub-areas were done so mostly by utilizing existing features such as plant or topographic zones, roads, fences, architecture, etc. Some sites were collected using a combination of techniques, by collecting all the "general type" artifacts (e.g., glass sherds, nails) and mapping in specific "important" specimens (e.g., gun parts and diagnostic ceramics). Artifacts with exact locational information are shown on the site maps when possible and are tabulated by collection units for each site when possible. All surface evidence of architecture could, of course, not be collected, but was recorded (i.e., drawn, measured, and photographed) and then plotted on the site maps.

Excavations

The excavations of historic sites were directed primarily toward the recovery of architectural data. The location of excavation units was determined by surface evidence concentrations, suggesting where subsurface features might be found. For example, rock alignments exposed on the surface may be parts of buried walls. The hypothesized

buried walls were then "checked for" by excavation or sweeping away vegetation and debris with a broom to determine if these features were there. Most of the structures probably had earth floors which are usually poorly preserved. It was hoped that some sections of floor might be preserved. Since such floors are generally best preserved in room corners, some of the suggested or observed corners were excavated to find the floor. Areas that were suspected to be structures or where wall locations were not fully detectable were tested by trenching across the area. Where there was evidence of architecture such as walls or chimney foundations, these features were sectioned to disclose methods and details of construction.

Supra-surface Investigations

Some historic structures are still standing in the project area and warranted special consideration. Two extant houses, 41LK66 and 41MC175, were measured, photographed, and floor plans drawn. Site 41MC17 has an extant chimney of sandstone block masonry. Stone chimneys were probably common in the project area. Most sites were marked by mounds of sandstone blocks and upon close examination have chimney foundations associated. To fully document these features above ground, considerable brush clearing usually had to be done. The project area has heavy brush; this has occurred since the original Yarbrough Bend settlement period and is primarily the result of grazing practices. In some cases, a relatively thin layer of dead vegetation and foliage masked features and was raked up or swept from the ground surface. All exposed artifacts and architecture were then recorded. As each site is slightly different, field techniques were used in various combinations.

LABORATORY ACTIVITIES

The temporal placement of sites is of paramount importance and it was toward this end that the bulk of lab activity was directed. Major activities are listed below:

1. Identify and tally (by lot) all nail types to gain clues as to the specific details and possible time period of construction of each site, using a nail typology developed and used by Fontana and Greenleaf (1962).

2. Identify and date all metal containers (tin cans) by the chronology of manufacturing processes. Various types of cans might also help determine the economic function of the site and its occupants.

3. Identify and photograph all ceramics with maker's marks. Manufacturers of English ceramics (which comprises the majority of the assemblage) often had short existences; the identification of a manufacturer can therefore help to indicate the time period of manufacture and hence of earliest possible occupation.

4. Classify all ceramics by material type. Some types have restricted time occurrence and so are temporally definitive. Some types were more costly and can serve as an index of socio-economic status.

5. Identify and tabulate personal household items such as toys, clothing and toiletry remains; such items are often age and/or sex specific.

6. Identify all machinery parts (cast or wrought metal); their function is indicative of economic activity.

7. Classify and count glass sherds, evaluate intra-site and inter-site distributions. Glass is of two types, windowpane, and container. Window glass indicates the presence of architecture and possibly economic affluence. Shapes of glass containers are sometimes diagnostic of contents and may give clues to site function or social stratification. Such items as perfume bottles may indicate sex; historic census records might be matched to such archeological data. Manufacturing techniques of bottles are also temporally diagnostic and can be determined.

Here we can note that both population and agricultural censuses have occupational information. Some persons were called "cowboys,"

some "shepherds," some "share croppers." Historically we have conceptions of social status and economic affluence associated with certain occupations. These conceptions may or may not be correct. Lab analyses may help provide data which will serve as a gauge of the accuracy of these conceptions.

ARTIFACT DESCRIPTION AND CLASSIFICATION

The previous work on artifacts from the Choke Canyon sites by Lynn, Fox and O'Malley (1977) was used as a model for artifact classes where possible to allow for comparability between studies, but some modifications were made to meet the needs of this project. Artifacts were cleaned and catalogued and then segregated into general categories of material, e.g., ceramic, glass, metal. Where possible, analytical categories were determined by some function that could be diagnostic of time period. Most materials were subdivided into these use categories, the balance into descriptive categories. Table 6 outlines the artifact classification and Table 7 lists the artifact inventory.

Ceramic

The most numerous artifacts are ceramic. There are three major groups of ceramics present: earthenware, stoneware, and porcelain. Some ceramic specimens were difficult to classify within these types. Each of these categories was subdivided further, based upon observed differences in paste, glaze, decoration, manufacture, and vessel shape and/or function. Only a few sherds displayed maker's marks (Fig. 6, h-j).

Earthenware

White paste, clear glaze

This class of artifacts is of two types, decorated and undecorated. The undecorated sherds are probably the most frequently found artifacts in the entire assemblage with the possible exception of square cut nails. The volume of undecorated earthenware is reflective of a preference by the 19th century inhabitants for such wares probably by default (economic restrictions).

The decorated wares are of two main types: 1) those with decorations applied to the surface and 2) those with decorations molded in the paste. These wares are made with a raised design which is accentuated by the glaze having a slight green tint flowing in differential thickness around the raised design making the design visible (Fig. 6, p). These embossed designs are restricted to the rims of vessels (mainly plates) and represent a style of decoration popular mainly through the last half of the 19th century. The balance of the decorated white paste wares are colored designs applied to the vessel by various techniques. The following descriptions pertain to each decorated (non-embossed) ware type, some of which are semidiagnostic of particular time periods and can be used as chronological indicators.

Blue transfer printed ware

The most abundant decorated ware type, this has various floral, geometric, and scenic designs in blue on a white background (Fig. 6, n). The design is put on vessels from a master copper plate. The copper plate is embossed with the design and is dressed with a thin coat of linseed oil. The excess oil is wiped off leaving the embossed or imprinted design concavities filled with oil. This oil pattern is then picked up with a paper sheet by pressing it against the plate and then against the vessel. This process effectively and quickly transfers the design from the copper plate to the vessel. The still wet oil droplets on the vessel are then carefully dusted with powdered pigment which sticks to the oil areas. Firing of the vessel then fixes the design permanently to the vessel. The designs are typically composed of multiple stipples, many of which fuse (Godden 1964:113).

Variations of wares were created by firing in a chlorine kiln atmosphere (flown blue), using purple pigments (purple transfer printed ware), or using black pigments (no examples found).

The transfer print technique was developed in the 1750s but was used mainly on porcelain until the early 1800s. Between the years 1800 and 1825 over 50% of all English earthenware produced was decorated with this underglaze blue. During the first half of the 19th century, America was a primary market for English potteries. Blue transfer printed ware is still manufactured today.

Flown blue transfer printed

Similar to regular blue transfer printed ware, flown blue is manufactured the same way except for the final firing. The firing atmosphere has chlorine (Godden 1964). The visible difference is in the sharpness of the colored image (Fig. 6, k). The chlorine atmosphere causes the blue coloring to diffuse into the covering glaze and on the vessel paste, making the image fuzzy or blurred. The exact temporal span of the ware is not known but is assumed to be contemporary with regular blue transfer printed ware (late 18th century to present).

Purple transfer printed

This is thought to be the same as the blue transfer printed ware, only the color being different (Fig. 6, l).

Polychrome transfer printed ware

Only one example of this ware was recovered, being a transfer printed butterfly design of purple, yellow and blue.

TABLE 6. ARTIFACT CLASSIFICATION OUTLINE.

I. Ceramic

A. Earthenware

1. white paste

a. clear glaze

(1) undecorated

(2) decorated

a. embossed

b. blue transfer-printed

c. flown blue transfer-printed

d. purple transfer-printed

e. polychrome transfer-printed

f. lined

g. feathered edge

h. sponged

i. hand painted floral

j. mocha

k. unclassified

(3) maker marked

b. colored glaze

(1) solid colored

(2) embossed brown glazed

(3) maker marked

2. colored paste

a. clear glazed

b. tin-enameled ware

B. Stoneware

1. Albany glaze interior

a. Albany glazed exterior

b. Bristol glaze exterior

c. gray or tan salt glazed exterior

d. gold glazed exterior

2. Bristol glazed interior

a. Bristol glazed exterior

b. yellow glazed exterior, red paste

3. alkaline glazed interior

a. clear glazed exterior

b. red paste

4. unglazed red paste

5. orange glazed interior and salt glazed exterior

6. buff-orange slipped

7. salt glazed rims and handles

8. green alkaline glazed interior and exterior

9. white glazed with blue speckles

C. Brick

D. Porcelain

E. Miscellaneous

TABLE 6. (continued)

II. Glass

A. Clear

1. bottles
2. jars
3. special

B. Aqua

1. bottles
2. window

C. Amber

1. bottle

D. Green

1. bottle

E. Miscellaneous

III. Metal

A. Farming and ranching implements

B. Construction materials

C. Household items

1. general house and garden
2. kitchen implements

D. Personal items

E. Cast metal

F. Gun parts and ammunition

IV. Other Objects

V. Prehistoric Artifacts

TABLE 7. ARTIFACT INVENTORY.

	41LK66	MC15	17	46	72	74	91	166	168	175	185	192	193	194	195
CERAMIC															
Earthenware															
white paste															
clear glaze															
undecorated	59	49	65	42	14	49	22	18	15	15	35	54	8	7	3
decorated															
embossed rim		1	1		2	12					1	3	2		
blue transfer-printed	1	4				2									
flown blue transfer-printed		2		1		15						1			
purple transfer-printed											1	9			
polychrome transfer-printed						2						4	7	1	
lined	2	2	1			5						1			
feathered edge		2				4						5			
sponged		8				7				2		1			

TABLE 7. (continued)

	41LK66	MC15	17	46	72	74	91	166	168	175	185	192	193	194	195
hand painted floral		22			1	4						6		1	
mocha	1	1	1			3	1					1	2		
unclassified	2	5	1	1						3					
maker marked	1		2	2	1		1		1	1	2	8	1		2
colored glaze															
solid colored		2				4	1			3		1			
embossed brown glazed												4			
maker marked						8				1					
colored paste															
clear glazed		2				8									
tin-enameled ware											1	1			
Stoneware															
Albany glaze interior															
Albany glazed exterior	12			1	1	6	2		1						
Bristol glaze exterior	1														
gray or tan salt glazed exterior	14		6	2			4	3	1	8	2	3			

TABLE 7. (continued)

[illegible]

TABLE 7. (continued)

	41LK66	MC15	17	46	72	74	91	166	168	175	185	192	193	194	195
Brick	1														
Porcelain	6		1				2			7		6			
door knob															1
Miscellaneous	2														
Glass															
clear															
bottle															
complete, machine made										3					
rim	4			1		7				1		4			
rim, machine made	3						2			1					
rim, applied lip											1				
rim, applied lip, bead finish							1								
rim, applied lip, extract finish										2					
base	8					4	2		1	8	1	1			1

TABLE 7. (continued)

[illegible]

TABLE 7. (continued)

	41LK66	MC15	17	46	72	74	91	166	168	175	185	192	193	194	195
rim, applied lip, extract finish			2												
rim, applied lip, champagne finish						1									
rim, applied lip, bead finish												1	1		
rim							3		1		1			1	
base	1		1	1	1		2	4		4	2	5	4		
base, bottom-hinged mold									4						
body, cylindrical	4				3	9	11	6	1	2	21	15	3	3	
body, panel	9	3			4	22	2	2	1	1	13	12	3		
body, embossed															
window	241	13	8			5	1	1		14	5	6			
amber															
bottle															
complete, machine made	1														

TABLE 7. (continued)

	41LK66	MC15	17	46	72	74	91	166	168	175	185	192	193	194	195
snuff	2								1		2	1			
complete, machine made										2					
fragment										1					
fragment, machine made	3									2					
rim	4							2				4			
rim, machine made	2														
rim, applied lip	1														
rim, applied packer finish	1														
rim, applied lip, oil finish						1						1	2		
base	4					2	1	1			1	12			
base, machine made	1									1					
base, bottom hinged mold	1														
body, cylindrical	6		13	2		6	2	2	3	2	6	6		1	

TABLE 7. (continued)

	41LK66	MC15	17	46	72	74	91	166	168	175	185	192	193	194	195
body, panel	10		1	5		8	4			1	9	28	7	2	
body, embossed															
green															
bottle															
complete, machine made										1					
rim	1				1				1			1		1	
rim, applied lip	1					2									
rim, applied lip, extract finish								1							
base	1					3				1		1			
base, kickup	1						1				1	2	1	1	
body, cylindrical	4	9		12	6	26	3	1	2		1	16	3		
body, panel		1		1		2						4	1		
miscellaneous															
clear		1													

TABLE 7. (continued)

[illegible]

TABLE 7. (continued)

	41LK66	MC15	17	46	72	74	91	166	168	175	185	192	193	194	195
milk glass rim	2						1			2					
milk glass base										1					
milk glass body	1									1					
milk glass panel, embossed	1														
milk glass, embossed		1													
light blue rim, embossed	1														
dark blue base, embossed	1														
dark blue (fragment)	1														
dark blue body	1														
blue rim							1								
blue body							2								
dark blue base										1					
light blue body										2					
purple (fragment)	1														

TABLE 7. (continued)

	41LK66	MC15	17	46	72	74	91	166	168	175	185	192	193	194	195
baling wire	5										2				
heavy wire	2		1	1		2	3				3				
galvanized wire	2														
railroad-type spike	1														
brass fitting	1														
roller	1														
hammer wedge	1														
wrought spike		1													
nuts and bolts, miscellaneous			3			1									
chain link					2		1			2					
wrought material					1	3					1				
wrought anchor device												1			
wrought hook and eye anchoring device							2					1			
copper tubing and fitting							1								

TABLE 7. (continued)

	41LK66	MC15	17	46	72	74	91	166	168	175	185	192	193	194	195
bolt and washer							2								
rivet							2								
buckle										2					
buckle with leather strap										1					
chain and ring										1					
bicycle chain										1					
decorative hinge										1					
"6" strap hinge										2					
wing nut										1					
washer										3		1			
gas cap										1					
spark plug										1					
heavy machinery chain										1					
slotted eye lag bolt										1					
grommet										1	1				

TABLE 7. (continued)

	41LK66	MC15	17	46	72	74	91	166	168	175	185	192	193	194	195
threaded rod										1					
harness buckle											1				
unidentified	1					2			1	2	1				
construction materials															
square cut nails	126	75	174		24	37	20	2	3	5	38	39	9	3	1
wire nails	164	1	1		1	2	11			24	2	2			
wood screws	2						1			2					
tacks	5														
masonry screw nails	3														
staples	1														
household items															
general house and garden															
clock part	1					2									
mop head	1														
door plate	1														
key	2														

TABLE 7. (continued)

	41LK66	MC15	17	46	72	74	91	166	168	175	185	192	193	194	195
battery post	1						1			2					
window screen fragments	3														
lantern base	1														
decorative copper or brass	1														
coat hook						1									
furniture hardware							1								
hoe										1					
heavy spring										1					
file										1					
suitcase hinge										1					
keyhole plate										1					
fish hook												1			
upholstery tack												1			
lamp part												1			
bell clapper assembly												1			

TABLE 7. (continued)

	41LK66	MC15	17	46	72	74	91	166	168	175	185	192	193	194	195
chamber pot cover			1												
foil packet			2												
tin cans-identifiable	1		1	1		1					2	5	1		
tin can fragments	3	11	3	2	2	11		1			19	9			
tin can lids	1									1					
flat tin container	1														
jar lid	1									2			1		
Crown bottle caps	22									2					
foil bottle cap liners	2														
Pearl bottle caps	2														
Teem bottle caps	1														
non-ferrous white metal		24													
tubular copper			1												
unidentified	3		1		1	1									

TABLE 7. (continued)

	41LK66	MC15	17	46	72	74	91	166	168	175	185	192	193	194	195
kitchen implements															
coffee pot	1														
coffee or tea pot lid	1														
tea pot spout	1														
metal plate	1														
pot	1														
decorative spoon	1														
knife handle	1														
small pan				1											
serving spoon						1				1					
ice tray divider										1					
coffee percolator part										1					
can/bottle opener										2					
butcher knife blade										1					
table spoon										1					
stove pipe elbow										1					

TABLE 7. (continued)

	41LK66	MC15	17	46	72	74	91	166	168	175	185	192	193	194	195
fork handle											1				
pickle fork handle												1			
utensil handle												3			
scissors handle												1	1		
personal items															
clothing rivet	2					1	1					1			
toy gun	1														
pencil lead	1														
buckle		1	1				3			1					1
button			1				1			1					
gold flaked bead			1												
needle			2									1			
slate blackboard					2										
knife blade						1									
snap							1								
S-hook							1								

TABLE 7. (continued)

	41LK66	MC15	17	46	72	74	91	166	168	175	185	192	193	194	195
pencil end										1					
latch type fastener										1					
coin												1			
pocket knife handle												2			
unidentified decorative			1				1					1			
unidentified		4								2					
cast metal															
stove parts	3	3	4	3	1	2	6	1		1		4			
vessel fragment				1		2				1	2	2	1		
coffee grinder part					1		1	1							
handle										1					
roller											1				
unidentified	7	2					1					1			1
gun parts and ammunition															
tumbler												1			

TABLE 7. (continued)

	41LK66	MC15	17	46	72	74	91	166	168	175	185	192	193	194	195
trigger assembly													1		
lead balls and bullets															
.36 cal (?)			2												
.44 cal (?)			1												
lead ball												2	1		
fragments												3			
unidentifiable			1			1				2					
percussion cap			2												
cartridges			1												
shotgun shell												1			
.22 cal	11						1			6	1				
.45 cal	1														
.16 gauge shotgun	1														
.12 gauge shotgun	1														
.44 Henry flat			3				1				1				1
.44 short															

TABLE 7. (continued)

[illegible]

TABLE 7. (continued)

	41LK66	MC15	17	46	72	74	91	166	168	175	185	192	193	194	195
button, black plastic								1							
toy wheels										2					
bottle caps										1					
dart shaft										1					
syringe										1					
bead												1			
unidentified	1									4					
wallpaper (fragments)	5														
wood (fragments)	3		2												
snail	2	68	72		10	6						32			
shell	33	47	150	1	3	16				1		20			
bone	X	X	X		X	X						X			
Prehistoric artifacts															
chipping debris	50	100	160	1		4	61					103	1		
pottery			1										1		

TABLE 7. (continued)

[illegible]

Lined

This type has colored lines near the lip on rim sherds. The colors are varied, as are the widths. The lines occur mostly on cups. This type encompasses the entirety of the chronology chart from the 18th century to the present, and therefore cannot be used as a distinct time indicator. Lines are mostly of dark brown color near the lip of the vessel rim and often are in an interior-exterior set (Fig. 6, d). One lined cup rim sherd is decorated with a floral sponged design in green underglaze. Two sherds are gilded in a single band.

Feathered edge

The decoration motif of this type is a blue band on the edge of plate rims with the interior edge of the blue band painted to a "feathered edge" (Fig. 6, a, c). The surface treatment of the paste is usually molded, with linear or curvilinear indentations oriented perpendicular to the interior face of the plate rim. Some plates are not molded. All rims are smooth. This type ware was apparently manufactured in England during the first three-fourths of the 19th century and was a popular ware in Texas during the mid-19th century (Davis and Corbin 1967).

Sponged

Sponged ware has a decoration application using a stamp made of sponge stem (Godden 1964:111). A design is carved in the cross-cut end section of a sponge stem or root, and after being dipped in the color solution is applied repeatedly to the vessel surface (Fig. 6, m). One specimen (Fig. 6, o) is a cup stamped with semi-floral patterns of red (lower) and green (upper) colors which are fairly detailed.

Hand painted floral design

This ware is characterized by colored flower blossoms, leaves, stems, and related plant-like decorative motifs in underglaze colorings hand painted onto the vessel (Fig. 6, e-g). The chronological position of this ware cannot be closely delineated as it was manufactured widely throughout the 19th century.

Mocha

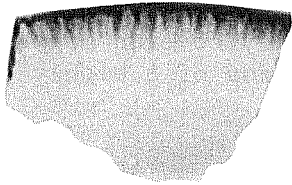
This ware type is the same as banded ware (Lynn, Fox and O'Malley 1977:187). Mocha ware has a manufacturing time range of 1799 to the present day (Godden 1964:109). Typical mocha ware often contains tree-like patterns but none was present in this assemblage. Colors present include blue and white; blue, gray/green and white; and yellow, white and dark brown. All bands are on exterior surfaces (Fig. 6, b).

Figure 6. *Various Ceramics: earthenware, stoneware and porcelain.*

- a. feathered edge ware
- b. mocha "banded" ware
- c. feathered edge ware
- d. lined earthenware
- e-g. hand painted floral design earthenware
- h. earthenware sherd with maker marks, Bridgewood & Clarke, Burslem, England, 1857-1864
- i. earthenware sherd with maker marks, J. W. Pankhurst & Co., Hanley, England, 1850-1882
- j. earthenware sherd with maker marks, Bridgewood & Clarke, Burslem, England, 1857-1864
- k. flown blue printed earthenware
- l. purple transfer printed earthenware
- m. sponged earthenware
- n. blue transfer printed earthenware
- o. sponged decorated cup with top patterns green and bottom patterns red
- p. stoneware larged mouthed vessel
- q-r. porcelain objects
- s. unidentified tubular piece
- t. insulator



a



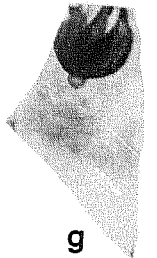
c



e



f



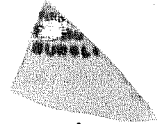
g



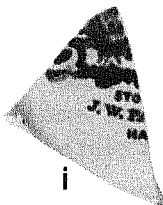
b



d



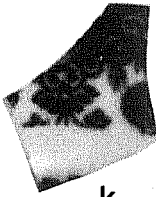
h



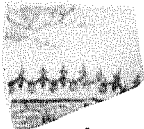
i



j



k



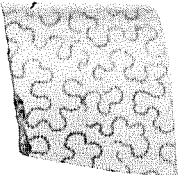
l



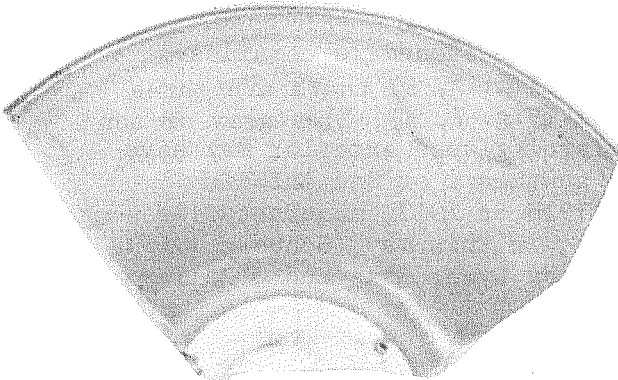
n



o



m



p



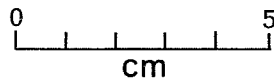
q



r



s



cm



t

White paste, colored glaze

The class of artifacts is of 2 sub-groups: solid colored and embossed brown glazed. The age of both these types is unknown. The solid colored glazed wares have an evenly covered monochromatic glaze. The brown glazed pieces are all sherds of a highly decorated (embossed) vessel or perhaps of figurines.

Colored paste earthenware

Colored paste wares recovered were of two types, clear glazed and tin enameled ware. Several small sherds with clear glaze were recovered and are of an unknown type. The tin enameled ware sherd from 41MC185 is probably Mexican majolica. Majolica is characterized by an opaque white enamel of tin oxide in a lead glaze and a soft paste body (Goggin 1968:3). It dates from quite early (1650) but is made up to the present time and is datable mainly by design components and motifs. None of the small pieces recovered is complete enough to allow such dating (for detailed discussion see Lynn, Fox and O'Malley 1977:188-189, 216).

Stoneware

The numerous types of this class of ceramics are designated by various colors, types, and combinations of glazes and pastes. The manufacturers of this ware are unknown but some are possibly of local manufacture. Kilns are known to have been in operation at San Antonio, Seguin, and Texana, Texas during the mid to late 19th century, and some tentative matches are proposed. Comparative specimens from these kilns were not available at the time of this analysis, but written descriptions indicate some of the wares may be the same. The balance of the wares are probably from manufacturers outside the state of Texas. The following glazes labeled as Bristol and Albany are not identified as being manufactured in Bristol or Albany but are like the glazes manufactured there. Albany is a dark brown, highly glossy semi-opaque glaze and Bristol is a glossy white to cream colored opaque glaze.

Albany glaze interior

This group of wares is the largest of the stoneware ceramics. Besides sherds with Albany glaze exterior (Fig. 7, a) there are three other types of exterior glaze, 1) Bristol (Fig. 7, b), 2) a gray or tan salt glaze and 3) a gold glaze. The Bristol glazed exterior may have been manufactured at the Elmendorf kiln southeast of San Antonio which was in operation between 1885 and 1916 or 1917, manufacturing crockery vessels of local clays and glazed in this way (Schuetz 1969: 23-24). The previous work at these sites by Lynn, Fox and O'Malley

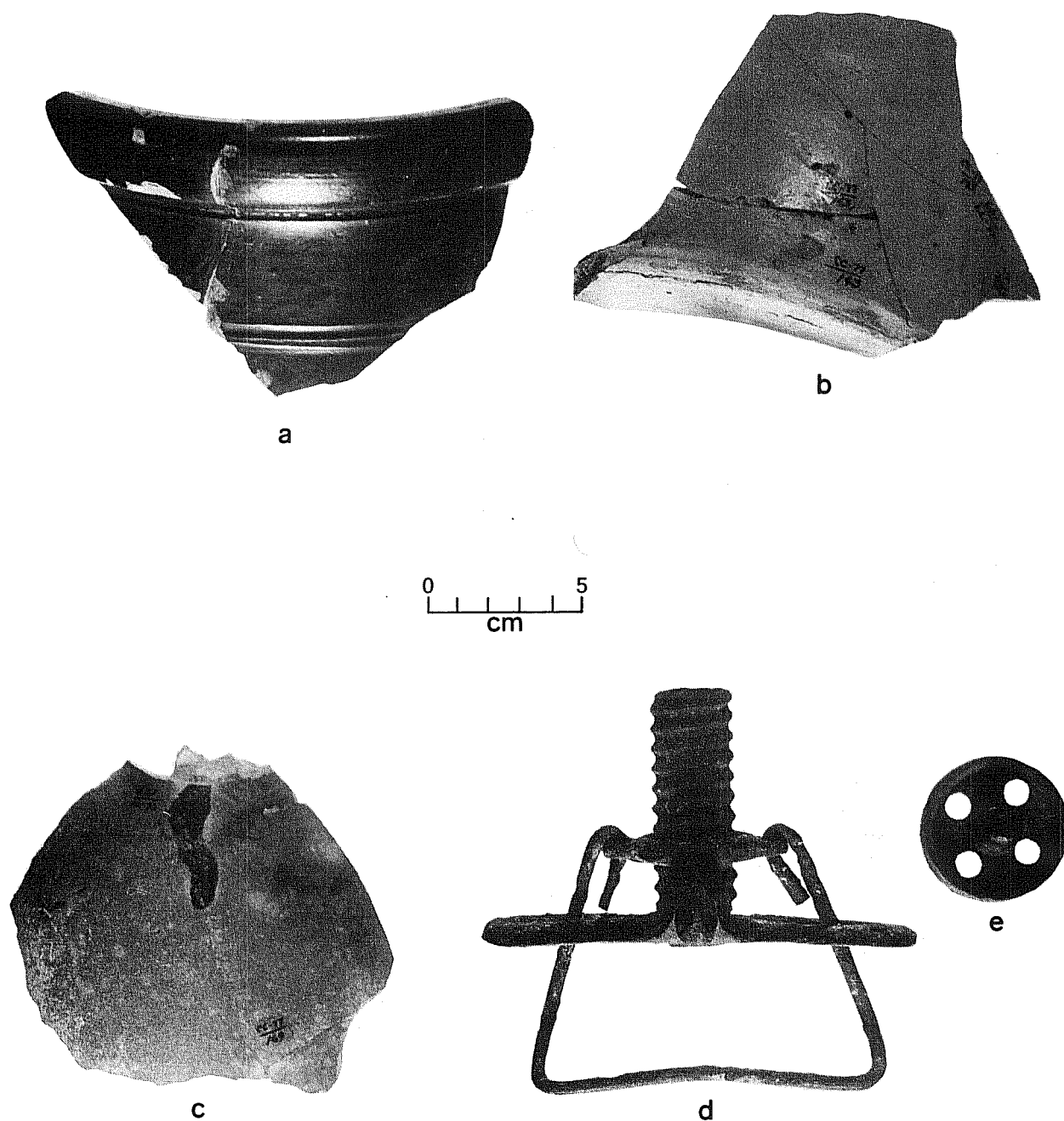


Figure 7. *Stoneware Ceramics and Metal Artifacts.* a, stoneware large mouthed vessel rim sherd, Albany glazed interior and exterior; b, stoneware vessel, base sherd, Albany glazed interior, Bristol glazed exterior; c, stoneware, jug body sherd with olive green salt glazed exterior and orange glazed interior; d-e, mop head fragments.

(1977:194) recovered one specimen of this type from site 41MC166 which was manufactured by the Western Stoneware Company of Monmouth, Illinois, after the turn of the century. No recovered specimens have maker marks.

The gray or tan salt glazed exterior sherds are similar to those recovered in 1976 with various gray to tan colors, the shade partly dependent on the color of the sherd paste caused by the kiln firing environment. The color configuration of light colored glaze on the lower exterior body of jugs and jars seems to be fairly common. Manufacturers are unknown, as are the dates of manufacture.

Specimens with the gold glazed exterior may have been turned this color by clay iron content used in making the glaze mix. No age or manufacturer information is known.

The last type of sherd within this stoneware class is that with Albany glaze on both surfaces. Only a few sherds were recovered in this study which had both Albany and Bristol glaze on the exterior surface. The previously mentioned vessel made by the Western Stoneware Company was covered in Bristol glaze on the jug body exterior and Albany glaze on the neck, mouth, handle and interior of the jug in a style popular in the 19th century. Some small sherds in this group are from the upper parts of jugs (Fig. 8, g), but some are straight sided vessel walls, and one specimen included the rim of a large open jar (Fig. 7, a). Except for possible jugs, no known locally manufactured wares have Albany glazed exteriors.

Bristol glazed interiors

A few sherds were recovered with Bristol glaze on the interior and the exterior. These are apparently from large open top jars and similar to wares made at the Elmendorf kiln. Another variation is represented by several sherds with a yellow exterior glaze and red paste. These sherds are relatively thin and are portions of smaller containers for liquids such as ink (Fig. 9, a) or ginger beer.

Alkaline glazed interior

Two types of wares so glazed were analyzed, one with a clear exterior overglaze and one unglazed with red paste. Similar wares were recovered in 1974-76 (Lynn, Fox and O'Malley 1977:195) and are generally nondescript, greenish color glazed crockery.

Unglazed red paste

This ware, known otherwise as "bisque" ware, is generally used for such functions as flooring and roofing and is not generally used for food or fluid storage (the common use of crockery) due to its porosity. Unglazed ware will not contain liquids without seeping

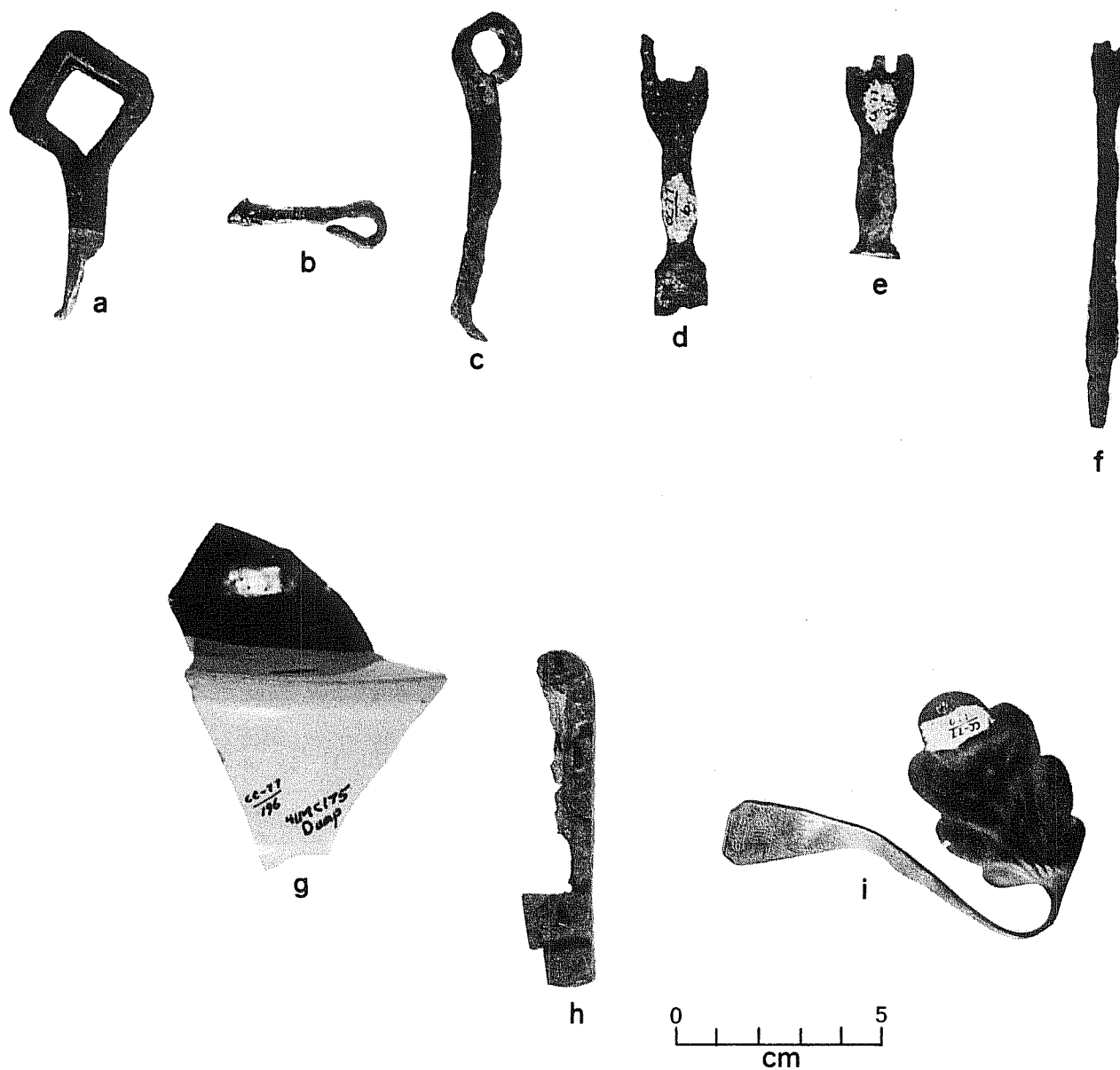


Figure 8. *Wrought Metal, Stoneware and Household Artifacts.* a-c, wrought metal pieces; d-f, cast iron forks; g, upper part of stoneware jug; h-i, pocket knife and brass relish spoon.

and leaking. Kilns at San Juan and Texana both produced unglazed wares (Schuetz 1969:25) but neither is considered to be the actual source for these recovered specimens. The Texana kiln was operated between 1854 and 1865, perhaps too early for the Yarbrough Bend community and too distant. The kiln at San Juan was in operation between 1928 and the 1930s and may be too late. It was founded by James Richter, "the last working pottery of those German settlers who founded at least half a dozen kilns...near San Antonio" (Schuetz 1969:25). This phrase implies there were numerous other kilns (some unnamed) which were earlier and are candidates for being the origin of many of the project wares.

Orange glazed interior and salt glazed exterior

This ware (Fig. 7, c) has poorly fired orange glaze on the vessel interior and an olive green salt glazed exterior. Exterior glaze has a grainy and mottled surface characteristic of poorly fired salt glaze. The sherd paste is a yellow buff.

Buff-orange slipped

This unusual ware is identical to that recovered in 1974-76 (Lynn, Fox and O'Malley 1977:195) and is identified by the distinct orange colored interior. The orange color permeates deep into the paste and numerous sand grains are visible through the slip and throughout the paste. One sherd, a base, shows these sherds to be from a flaring-sided bowl; the orange color soaked entirely through to the bottom exterior surface of the vessel. Both recovered sherds are exteriorly glazed with a thin yellow matte surface material.

Salt glazed rims and handles

Represented by one sherd of each, these vessels are covered with a thin gray salt glaze. Coming from different sites, they are not from the same vessel and there are no other similarly glazed body sherds from this type of vessel.

Green alkaline glazed interior and exterior

This ware, glazed on both surfaces with a thick even glaze, is a dark olive green on the interior and a lighter yellowish green on the exterior. The interior and exterior glazes are probably the same material but are different colors due to the difference of firing atmosphere in the interior of the jug.

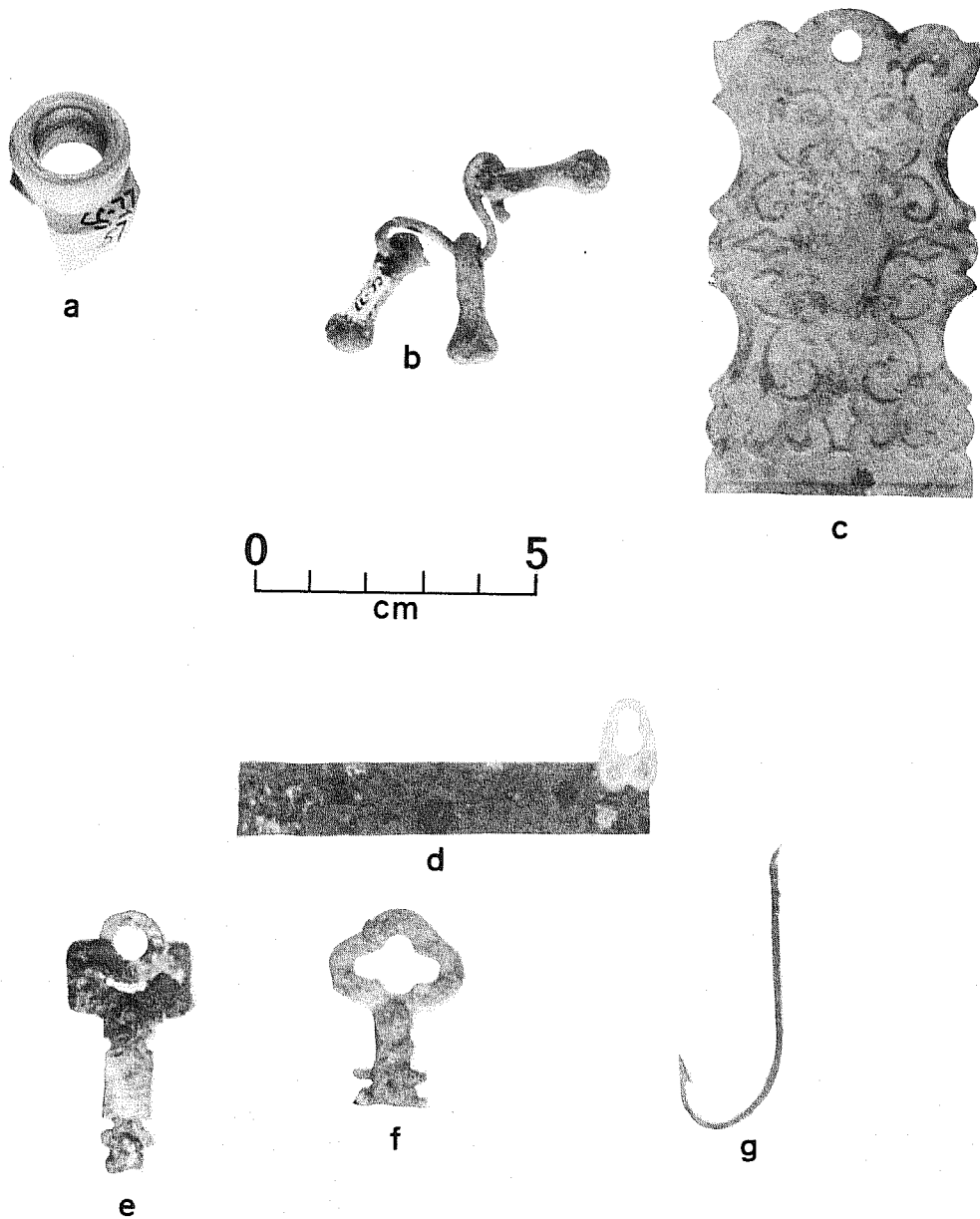


Figure 9. *Stoneware and Household Items.* a, stoneware, ink bottle rim and sherd; b, metal bell clapper assembly; c, decorative brass plate; d, door plate; e-f, metal keys; g, fish hook.

White glazed with blue speckles

This ware is of an unknown make and age, consisting of three sherds (same vessel) of a ware with light yellow hard paste, opaque white underglaze, blue speckled or sprayed-on color on one edge, and clear overglaze. There is some faint crazing of the underglaze and the glaze surface is a smooth shiny metallic-like finish. Vessel is a large open bowl with an outward flaring embossed rim.

Porcelain

Objects of porcelain were various but included vessels, insulators and unidentified pieces (Fig. 6, q-t). Descriptions of individual pieces are included under each site section.

Miscellaneous

Several unique, nondescript, and unknown wares were recovered and put in a general catchall category, if represented by only one sherd. They will not be further described.

Glass

Glass material was segregated into four groups based on color: 1) clear, 2) aqua, 3) amber, and 4) green. The overall research design requires information on age and function of objects, neither of which is obtainable from glass color directly. Color was used in order to be consistent with previous analyses and will segregate some functional categories such as snuff bottles or window glass from the general assemblage. The vast majority of the glass sherds are from bottles of various types, some of which bear characteristic manufacturing attributes which are of specific temporal distribution. Some other more complete specimens are identifiable as to function (what they contained or were used for).

Several distinct patterns are of note concerning function vs. glass color. In the clear glass category are the only recognizable glass food preservation or fruit jars. These are of the screw top, external ribbed, and bail latch or lightning closure types. Initiated in 1815, the jar business began to boom with plain cork closures. In 1855 Robert Arthur invented and began manufacture of a tin lid closure. This closure consisted of a saucer-shaped tin lid, the edge of which inserted into a groove in the lip of the jar. It was sealed by pouring melted wax in the groove. Threaded bottles were made as early as the 17th century in Germany and later in England. The use of threads on wide mouthed jars was adopted in 1858 to accept the famous Mason lids. Mason didn't invent the threaded fruit jar or manufacture jars, only the zinc lids. Glass lids were adopted in the 1870s, and in 1875 the bail latch or lightning stopper was fitted to fruit

jars. Most early jars were manufactured in light aqua or green colors but other colors were used also (Munsey 1970:146).

Window glass is all aqua colored. Flat glass sherds are, of course, indicative of window panes and reflect the use of windows in buildings. They were expensive and may reflect the affluence of the house owner.

Snuff bottles, being quite distinct in shape, are generally identifiable from any large rim or base sherds.

The categories within the glass material are otherwise self explanatory. The glass items presented in the chronology charts in Table 8 are wares which have restricted temporal distribution and are identifiable from distinct attributes such as manufacturer's mark or method of manufacture.

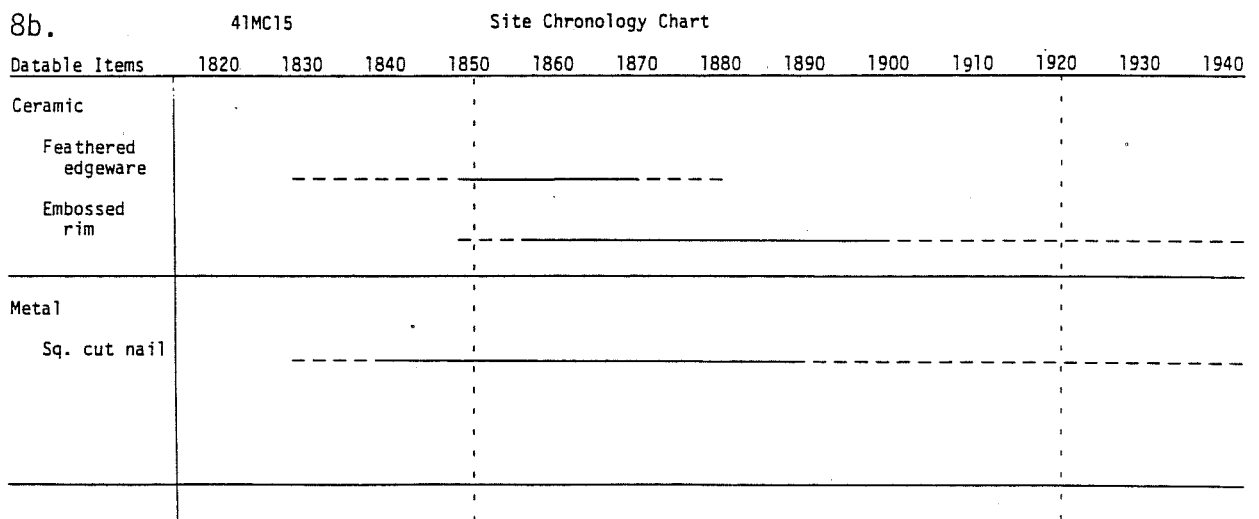
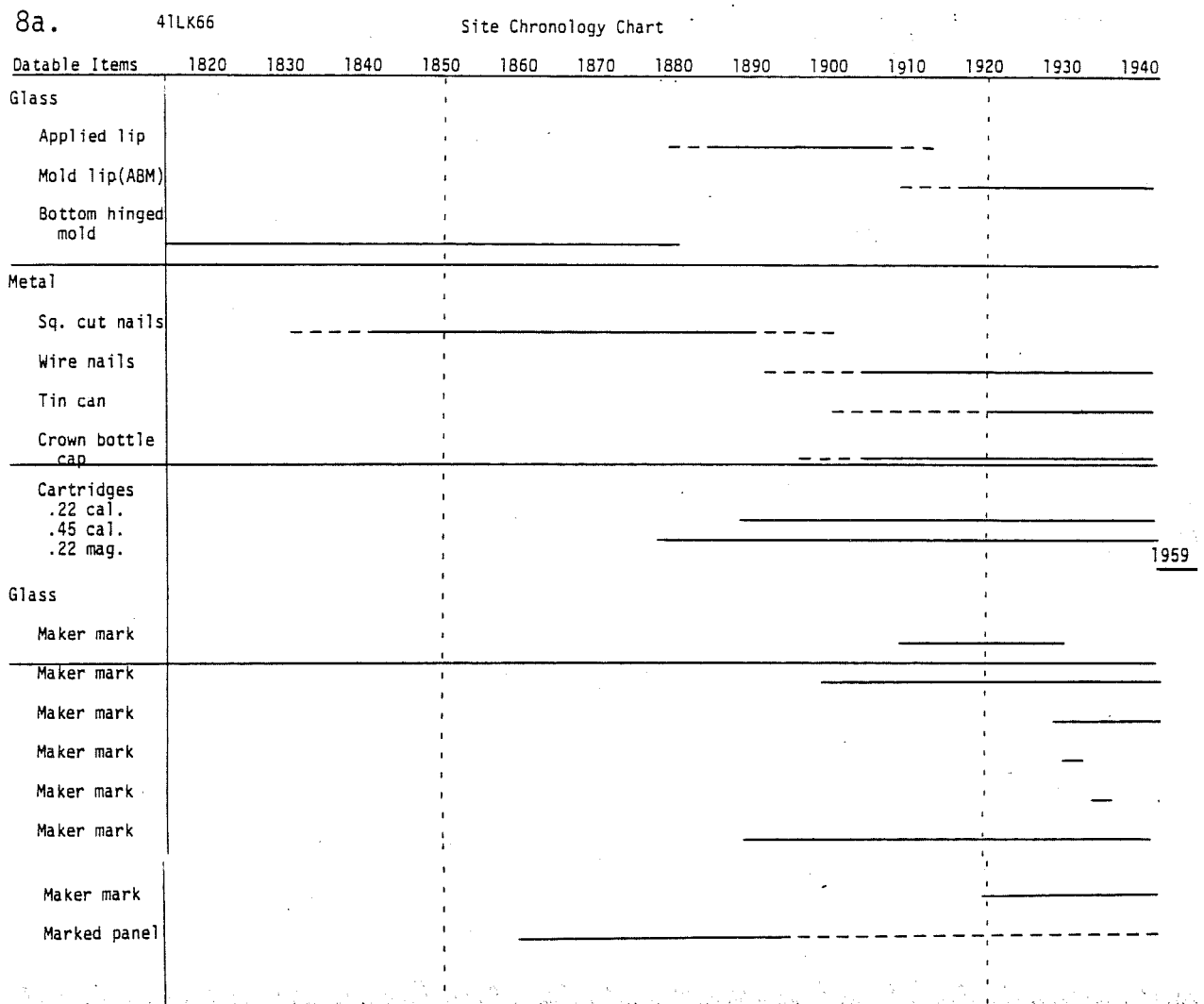
Metal

Many objects in the frontier home and ranch were made of metal and some, being specialized items, are indicative of some specific use or set of uses. The metal materials were segregated into categories that reflected in part these uses. Agricultural and ranching materials (Fig. 10, d, g-o) are generally recognizable as such and could usually be thought of as being used outside the family living area. Although many frontier families would include the horse and cow as family members and perhaps even keep them in the house, the harnesses and wagon would not be kept with the linen and dishes. Specific items listed in this category were classed into groups of common items.

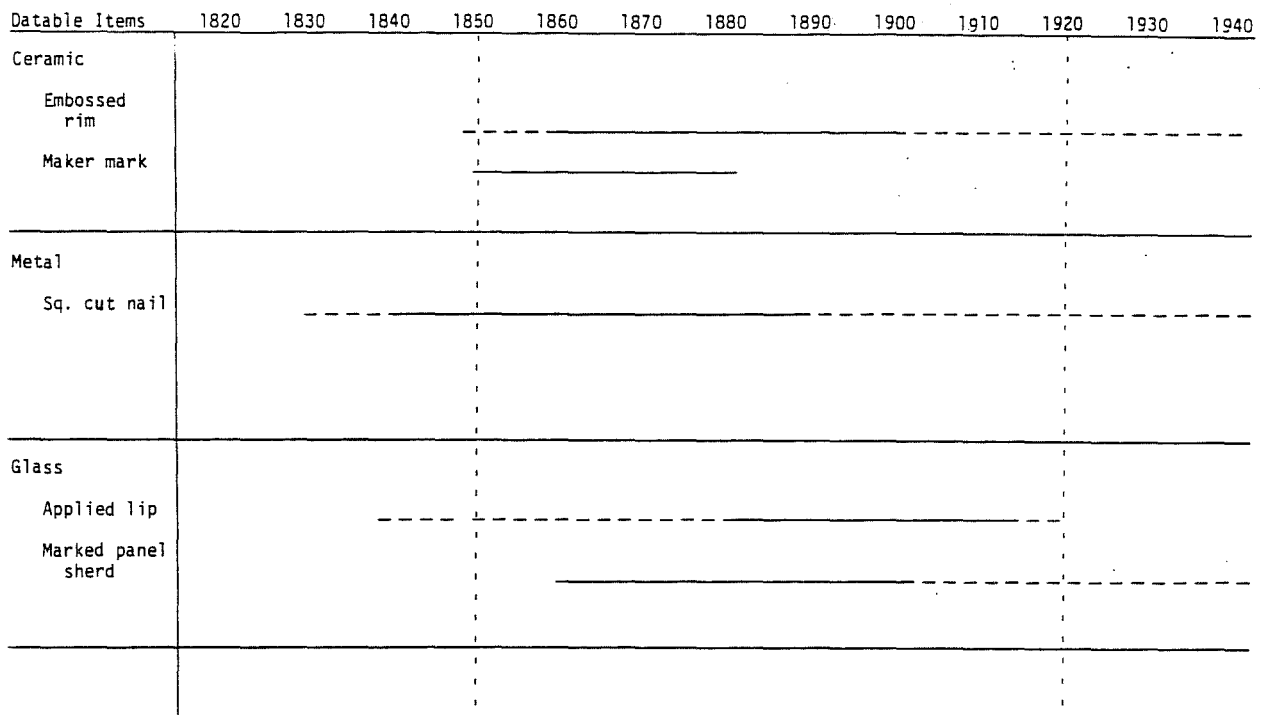
Construction Materials

Of all types of hardware, nails are the most diagnostic. Wires, bolts, screws, hinges and wrought pieces (Fig. 8, a-c) were also used in house construction, but their presence is not necessarily indicative of such. Within each site assemblage, the nails (Fig. 11, a) were identified as to type and size (see Table 9 for each site) and frequencies determined. Each of the different sizes and types of nails may be indicative of a general time range or a feature of architecture. The square machine cut nail was not in regular use until 1830, and although it is still made and sold today for special purposes such as roofing and flooring, was not continued in general use much past 1900. The wire nail was invented in the 1700s but was not in general use until 1890. Wire nails were used for most purposes after 1900 (Nelson 1968:8-10).

TABLE 8. SITE CHRONOLOGY CHART.



Site Chronology Chart



Site Chronology Chart

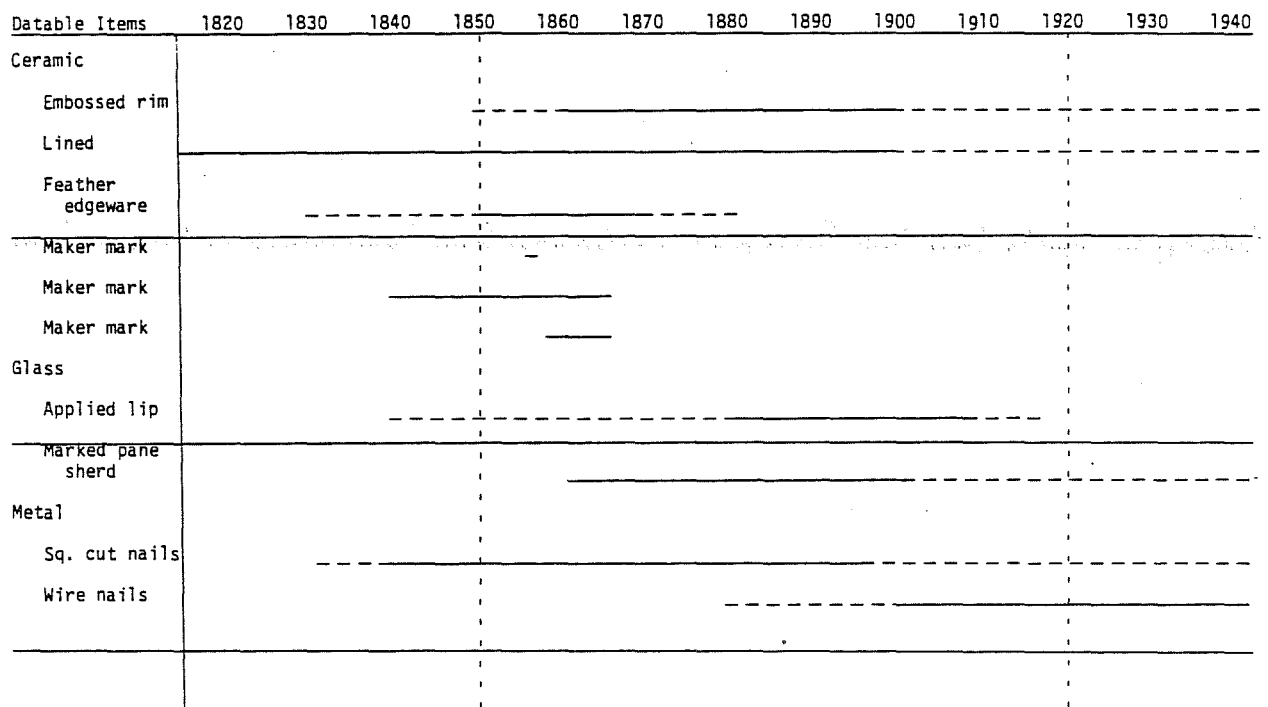
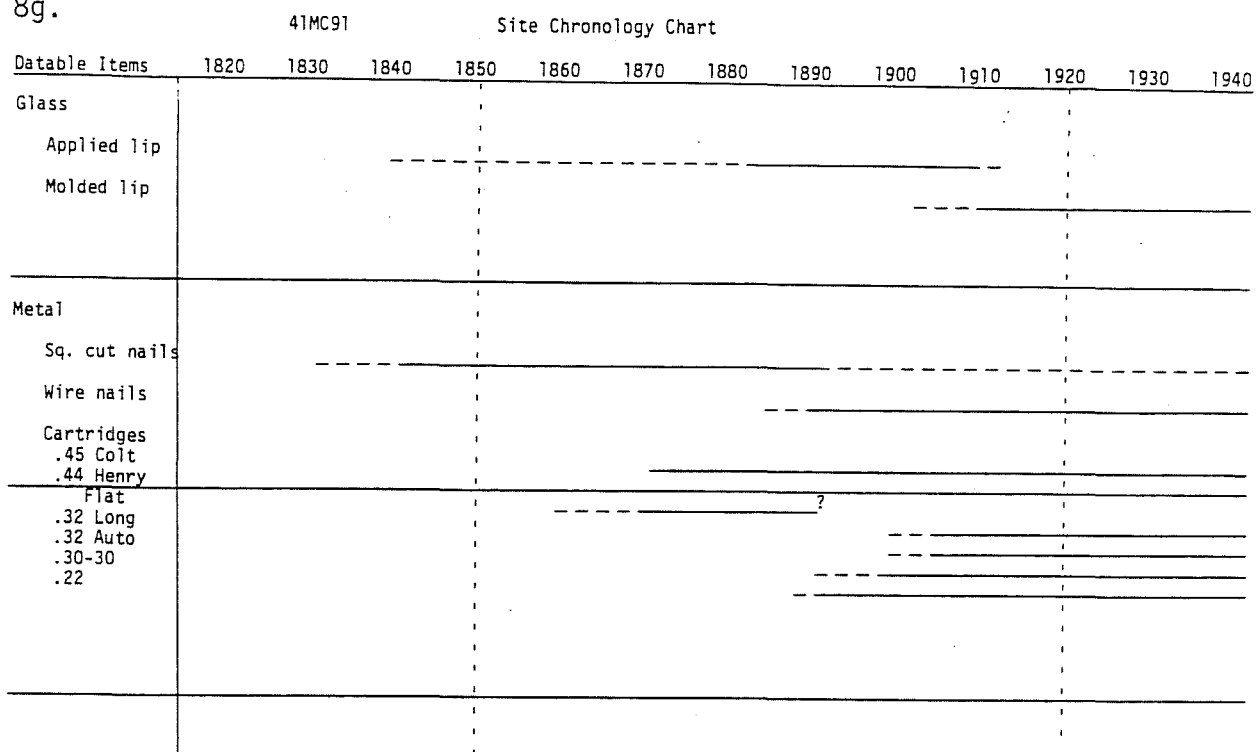


TABLE 8. (continued)

8g.



8h.

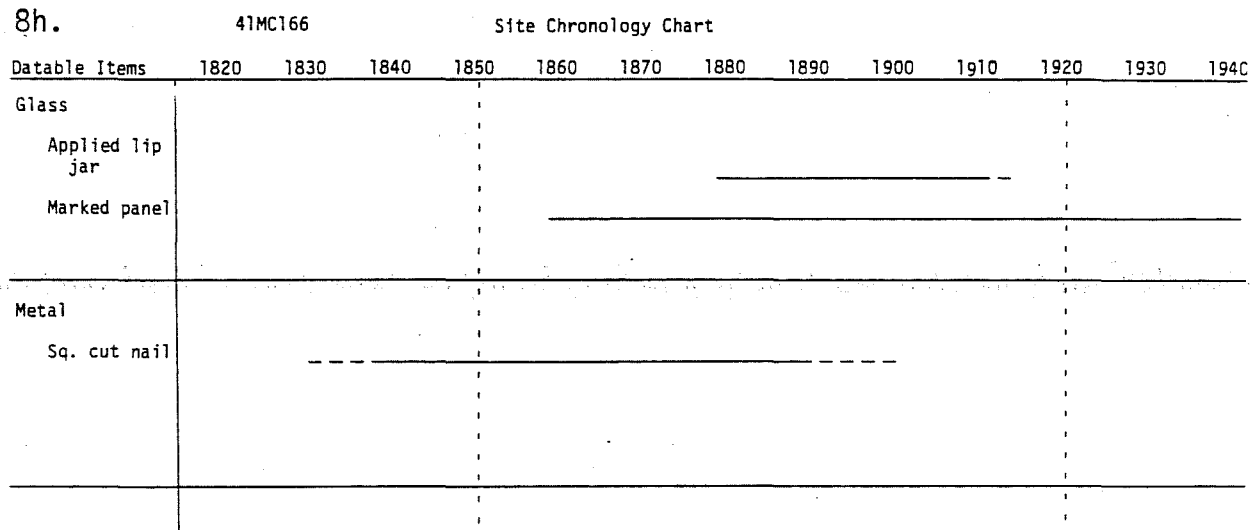


TABLE 8. (continued)

[illegible][illegible]

8n.		Site Chronology Chart												
41MC195		1820	1830	1840	1850	1860	1870	1880	1890	1900	1910	1920	1930	1940
Ceramic	Maker mark				—————									
Metal	Sq cut nail	-----			-----									
	Cartridge													
	.44 Henry				----- ?									

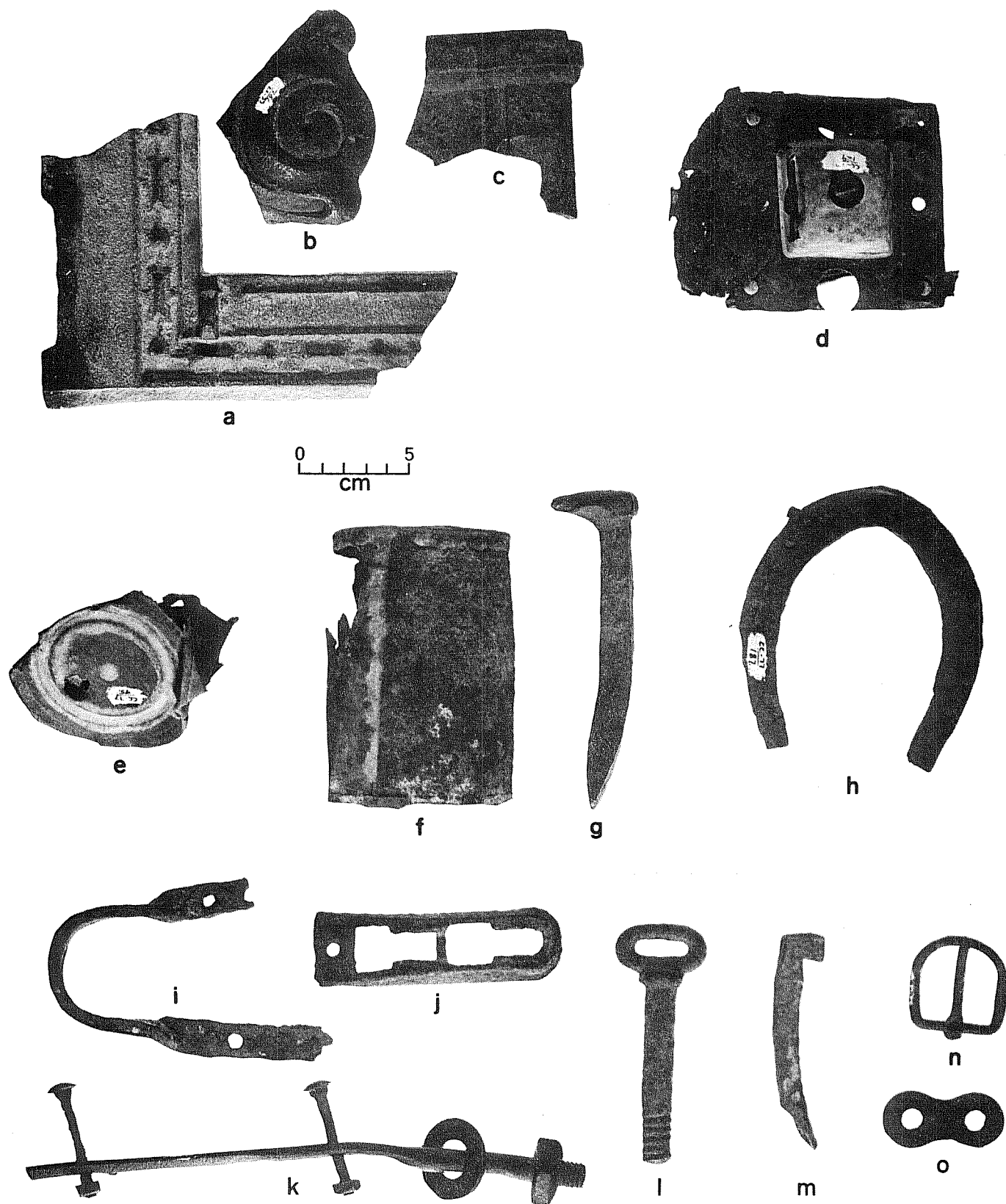


Figure 10. *Household and Metal Artifacts*. a-c, cast iron stove fragments; d, metal, probably harness piece; e, tin can top showing the soldered "hole in the top" and a center vent hole also soldered; f, soldered side seams and lap seam ends; g, metal railroad spike; h, metal horse shoe; i-k, metal wagon parts; l, thread slotted bolt; m, unidentified cast iron object; n, harness buckle; o, chain link piece.

FIGURE 11. *Metal Items, Gun Parts and Ammunition.*

- a. square cut nails
- b. guntrigger assembly from 41MC193
- c. molded bottle lip, made in automatic bottle machine, 41MC46
- d. coin, silver 5 centavos piece, Mexican dated 1870
- e. chamber pot cover (?), 41MC17
- f-k. ammunition cartridges
- f. percussion cap
- g. .41 caliber short
- h. .44 caliber Henry short
- i. .44 caliber Henry (medium length)
- j-k. .44 caliber Henry long made by Union Metallic Cartridge Company, (41MC17)
- l-p. ammunition cartridges head stamps
- l. .41 caliber short fired in a pistol
- m. .44 caliber short fired in a pistol
- n. .44 caliber fired in Henry rifle. Paired firing pin indentations, indicative of the Henry rifle, show this cartridge to have been misfired twice before finally firing
- o-p. .44 caliber Henry made by Union Metallic Cartridge Company

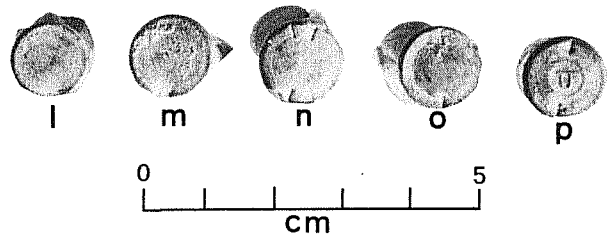
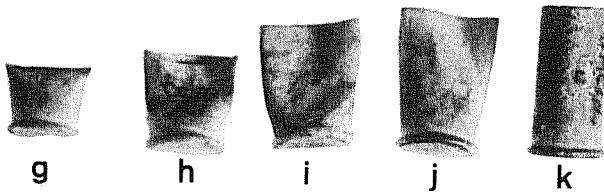
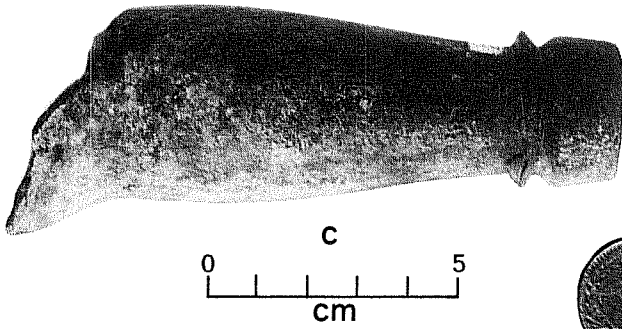
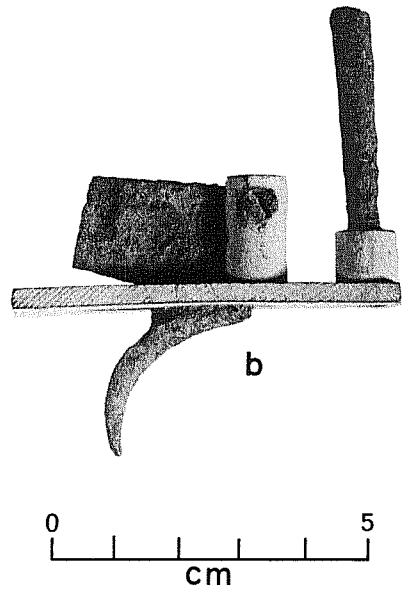
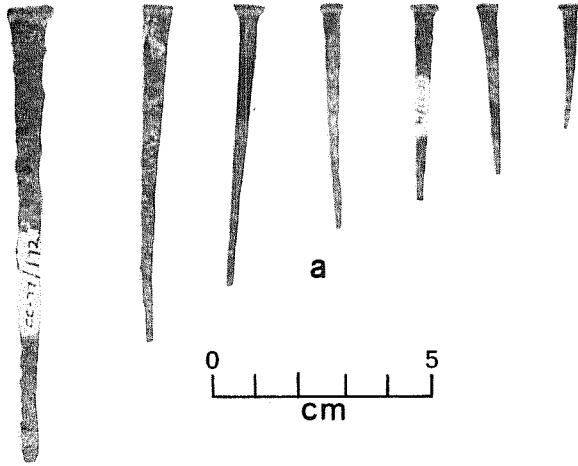


TABLE 9. NAIL TOTALS FROM EACH SITE.

Site Number	Square Cut		Wire				
	ID	FR	Common	Finish	Fencing	Roofing	FR
41LK66	93	33	93	6	18	1	46
41MC15	51	24	1				
41MC17	97	62	1				
41MC72	15	9			1		
41MC74	33	3	1	1			
41MC91	18	2	8		3		
41MC166	1	1					
41MC168	3						
41MC175	5	3	16		4	3	1
41MC185	31	7			2		
41MC192	29	10	2				
41MC193	7	2					
41MC194	3						
41MC195	1						

ID=identifiable

FR=fragment

Household Items

The items generally associated with homemaking and housekeeping are of three general groups: 1) general house and garden, 2) kitchen implements, and 3) miscellaneous household. General house and garden items found include a garden hoe head, mop head (Fig. 7, d, e), oil lamp and items of general furniture or housekeeping nature. Kitchen implements (Fig. 8, d-f, i) include such items. Miscellaneous household items (Fig. 8, h; 9, b-g) are on the same list. The use of metal food storage canisters (tin cans) is a relatively recent phenomenon, being invented by Heine and Durand in 1810. The general use of cans did not occur until later in the 1800s (Fontana and Greenleaf 1962:67). Numerous innovations occurred in the canning industry, and in general they are summarized as follows:

hole in the top (Fig. 10, e) -----	1815-1900
tapered meat can -----	1875-?
fold locked seam -----	1900-present, not popular until 1920s
soldered seam (Fig. 10, f) -----	1815-1920, fading after 1900, continued to present in milk cans

Crown bottle caps, which were crimped onto the bottle top, came into use in 1907 (Fontana and Greenleaf 1962:73). Not only is this cap readily identifiable, but the bottles were designed specifically to accept such a cap.

Personal Items

Personal items are those articles associated, at least temporarily, with a specific individual. Clothing parts, jewelry, toys, and other metal items are simply listed under the outline heading. The purpose of listing a series of functionally dissimilar items under a common heading is to compile in one specific area (of the table) items which might be indicative of a specific individual by sex or age. Any particularly diagnostic items in this category are discussed in specific site sections. The first criterion of division in the assemblage is by material; such items as buttons appear in numerous places in the inventory, depending upon what material they are made of, i.e., glass, plastic, or metal.

Cast Iron

The cast iron material is a break in the function categorization and was used mainly because of the difficulty in identifying specific items. Most recovered cast iron items were fragments of flat objects,

probably stove parts (Fig. 10, a-c) or cookware. The stove could also fit into the general household or kitchen category.

Gun Parts and Ammunition

Various ammunition cartridges and a few gun parts which are easily dated were recovered. Guns and ammunition probably have better documentation available than that of any other class of artifacts, due mainly to their extreme popularity with collectors and the voluminous manufacturers' records associated with military work and patents. Specific items are discussed in the particular site descriptions.

Other Objects

The last category is an accumulation of various materials that are either rare, very late, or perhaps of natural origin (ecofacts). Objects of plastic date to the recent 20th century as do most objects of readily perishable material. The exposed nature of most of the sites does not facilitate good material preservation (except in association with extant structures). Rubber objects are not common (probably due to poor preservation), although objects were commonly made of hard rubber during the late 19th century. Numbers of shells and presence of bone were recorded in the materials inventory.

Prehistoric Artifacts

Most historic habitation sites in the project area are situated on terraces or other localities previously inhabited by prehistoric people. These prehistoric materials most probably have no temporal association at all with the historic Anglo or Mexican inhabitants and are included here as a matter of record. Several sites such as 41MC15 and 41MC17 have extensive prehistoric components which have been tested and evaluated by the UTSA field crews and will be fully reported and analyzed in their work. Lithic artifacts and chipping debris were recorded and, where possible, identified in the materials inventory.

SITE DESCRIPTIONS

41LK66 Nichols House (Surface Collection and Intensive Testing)

Description

Consisting primarily of an extant structure ("Nichols House") and some associated features, the site was investigated and documented with a plane table map (Fig. 12), three test pits, plan maps of architectural details, and controlled surface collections. The specific remains associated with the structure include scattered historic occupational debris, a water cistern and several outbuilding structural remains. One outbuilding (Fig. 13) is located 25.9m north of the house. At a point midway between the two structures a demarcation line was established separating the two and designating area A associated with the extant house, and area B associated with the northern outbuilding. Surface collections were then carried out separately.

The front of the house apparently once had a porch (see side elevation, Fig. 14, a). Test pit #1 (see floor plan, Fig. 15) was situated outside the front door extending 2.5m to slightly past the outer foundation wall of the front porch. This test pit was 1m wide and subdivided into two parts, the western, inside the porch foundation and the eastern, outside the foundation. The interior portion of the pit was excavated to a depth of 65cm. Most of the artifacts recovered here were from the surface and included some very recently introduced materials, such as modern bottle caps. However, some items were found at deeper levels. The matrix within the foundations is fill dirt in the upper 30-35cm, with a thin (2cm) layer of light gray sandy loam soil on top, possibly representing dirt which had settled through the porch floor while the house was occupied. The fill is a light to dark (mottled and mixed) sandy clay loam with gravels, rootlets, and rodent burrows. This fill grades into a zone with yellow-tan sandy clay soil and mixed chert gravels which is probably the original ground surface at the time of the house construction. Below this is a basal soil zone of mottled yellow-tan calcareous clay with a few white calcareous (?) nodules and chert gravels. The eastern part (about one-fourth) of the pit, outside the porch wall, was excavated to a depth of 35cm and contained the largest number and types of artifacts (see artifact inventory, Table 7). Artifacts were restricted to the upper 15cm outside the foundation. The porch wall construction used rather small rounded cobbles, with generous amounts of mortar in lumps, to build a foundation about 30-40cm wide, set in a narrow trench no more than 20-25cm deep. No evidence of the extent of the footing trench was found, so it is assumed to have been nearly filled with

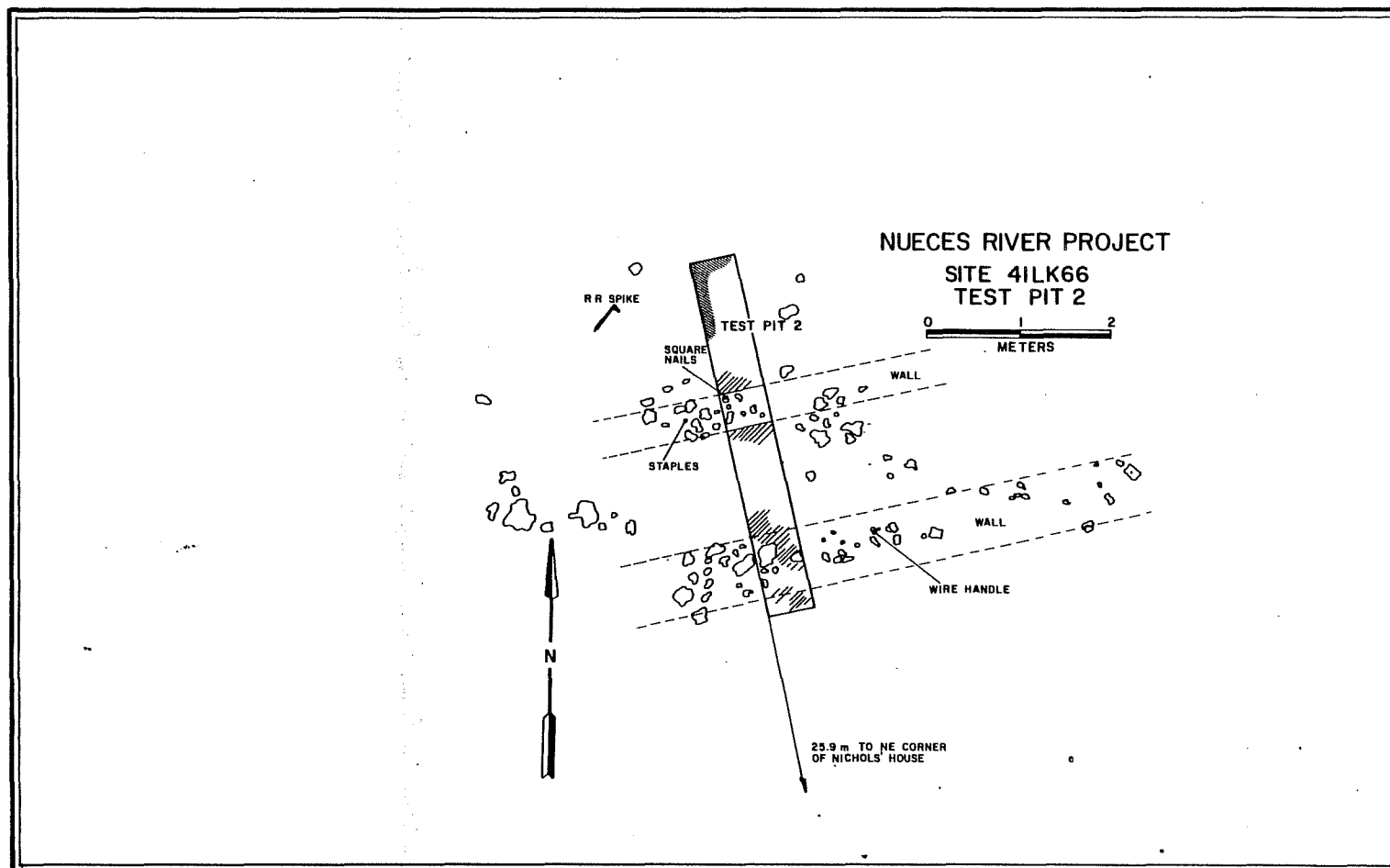
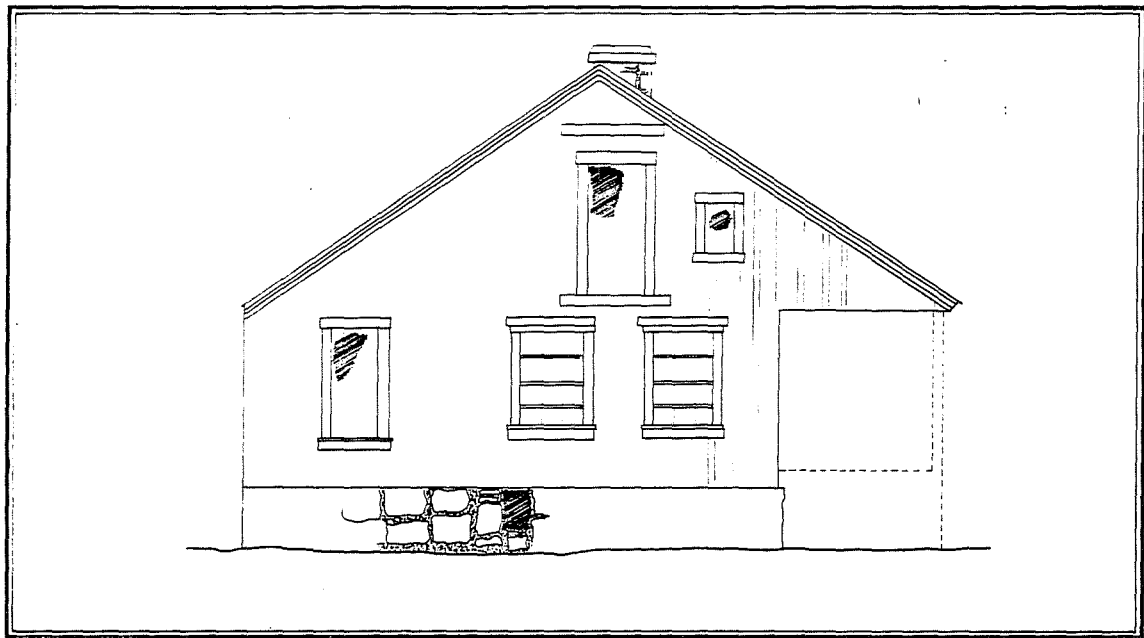
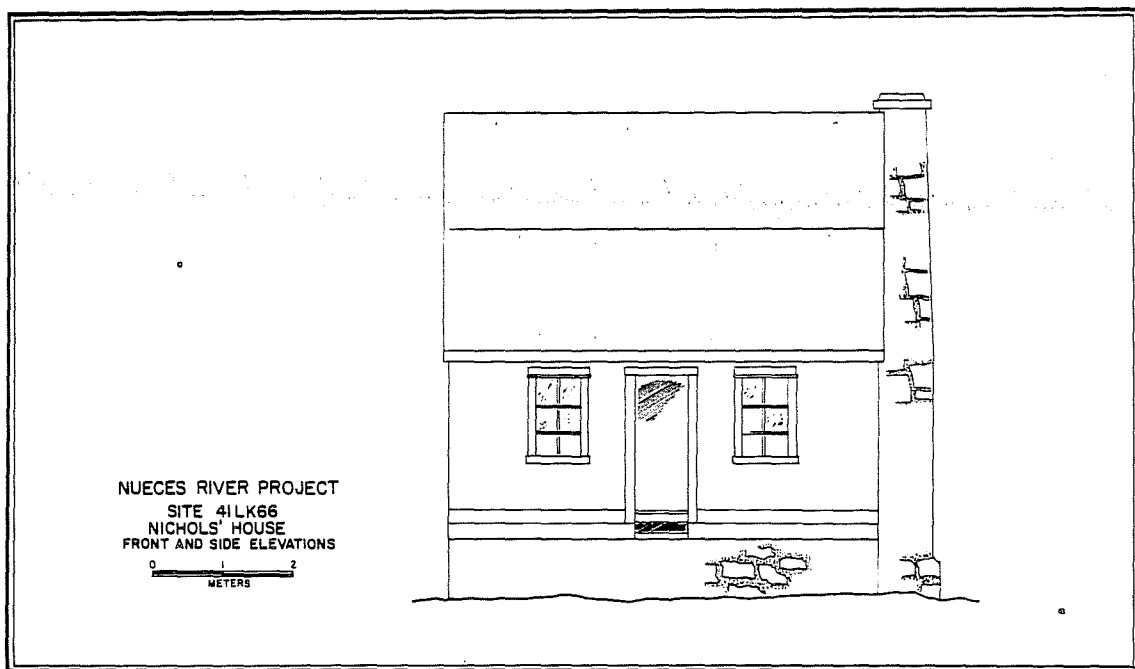


Figure 13. Test Pit 2 and North Outbuilding, 41LK66.



a



b

Figure 14. Elevations of Extant House 41LK66. a, side; b, front.

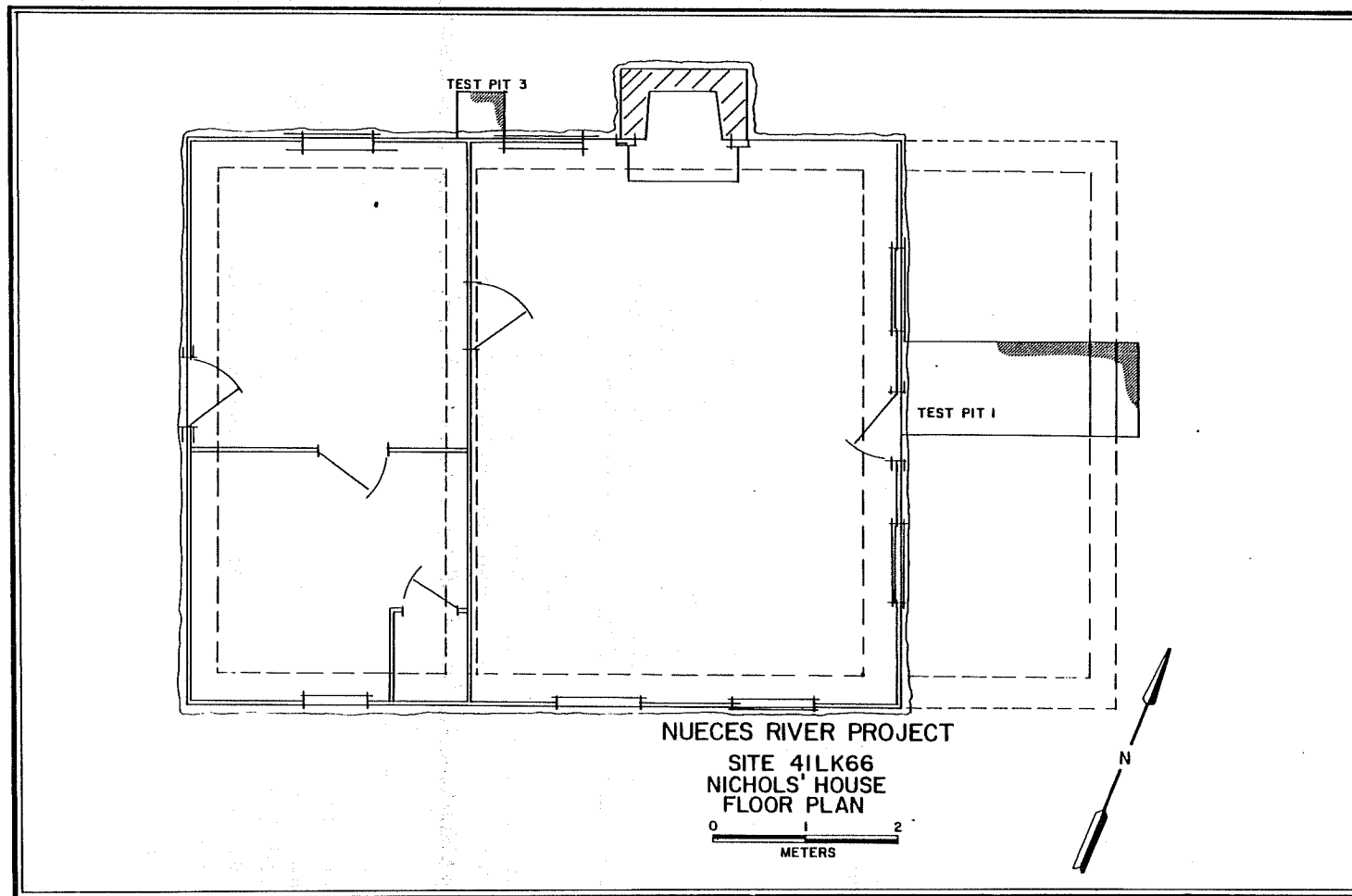


Figure 15. Floor Plan of Nichols House, 41LK66.

the foundation materials. The western 50cm of the pit (against the house foundation) revealed this foundation to be very similar to that made for the porch. There is a distinctly different selection of materials used in the upper as opposed to the lower parts of the house foundation. As described above, small rounded cobbles with generous amounts of mortar were used to cap the lower parts of the foundation. On top of this is a layer of mortar with a series of semi-shaped blocky sandstone rocks set in mortar for the balance of the foundation wall (see elevations, Fig. 14). There has been a noticeable amount of deterioration of the lower part of the foundation, due mainly to the heavy usage of mortar, which is becoming crumbly.

Test pit #3 was excavated against the north wall of the house (see floor plan, Fig. 15). This pit is 50cm², excavated as one level to a depth of 35cm below the ground surface, with the same results as test pit #1 except no occupational debris was recovered.

Test pit #2 was a 0.5x4m trench 10cm deep which transected the foundation of the northern outbuilding (Fig. 13). This structure was originally located by a concentration of small rocks scattered on the ground surface. As brush, grass and humus were removed by shovel scraping and a broom, historic cultural materials were encountered (square cut nails, bottle glass, wire, etc.). An area of about 4mx7m was cleared with some items mapped in, and pit #2 was put in to transect the apparent concentration. The full dimensions of the structure could not be obtained, but the two exposed foundations are about 2.25m from outside edge to outside edge. The northern wall, much more well defined and preserved than the southern wall, is about 40cm wide. The wall footing is constructed mainly of rocks and gravels with no mortar, and is only about 5cm thick.

Additional associated features include the fully collapsed and scattered remains of a barn and set of stock pens in an area about 65m west of the house and an outbuilding locality at mapping station #3. South of these buildings is an erosion gully that is situated and shaped such that it may be an old road. Recent disturbance and damage have been inflicted in this area by brush clearing and road building activities. The cistern is located 6m south from the southwest corner of the house. It is constructed of mortared rocks with about 5cm thick concrete plaster interior and exterior. The cistern is 3.21m deep with a bell shaped interior, and the mouth extends 0.71m above the ground surface. The slope to the south of the house is strewn with occupational debris and trash.

The extant house is 10m x 6.2m with three rooms measuring 4.5m x 6.2m, 3m x 2.6m, and 3m x 3.4m. One room, the smallest, has a 1m² closet. A front porch, 2.3m deep, went across the entire front of the house. The exterior and interior walls of the house are set on a masonry foundation. The construction shows both wire and square cut nails with many of the wire nails from relatively recent repairs. The house interior walls are finished with a pressed fiber wallboard under which is a wall covered with at least three and perhaps more layers of wallpaper

under which is newspaper against the lumber planks. One piece of recovered newspaper bears the date 1908. This particular piece of newspaper was found on the east wall of the northwest room, between the door and the north wall. This room had been covered with wall-board. The association of this newspaper to that on the walls in the rest of the house is not known. As far as is known, only the largest room had printed wallpaper over the newspaper.

Artifacts

The artifacts (Table 7) are of the types common at other project historic sites and indicate habitation at the site from the late 19th century until perhaps as late as the 1960s. Some artifact classes have differential distributions which may be a function of activity areas or behavior patterns. The most common occurrences of plain undecorated earthenware sherds are in areas A and the downhill dump. The decorated earthenware sherds are found only in the hillside dump, and no earthenware at all is found associated with the northern structure (test pit #2).

Chronology

Datable artifacts (Table 8a) indicate occupation at the site since the late 19th century. The proportion of wire to square cut nails is relatively high (Table 9).

Of the identifiable tin cans at LK66, one is of open top, locked seam manufacture of the "tobacco can" type, with a wire hinge around the top for opening and closing. The development of the open top, locked seam can depended upon the development of suitable machinery for forming and rolling a hermetic double seam. The diagnostic feature of this type of can is the locked and lapped seam on the side and the absence of solder for the sealer (Fontana and Greenleaf 1962:72-73). The locked seam can came into use about 1900 with general acceptance about 1922 (Fontana and Greenleaf 1962:72-73). Another locked seam can could be described as a "baking powder" can. A third variety of locked seam manufacture present at this site is something like a "boot polish" can. Two marked panel glass sherds are present and indicate production after 1860. Of the bottle maker marks identified, two were made by the Owens Bottle Co. of Toledo, Ohio. The use of the "O in a square" trademark was used from 1911 until 1929 when the Owens Bottle Co. with its subsidiary, the American Bottle Co., merged with the Illinois Glass Co. to form the Owens-Illinois Glass Co. (Toulouse 1971:397).

Three bottle sherds indicate they were produced by the Owens-Illinois Glass Co. The particular symbol shown by all three examples was used from 1929 through 1954 (Toulouse 1971:403). Two of these sherds have numbers to the side of the maker mark which indicate plant

number and year of production. A chart on page 395 of Toulouse's Bottle Makers and their Marks refers to the plant number, where it was located, and when it was operated. The plant number is to the left of the mark and the year of production after the beginning of the plant is to the right of the mark. On one specimen the plant number is not identifiable, but the year of production shows a number one. Assuming the plant began production in 1929, the date for this piece would be 1930. The second specimen from the Owens-Illinois Glass Co. shows a seven for the plant number and a four for the year of production. The number seven refers to the plant at Alton, Illinois which started in 1929. The fourth year of production would date this piece at 1933. One bottle sherd exhibits the mark used by the Hazel-Atlas Glass Co. of Wheeling, W. Virginia, which operated from 1920 through 1964 using this particular symbol (Toulouse 1971:239-242). One sherd shows the Ball Bros. maker mark which has been used in several variations of design of the lettering of the word "Ball" from 1888 until the present (Toulouse 1971:66-68). Another glass sherd has the Heinz Co. trademark with the "57". This piece probably dates after 1896 since the "57" was not adopted until that time (Toulouse 1971:236-238).

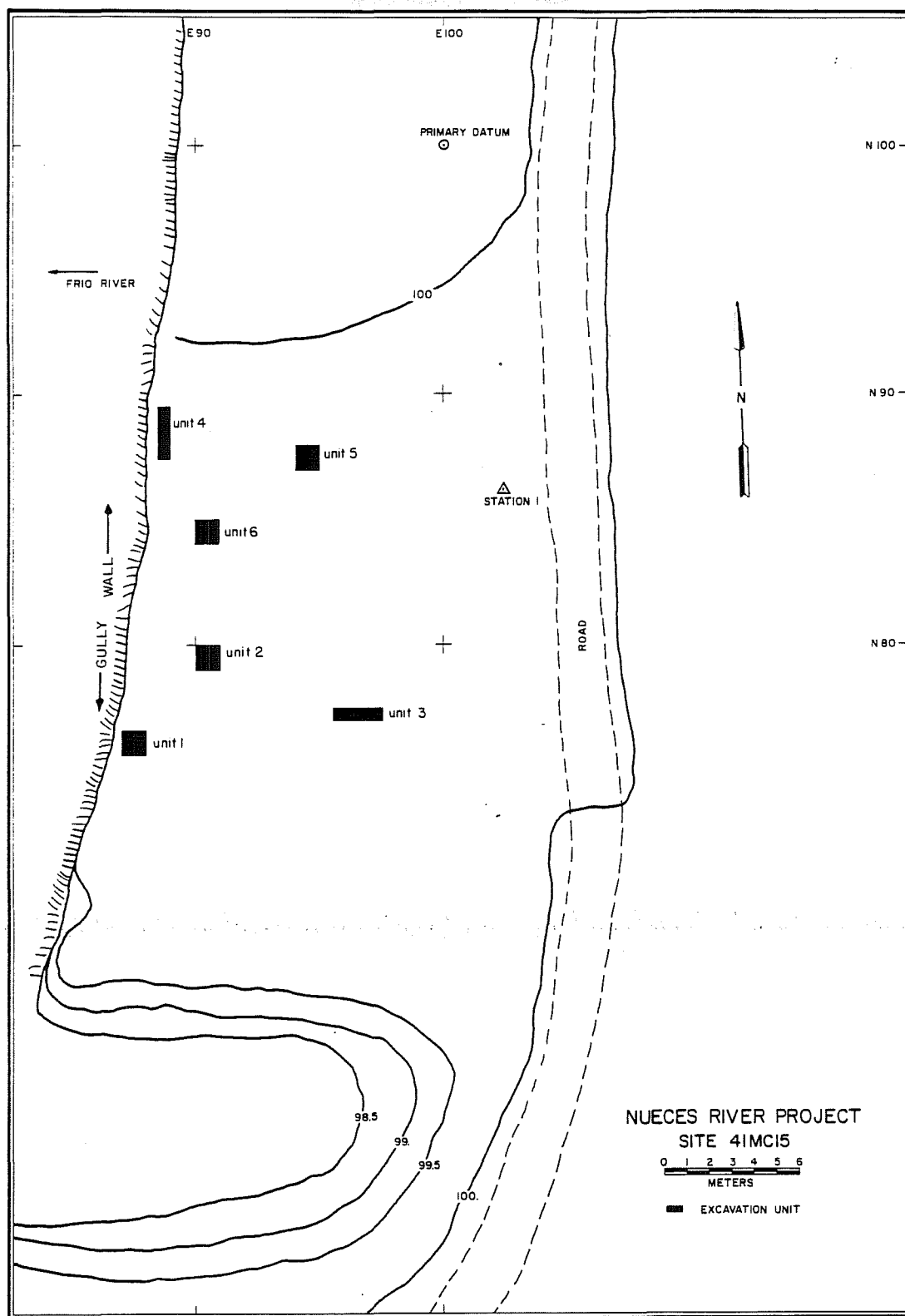
Several ammunition cartridges were identified and dated. A .45 Colt, introduced in 1873, is present. Three .22 long or long rifles which were introduced in 1887 are among the collection for this site. A .22 magnum Winchester Super X which was not produced until 1959 is also in the collection.

41MC15 (Surface Collection and Intensive Testing)

Description

The remains evident at this site are scattered sandstone and historic occupational debris and at least one architectural feature. The site, much larger at one time, presently covers an area about 15m x 30m. The site is situated on the western margin of a fossil flood plain overlooking the Frio River 10m to the west. Erosion from the Frio River has removed parts of the site on the western edge, the lower slopes below the site being strewn with sandstone blocks and historic occupational debris. A gully to the south of the site (Fig. 16) has removed a segment of that end of the site. A distribution map of the scattered sandstone (Fig. 17) discloses two relatively distinct groups of stones: 1) those to the north near test pit #4, and 2) a southern group. Six test pits were excavated, encountering historic occupational debris down to 30cm below the surface.

To search further for architectural remains, the ground surface was swept with a broom in suspected areas to clear the ground of vegetational debris and expose any features. An area of ground was swept revealing the only known intact architectural remains at the site, in the southeast corner of the site. These remains (Fig. 18) are a single course of aligned sandstone slabs which are buried only a few



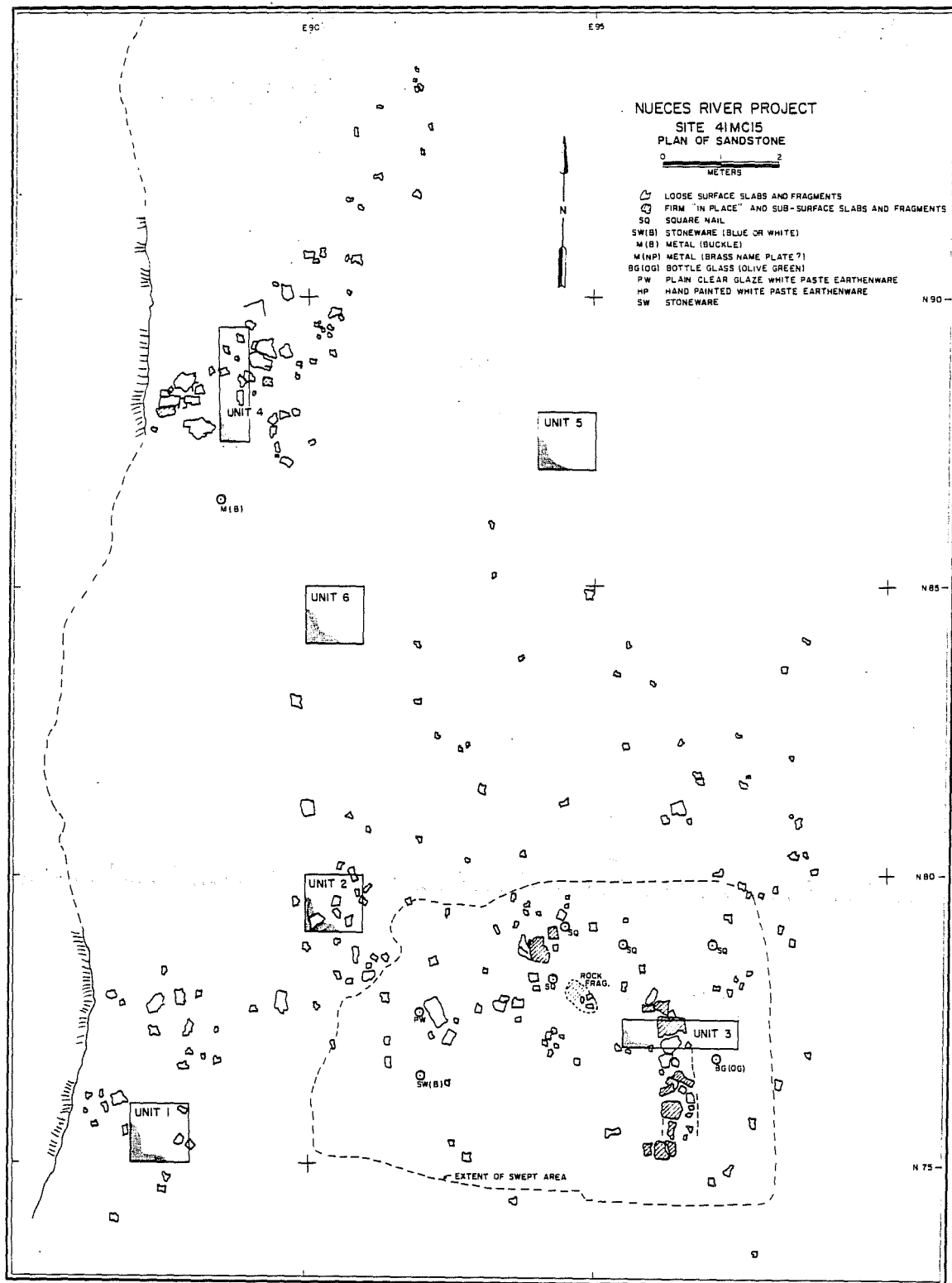
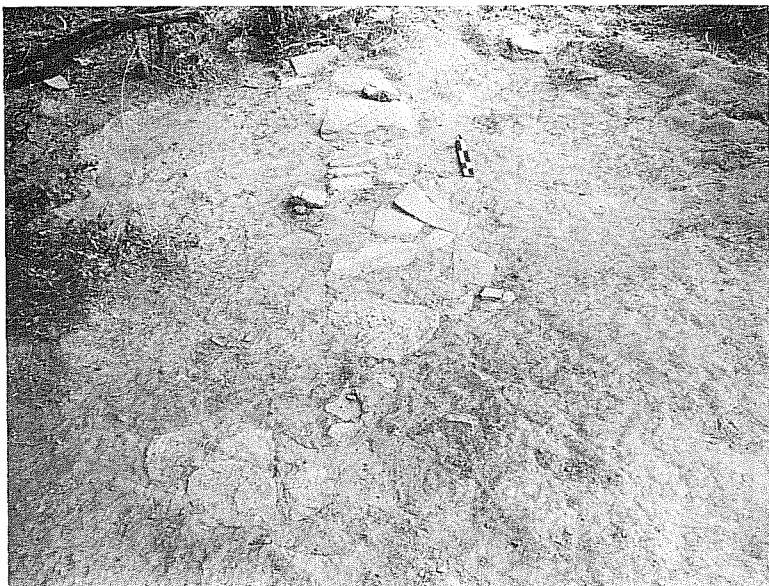


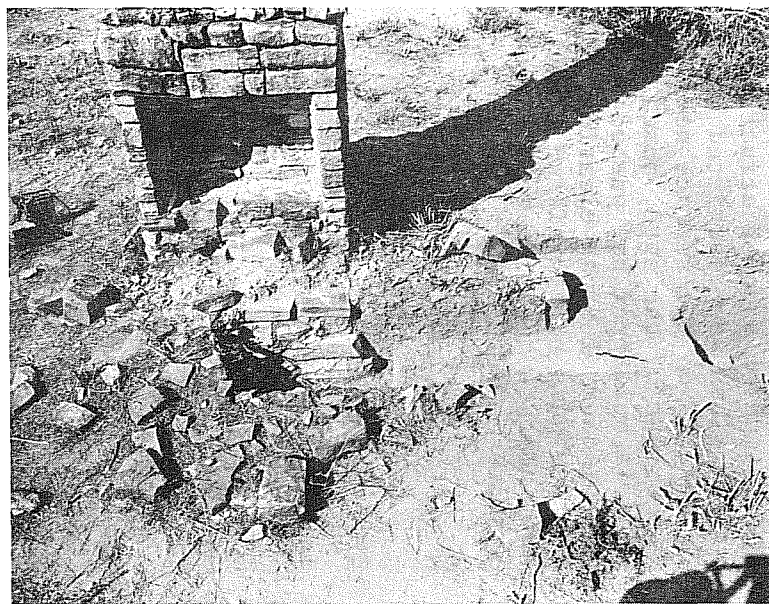
Figure 17. Plan Map of Sandstone, 41MC15.



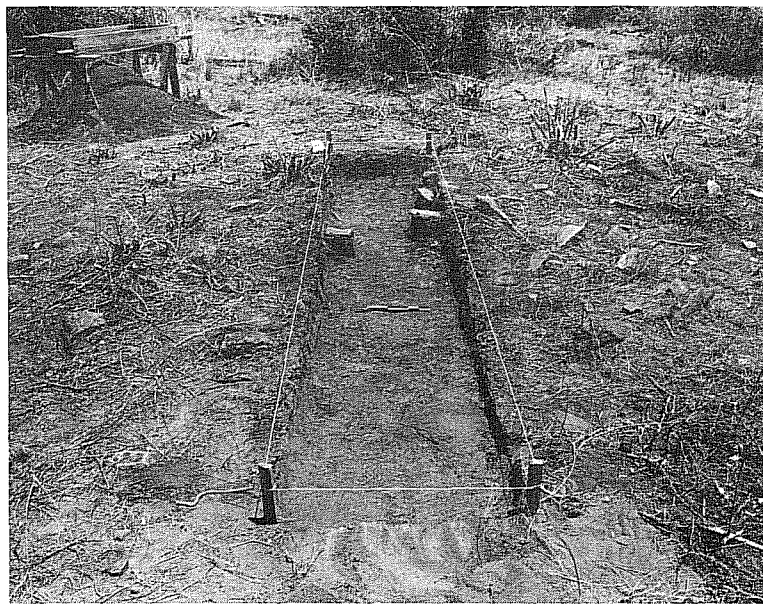
a



b



c



d

Figure 18. *Photographs of Various Features.* a, sandstone slab alignment, 41MC15; b, sandstone house chimney, 41MC17; c, scattered sandstone rocks and test pits #1 and #3 in front of chimney; d, test trench #1, 41MC74.

centimeters below the surface. Test pit #3 confirmed the shallow nature of the relatively undisturbed feature. Artifacts encountered during sweeping were carefully plotted on the plane table map. There are no associated architectural remains, and the occurrence of historic debris is restricted to the upper 10cm of soil. The exact function of this slab alignment is unknown, but it is assumed to be some type of wall footing or foundation.

The distribution of historic artifacts in the test pits ranges from the surface down to 10cm-30cm below the surface. Test pit #3, as did test pit #1, encountered debris only to 10cm. The next pits to the north encountered thicker deposits of 20cm, and pit #4 has nearly 30cm of historic material-bearing soil. Most of the underlying soils contain prehistoric, aboriginal occupational debris which is being tested and evaluated by the UTSA field crews. The progressive thinning of deposits to the south is due most probably to surface erosion being more extensive to the south end of the site and the material in the northern end actually being filled in, perhaps with soil from the southern end of the site. The historic deposits could be differentially deposited, but there is no discernible indication of this, such as soil color change or texture difference; only a slightly different soil compaction was noted.

Artifacts

The recovered archeological materials (Table 7) indicate this site to be a habitation site of mid-19th century occupation. The occurrence of ceramic dishes, glass bottles, and tin can fragments indicates the use of the site for habitation. Nails are relatively common and are indicative of a house structure, as is window glass. The occurrence of window glass was restricted mostly to the first level of test pit #4. The debris on the surface near test pit #4 is thought to be from some other part of the site, based on its appearance as a "site." It looks as if a bulldozer had pushed this debris along the ground surface in the process of brush clearing and left the pile by backing up to make another pass or by raising the blade. The occurrence of window glass may indicate the pile to be associated with the location of a (second?) structure.

Chronology

The datable artifacts (Tables 8b, 9) indicate the site to date between the 1850s and 1900.

41MC17 (Surface Collection and Intensive Testing)

Description

This site (Fig. 19) has the most complete older architectural remains in the western part of the reservoir. A well-preserved sandstone chimney (Fig. 18, b), scattered sandstone rocks and various historic occupational debris are evident on the surface in an area about 25m x 30m. Situated about 100m south of the Frio River on a high terrace and slight rise, the site has been damaged by brush clearing except adjacent to and including the chimney. No definite architectural remains were found in association with the chimney. On the north side of the chimney was a group of sandstone slabs (Fig. 18, c) one course thick (on the surface), which could have been a feature similar to that in site 41MC15 (Fig. 18, a). It was not tested.

Four test pits (Fig. 20) were placed in positions where walls, post molds, footing trenches, or other architectural features could be expected, but except for some disturbances which are probably rodent burrows, no such features were encountered. All historic artifacts were buried shallowly. The area around the chimney has been cleared several times, and one large pile of dirt and debris is the result of bulldozing. Test pit #4, situated in an area of scattered sandstone blocks, revealed that these rocks are all surface scatter. This evidence all indicates that the site, except for the chimney itself, has been extensively disturbed by clearing and most if not all other architecture destroyed.

Excavations encountered prehistoric debris in all areas. This site component was sampled and extensively tested by the UTSA field crew.

The stone chimney is constructed of shaped sandstone blocks mortared with lime mortar. The foundation (Fig. 21) extends about 36m below what may have been the ground surface at time of construction and is set on a 4cm thick layer of lime mortar. If the chimney foundation was constructed symmetrically with the stack, the total dimensions would be about 2m². The chimney (Fig. 18, b) stands 5.25m tall and is braced in the top or mantel of the hearth with a flat piece of iron which is apparently a straightened piece of wagon wheel rim. This metal piece is beveled on both edges of one side, is perforated with a hole every 62cm along its length, and measures 1.5cm x 6cm in cross section. Part of the metal brace is visible in the upper left corner of the hearth opening as shown in Figure 18, c.

Artifacts

An extensively controlled artifact collection was made at this site (Table 7). Items recovered indicate the site to be a mid-19th

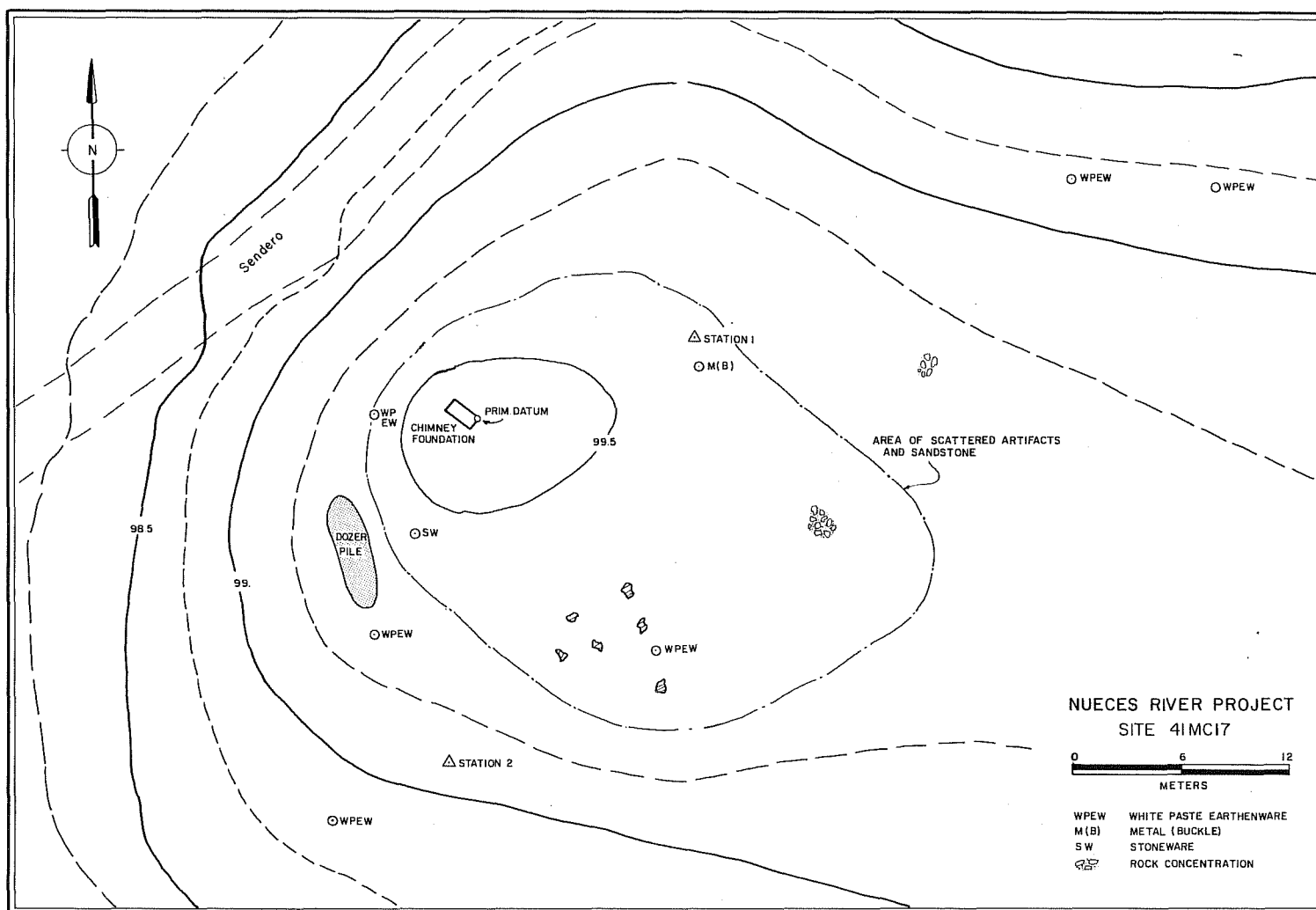


Figure 19. Site Map of 41MC17.

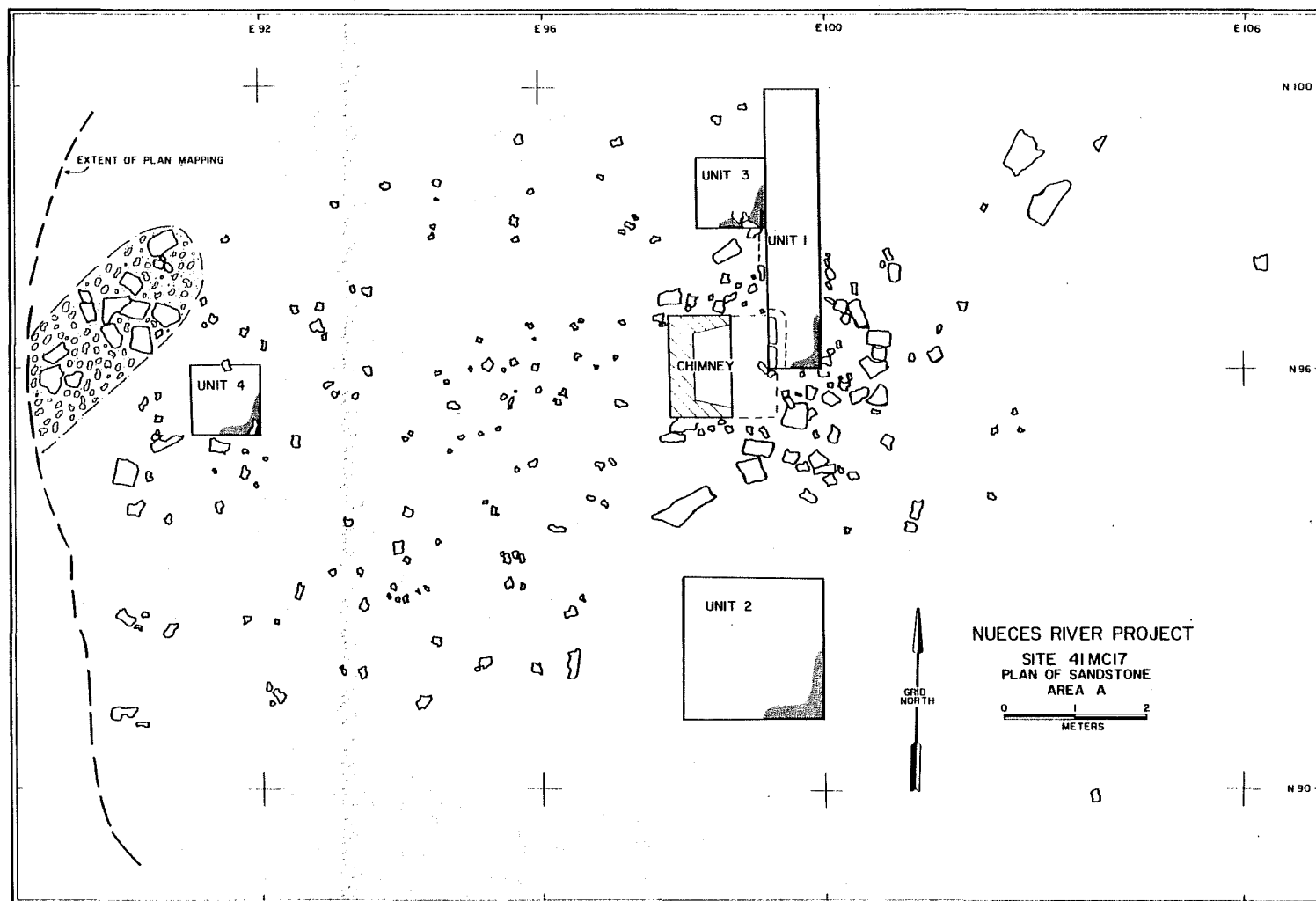


Figure 20. Plan of Sandstone and Excavation Units, Area A, 41MC17.

century habitation. The presence of nails (Table 9), some of which are relatively large, indicate a habitation structure with large-sized lumber construction. Window glass was recovered in two test pits, also indicating the presence of a house. The ceramics and glass are, in general, like that found in the other project sites. One unique metal artifact was thought to be a chamber pot cover (Fig. 11, e). Constructed from molded sheet metal, the can has two hinged tops that fit one on top of the other; the top one is solid and the second one has a large pear-shaped hole in it. The article is made without a bottom.

Chronology

The artifacts in general date from the last half of the 19th century (Table 8c). The exclusive occurrence (except for one fragmentary specimen of what might have been a wire nail) of square cut nails dates the site to pre-1890-1900. Although several maker marked sherds were recovered, these were not identifiable. The manufacture of bottles went through several distinct stages which allow for relatively accurate dating of specimens, particularly bottle rims (Lynn, Fox and O'Malley 1977:197), but the incompleteness of nearly all specimens prohibits more accurate dating. One bottle with applied lip (Fig. 11, c) is dated in the mid to late 19th century. Several items are of recent age, such as the Schlitz beer can and the foil packets; because the chimney is still standing, the locality attracts picnickers and visitors.

MC17 exhibited several ammunition cartridges (Fig. 11, f-p) which were produced primarily in the late 1800s. Two .44 Henry Flats, introduced in the late 1860s (Logan 1959:68), are probably the oldest cartridges examined. A .41 Short, introduced with the National Arms Co. breech-loading Derringer in 1863, was another of the older cartridges. Several pocket revolvers were chambered for the .41 Short, but it has been obsolete since World War II. A .44 caliber W.C.F., commonly called the .44-40, was introduced in 1873. This specimen used the balloon head primer which was not made after 1930 (Logan 1959:137). The latest cartridge for this site is a .44 Short. This cartridge, chambered in many popular pistols and revolvers, was well established by 1870, but obsolete by 1920 (Barnes 1972:279).

41MC46 (Surface Collection and Mapping)

Description

Site 41MC46 (Fig. 22), situated on a small knoll about 30m from Opossum Creek, is a scattering of sandstone blocks, under which are wall alignments, a chimney foundation and associated historic occupational debris. The outline shape of the house is discernible from a single course of aligned slabs. The slabs are clearly visible along the west edge of the structure and up to the chimney, which is set slightly into

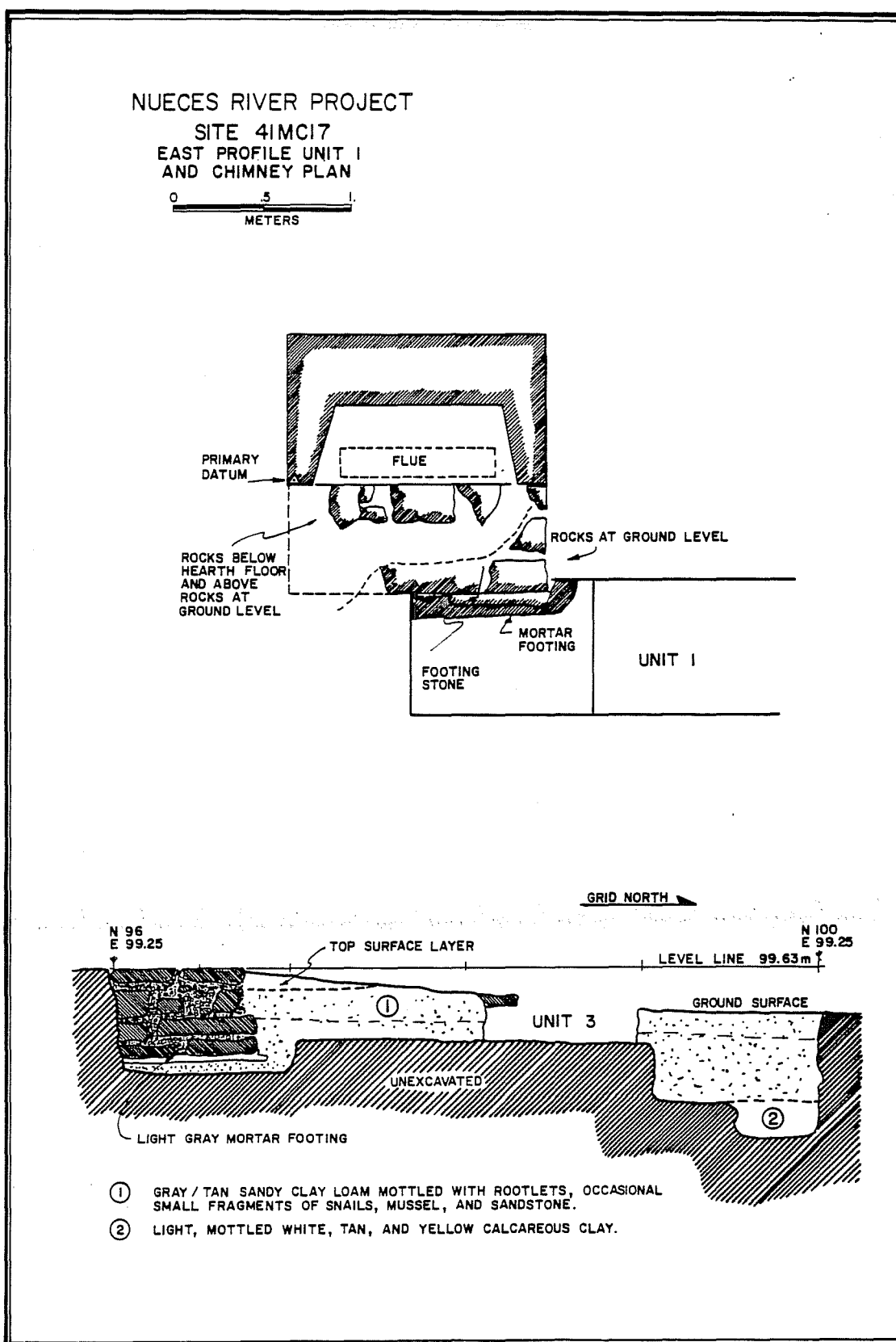
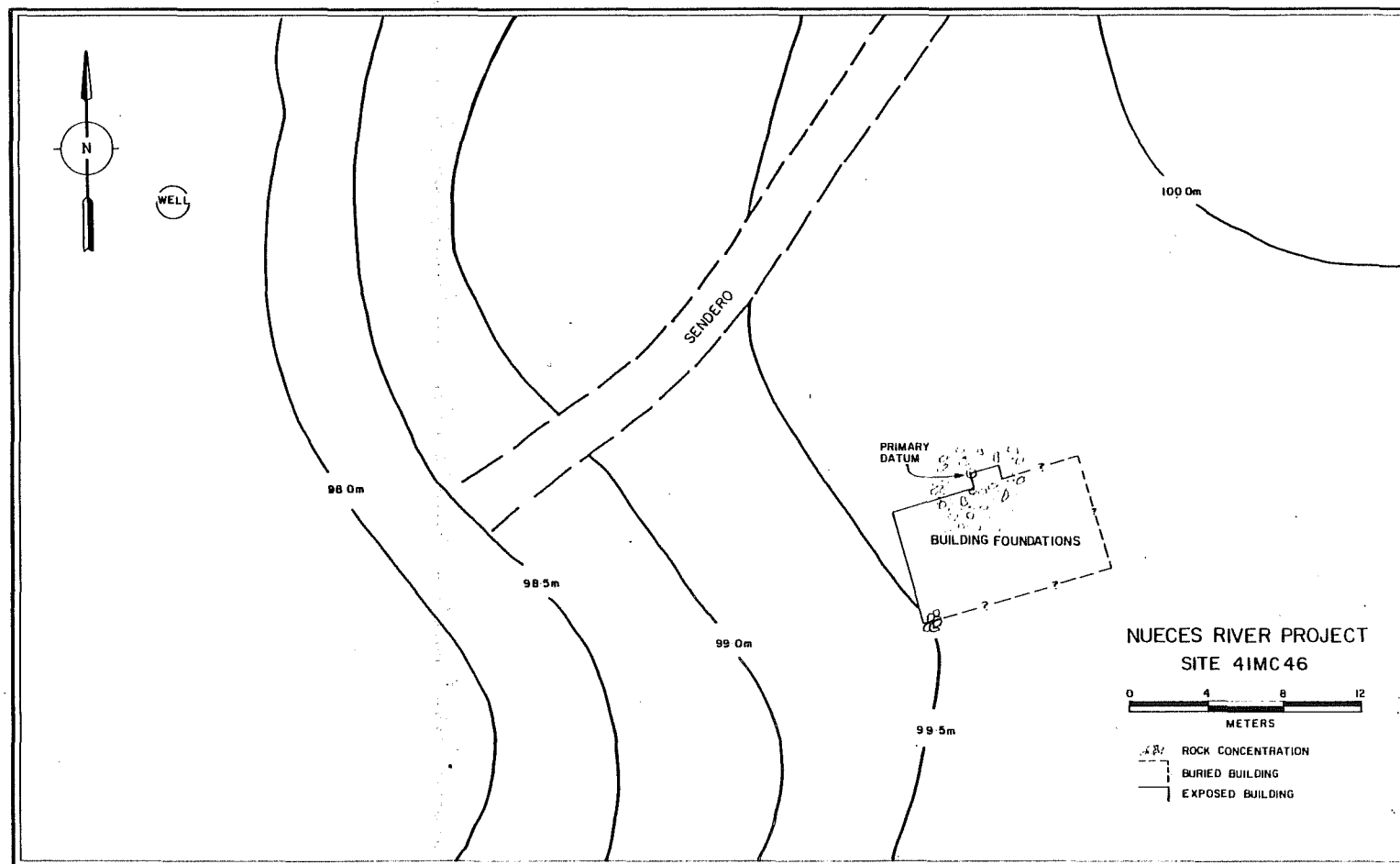


Figure 21. Details of East Profile Unit 1 and Chimney Plan, 41MC17.



the house. The chimney was apparently all of sandstone and collapsed into the interior of the house. There are scattered slabs and rocks over the entire house area, some of which are remnants displaced from the other walls of the structure. The site may be damaged from clearing, but subsurface excavations were not conducted to confirm the extent of damage and what portions of the structure remain.

Associated architectural remains include the collapsed chimney, chimney foundation, wall footing slabs, and a well. The well is located 44m west-northwest from the center of the chimney foundation and is about 1.6m in diameter and of an undetermined (3+m?) depth. The well is cut into a sandstone formation and had standing water in it at the time of the field work. The shaped stone and mortar chimney with a single course of very shallow to ground surface sandstone slab alignment are consistent elements of the Yarbrough Bend architecture. The presence of the wall footing slabs may explain in part why no foot trenches have been encountered to date, but the exact relationship of these slabs to the rest of the walls is still unknown.

Artifacts

The artifacts from this site (Table 7) were gathered as a general sample and indicate the site to be probably a late 19th century habitation site (Table 8d). There is an absence of square cut nails, but there was clearly a house at the site. The collecting methodology and the thick grass cover at the site may be responsible for this absence. The absence of many decorated ceramic sherds is perhaps indicative of "no frills" subsistence. The relative abundance of ceramic dishes and stove parts, and absence of bottle glass and tin cans, indicates that the house was not lived in for a very long period of time, and that it was abandoned with its contents, which were perhaps vandalized or discarded, but not moved and used later.

Chronology

One clear glass bottle base has the distinct circular scar indicative of manufacture by an Owens automatic bottle making machine, which dates the bottle after 1913 (Munsey 1970:249). Another attribute of the automatic machine made bottle is the extension of the side seams all the way to the top of the bottle and around the lip (Fig. 11, c). These molded lip specimens also date post-1913.

A rectangular top portion of a tin can suggests it is possibly the tapered "corned beef" type which started about 1875 (Fontana and Greenleaf 1962:73). Also, a ceramic sherd with a partial maker mark has two possibilities. It is probably Bridgewood and Clarke, since other marks by this maker have been examined. This would date 1857 to 1864 (Godden 1964:101). The alternate possibility is Edward Clarke, formerly Bridgewood and Clarke, which operated from 1865 through 1887 (Godden 1964:147).

41MC72, "New" Site (Surface Collection and Intensive Testing)

Description

This site (Fig. 23) is composed of mainly a sandstone block concentration, and thinly scattered historic occupational debris. The rock concentration is apparently a collapsed chimney; no foundation was located. A test pit encountered a soil change at about 15cm below the surface and a marked decrease of historic artifacts. The site has been extensively disturbed by clearing, is relatively shallow, and has no distinct architectural features visible from the surface. The site, discovered by the Texas Tech field crew in 1977, has not been previously reported. Located on the extreme edge of the terrace overlooking the Frio River, behind a barbed wire fence, the heavily overgrown site is hard to see even when immediately adjacent to it. There is virtually no artifactual material visible in the road and fence area, and heavy grass and brush growth beyond the fence on the site mask the other materials.

Artifacts

The site, based upon the artifact types recovered (Table 7), is a mid or late 19th century habitation locality. There was a structure, as indicated by the nails (Table 9) and window glass. The area immediately downhill from the structure is heavily eroded and is the area where most of the habitation trash was probably discarded, thereby removing much of this particular class of debris. There were not very many items recovered, making relative frequencies of items less significant, but there is a distinctly low frequency of decorated ceramics. Similar to other sites (specifically 41MC46), the site occupants may have had a "no frills" family economy.

Chronology

The temporal placement of the site is late 19th century. The datable items in Table 8e are various and cover a broad time period.

One fragmented ceramic sherd with maker mark (Fig. 6, i) probably represents J. W. Pankhurst and Co. of Hanley, England, which operated from 1850 through 1882 (Godden 1964:481). Also, a marked glass sherd is present indicating post-1860 manufacture.

41MC74 (Surface Collection and Intensive Testing)

Description

This site (Fig. 24) represents what was probably another typical late 19th century house structure, but extensive brush clearing and

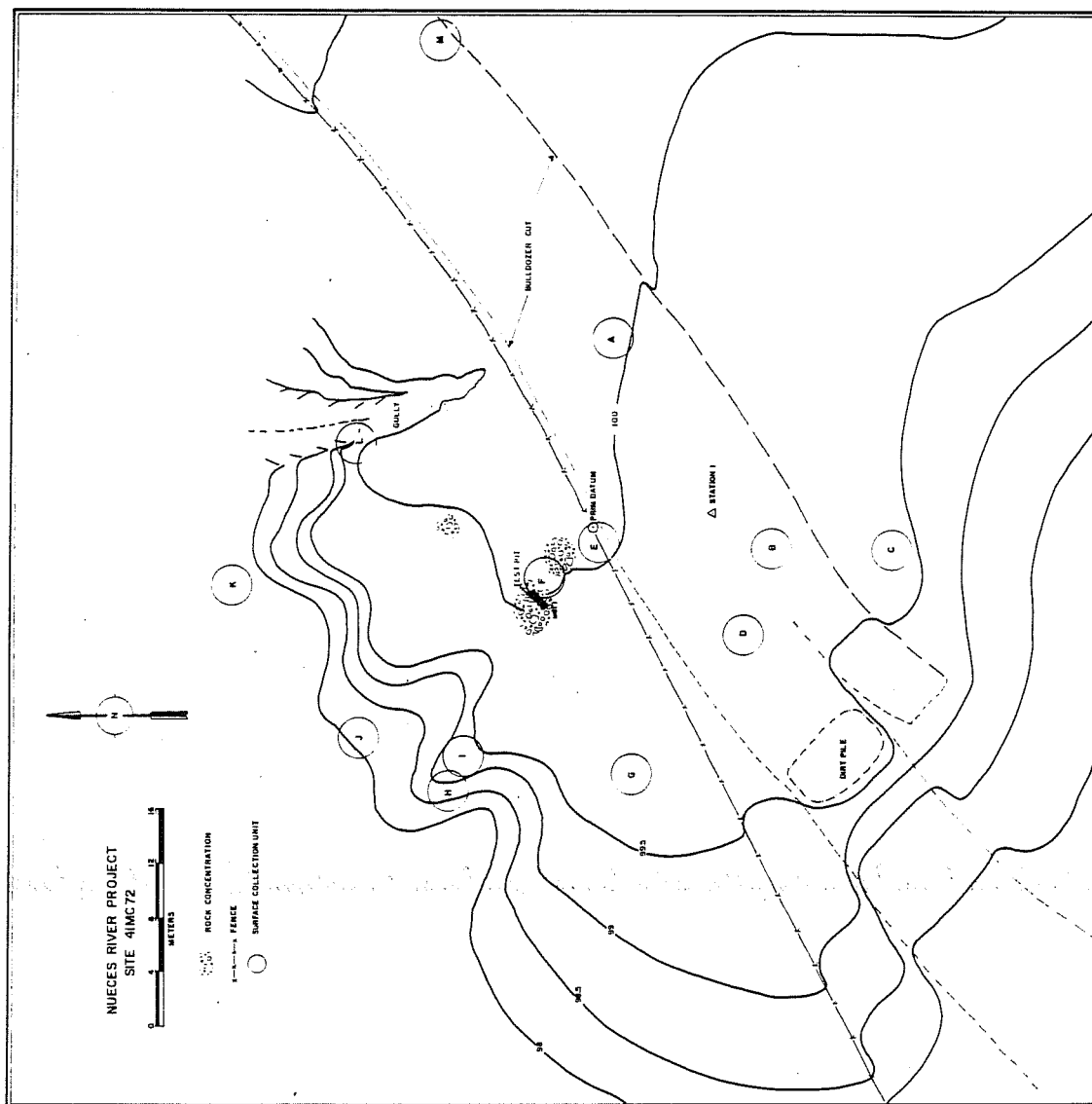


Figure 23. Site Map of 41MC72.

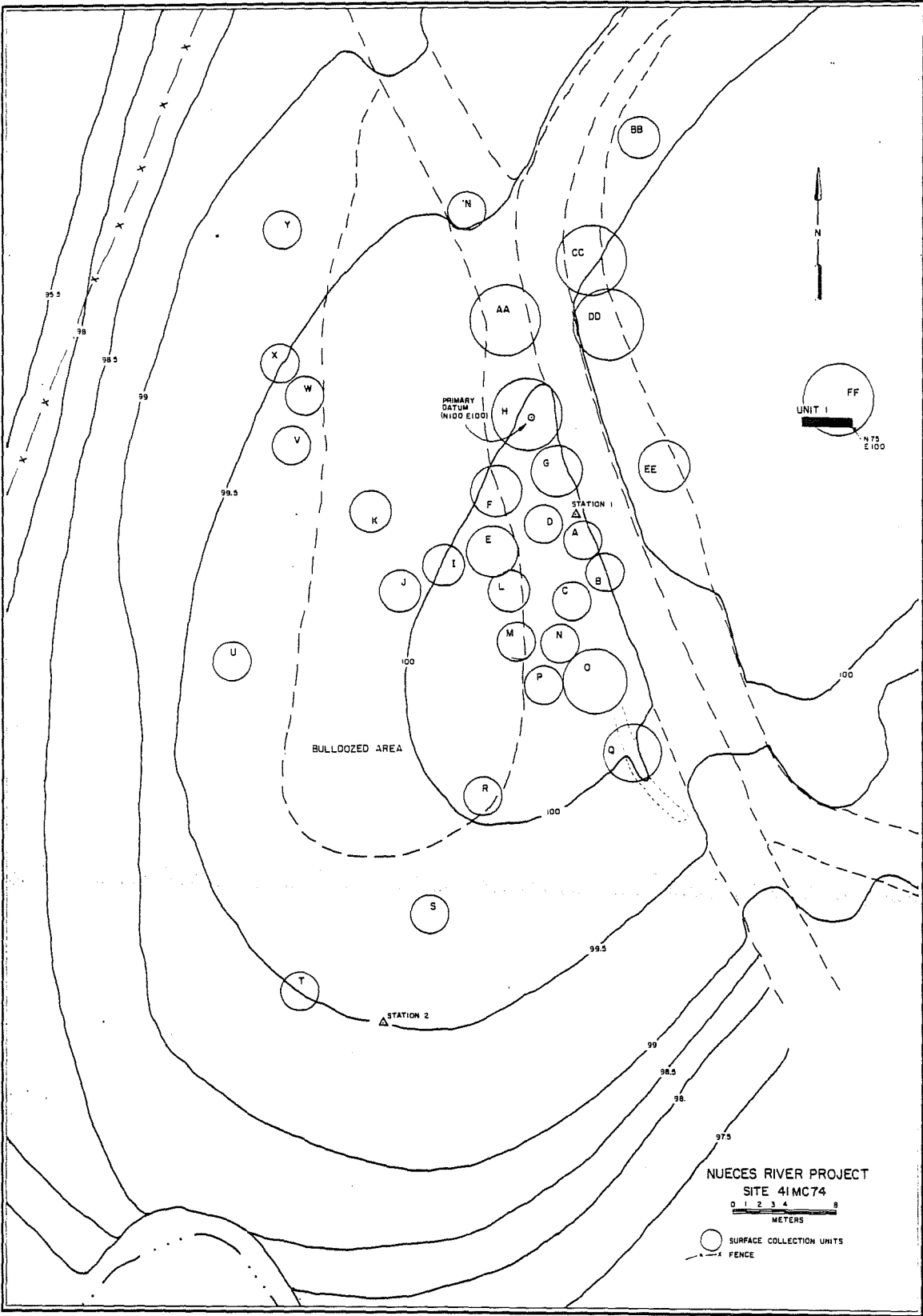


Figure 24. Site Map of 41MC74.

a road cutting through the middle of the site have destroyed most if not all of the structural remains. Scattered sandstone and historic occupational debris cover an area 40m x 60m on a hill near the Frio River, with concentrations of materials eroding from numerous dirt ridges and piles pushed up by bulldozers. Test pit #1 (Fig. 18, d) was put in an area where possible house remains were located. The .75m x 4m pit was excavated to 10cm below the ground surface at the southwest corner stake, and allowed the recovery of various historic artifacts, mostly in the upper 3cm of the level.

The historic artifacts scattered on the surface were fairly profuse, due mainly to the recently "filled" nature of the disturbances. These artifacts were collected in a series of collection circles of various sizes ranging from 1.5m to 2.5m in diameter, and situated where artifact concentrations were found. The central point of each surface collection circle was mapped with the plane table/alidade and drawn on a site overlay. The overlay was joined with the topographic map as shown in Fig. 24, and each was designated alphabetically by a letter.

Artifacts

The recovered artifacts (Table 7) indicate the site to be a mid-19th century habitation site. The wide variety and great quantity of material is due probably to the highly disturbed nature of the site. The common occurrence of square cut nails (Table 9), some of which are fairly large (3"), indicates a fairly large structure with heavy lumber construction. There are a few window glass sherds scattered over the site as well. The amount of materials that could be associated with habitation (trash) relative to the amount of material associated with a structure (construction and architecture) appears to be rather high in comparison to other sites. An in-depth and quantitative comparison is not possible within the scope of this project, but apparently some sites such as 41MC74 were inhabited for much longer periods of time than other sites such as 41MC46. It may be possible to construct a habitation index based upon some quantifiable criterion such as food container vs. shelter debris.

Chronology

Numerous artifacts were recovered with a distinct temporal significance (Table 8f). In ceramic ware there are embossed rims dating to the mid to late 19th century. Glass items include applied lips on bottles and fruit jars. A few wire nails were recovered, but the vast majority are square cut, indicating abandonment of the site by the 20th century.

The dates for MC74 are indicated by several ceramic sherds with maker marks. One sherd with the impressed Davenport mark of the

Staffordshire Potteries in England includes the last two numerals of the year, which are placed on each side of the anchor insignia (Godden 1964:189). These numerals indicate that this piece was made in 1856. A second ceramic sherd shows the W. Baker and Co. mark of Fenton, England (Godden 1964:51). This mark includes a diamond-shaped symbol which occurs on Victorian ceramics from 1842 to 1883. This was used to date the registration of the maker mark at the Patent Office in London. The letters and numbers were arranged in two different ways around the diamond symbol. From 1842 to 1867 the year letter appears in the top panel. From 1868 to 1883 the year letter appears in the right-hand panel (Godden 1964:526-7). Although the top panel of the specimen is obscure, the bottom panel is identifiable. The bottom panel, according to the two identification schemes, can have either a number representing the parcel or a letter representing the month. This specimen shows the number in the bottom panel, representing the parcel number, and indicating this piece was of 1842-1867 registration design. The third ceramic sherd with a maker mark (Fig. 6, h) is one produced by Bridgewood and Clarke of Burslem, England from 1857 to 1864 (Godden 1964:101). One glass marked panel sherd which was produced after 1860 is present in the collection.

41MC91 (Surface Collection and Mapping)

Description

This site (Fig. 25) has an extant frame house (Fig. 26, a) with associated scatter of historic occupational debris, water cistern or tank (Figs. 26, b; 27). The site is situated on a ridge top on the edge of the valley wall. The site is 30m from the old river bed of San Miguel Creek, which is presently about 700m to the south. Original investigations by THC questioned the antiquity of the extant house and noted the incongruence of its suspected post-1900 age relative to the late 19th century age of the site as suggested by the artifacts. A chimney foundation remnant, feature 1, was discovered eroding in the road bed in front of the extant structure, indicating the presence of an earlier structure and explaining the earlier incongruence problem. A second sandstone block concentration was noted to the NE of the extant house but is of an undetermined nature. Square cut nails were found in association with this concentration (on the south side), indicating perhaps an outbuilding in association with the earlier 19th century occupation.

A circular stone tank or cistern (Fig. 26, b) was found between the extant house and an associated shed, but the exact relationship of this feature is unknown. The feature is 1.8m in diameter, is filled with rocks and dirt, and is flush with the ground surface. The location of this feature is next to the corner of the extant house and could conceivably be associated with this house, but it is also close enough to the chimney foundation that it could be associated with the earlier structure.

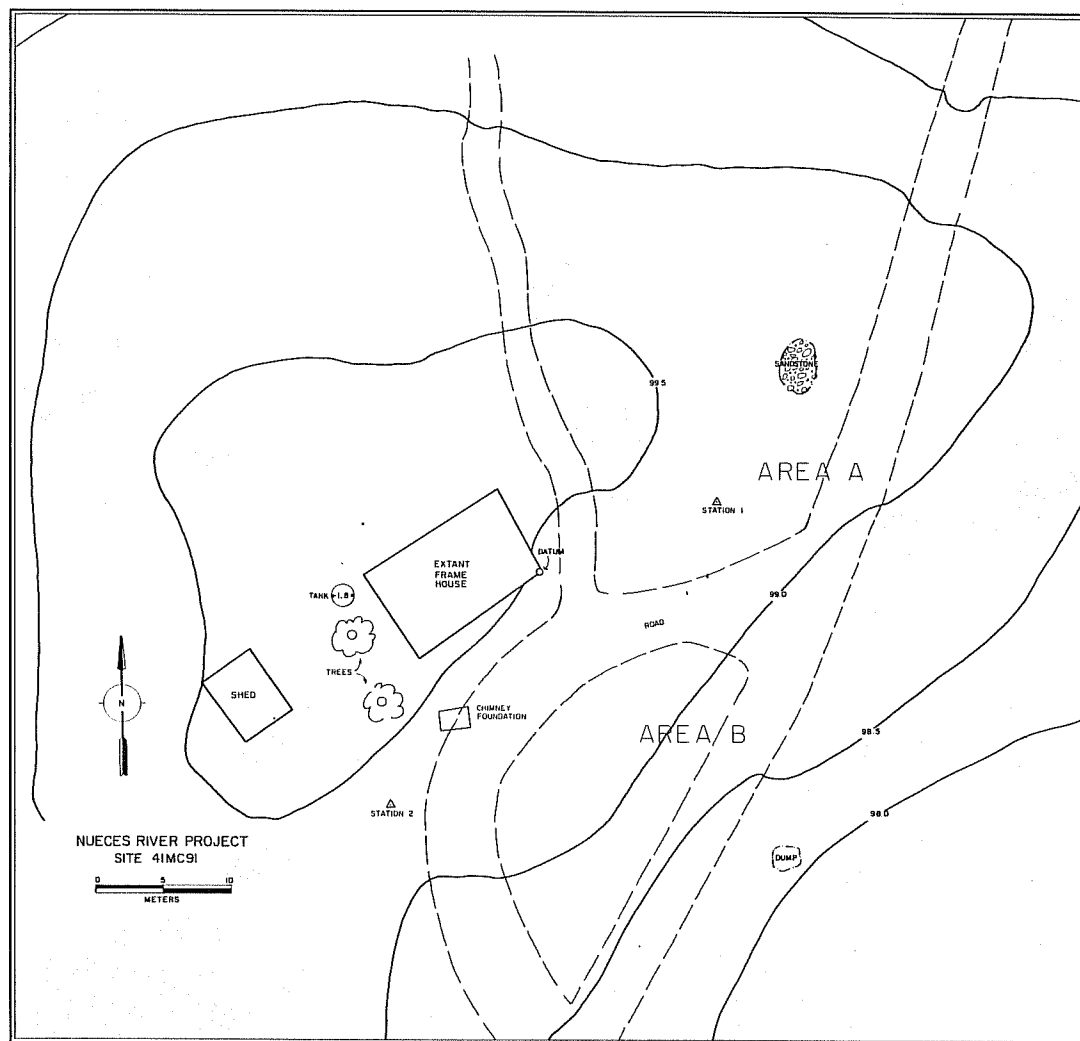


Figure 25. Site Map of 41MC91.



a



b

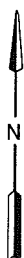
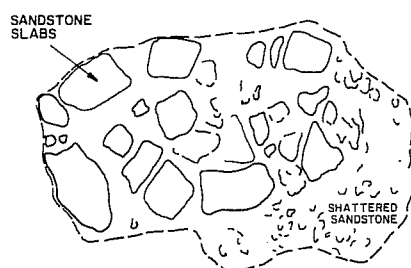


c



d

Figure 26. *Photographic Views of 41MC91 and 41MC185.* a, extant house, 41MC91; b, cistern or tank top west of extant house, 41MC91; c, feature 1, badly disturbed chimney foundation, 41MC185; d, feature 2, 41MC185.



NUECES RIVER PROJECT
SITE 41MC91
CISTERN

0 1 2
METERS

Figure 27. Cistern Plan, 41MC91.

For the collection of surface artifacts, the site was bisected with a line running east from the SE corner of the extant house; the area to the north of this line and east from the house was designated as area A, and the area to the south of this line and the house designated as area B.

Artifacts

Artifacts (Table 7) include a small amount of decorated ceramic ware, and a high occurrence of cartridges. The cartridges are recent items which are the result of the extant structure being used as a hunting cabin. The absence of decorated ceramics may be a function of the late chronological placement of the site.

Chronology

The site, based on datable artifacts (Table 8g), is probably no older than about 70-80 years. Built around the turn of the century, there is a high proportion of wire nails (Table 9), recent cartridges, such items as a battery post, copper tubing with a brass ferrule fitting, bright colored glass, and machine made bottles with molded lips. The applied bottle lips and square cut nails indicate a possible pre-1900 habitation of the site, possibly associated with an earlier structure. The exact age of the house itself cannot be ascertained at present.

Of the datable items from MC91, ammunition cartridges were quite prevalent. All cartridges are expended unless otherwise indicated. One .45 Colt, made by Western, was introduced in 1873 and is still popular today (Barnes 1972:172). The oldest cartridge from this site appears to be .44 caliber commonly referred to as a .44 Henry Flat. The .44 Henry Flat refers to the flat nose bullet, which is not present, but the case is of the same cartridge. F. Tyler Henry developed this large caliber for the 10,000 Henry repeating rifles produced from 1860-1866 (Logan 1959:68).

Two .32 caliber Smith and Wesson Longs, introduced in 1903, are present along with a .32 caliber auto, also introduced in 1903 (Barnes 1972:154). The .30-30 caliber Winchester found at the site was first marketed in 1895 for the Model 94 lever action rifle produced by Winchester (Barnes 1972:34). Also present is a .22 caliber long or long rifle cartridge which was developed in 1887 and is still very popular today (Barnes 1972:274). The distinction between the long and long rifle cartridge cannot be made since the case length is the same for each.

41MC166, "Dump" Site (Surface Collection and Mapping)

Description

The site consists of scattered historic age artifacts and refuse. There is no evidence of structural remains, and the evident refuse may be the result of dumping. The site is situated about 20m north of San Miguel Creek and covers an area of about 20m x 40m. The western portion of the site is heavily eroded by extensive gullying, and all the site is heavily overgrown with brush and grass. A general surface collection of specimens was accumulated, and no test excavations or maps were attempted.

Artifacts

The artifacts collected (Table 7) from this site indicated the site was probably a dump area. There is no evidence of a structure, and there is a low frequency of building related materials. Originally identified as a dump site by Lynn, Fox and O'Malley (1977, Table 21), the site, if it is a dump, is somewhat of an anomaly; it is the only "dump" site in an era when each habitation site had its own dump immediately adjacent to the structure. The site is very heavily eroded, and it can be suggested that the site may be a habitation locality with the associated structure completely obliterated. The occurrence of nails and window glass tends to support this possibility.

Chronology

The items dated from MC166 (Table 8h) indicated a wide time span through the mid to late 19th century. A single marked glass panel sherd appears in the collection, representing a date post-1860. Square cut nails (Table 9) represent mid to late 1800s, and glass material into the late 1800s and early 1900s.

41MC168, Teal Site (Surface Collection and Mapping)

Description

Discovered in the last few days of the field study, this site is reported after only a brief surface examination. The site covers a small area approximately 70m south of San Miguel Creek in the NW part of the previously reported prehistoric component of 41MC168. Consisting primarily of scattered historic occupational debris and sandstone, there is one probable rock house foundation, with a second rock concentration about 25-30m to the north and about 30m from San Miguel Creek. The site is disturbed by brush clearing, erosion, and animal burrowing, and is thickly overgrown with brush, grass, and cactus. No maps were made.

Artifacts

The ceramics are all undecorated earthenware or stoneware. No window pane sherds were present, but four bottle bases made in a bottom hinged mold were recovered. The site is a habitation site, probably dating in the late 19th century. The occupants of the site were probably of lower socio-economic status based on the lack of decorated wares. More extensive investigations may corroborate this view. As can be seen in the inventory (Table 7), there is a prehistoric site component.

Chronology

The items encountered at this site (Tables 7, 8i, 9) seem to represent the late 19th century even though the glass bottle bottom hinged mold pattern spans from 1810 to 1880 (Fig. 28, b).

One ceramic sherd with a maker mark has two possibilities. Its fragmentary condition prevents any exact identification. The first possible maker is Clementson Bros. of the Staffordshire Potteries in Hanley, England which operated from 1865-1916 (Godden 1964:149). The second possible maker is Johnson Bros. also of Hanley, England who operated from 1883 (Godden 1964:355). Three aqua glass sherds show the Frederick Hampton Glass Works maker mark (Fig. 28, a). The "FHGW" mark appears on several types of handmade beer bottles--amber, and finished for corks, as found in western ghost towns (Toulouse 1971:202). This mark was used circa 1880 to 1900. A fourth glass sherd with maker marks represents Burlington Glass Company. One of the oldest glass companies in Ontario, Burlington used its initials and sometimes its name in full on fruit jars (Toulouse 1971:85-86). The mark, "BGC2," was used from 1877 until 1909 when the company was taken over by the Diamond Glass Co. of Montreal. One ammunition cartridge, a .45 Colt which has been in production since 1873, is also present in the collection.

41MC175 (Surface Collection and Mapping)

Description

The site (Fig. 29) is an extant wooden frame house structure with associated barn, outbuildings, corrals, fences, and scattered historic occupational debris. The site is situated on a point on the valley wall overlooking the Frio River 750m to the west. Extant buildings include the house, a barn to the north of the house, a water tank/shed, and an outhouse or latrine. There is a dump area to the west of the house down the slope of the valley wall, and several remaining (standing) sections of fencing scattered in the area. One area fenced on the east side of the house and another to the south contain discarded wine bottles and trash. To the southwest of the house is a building foundation

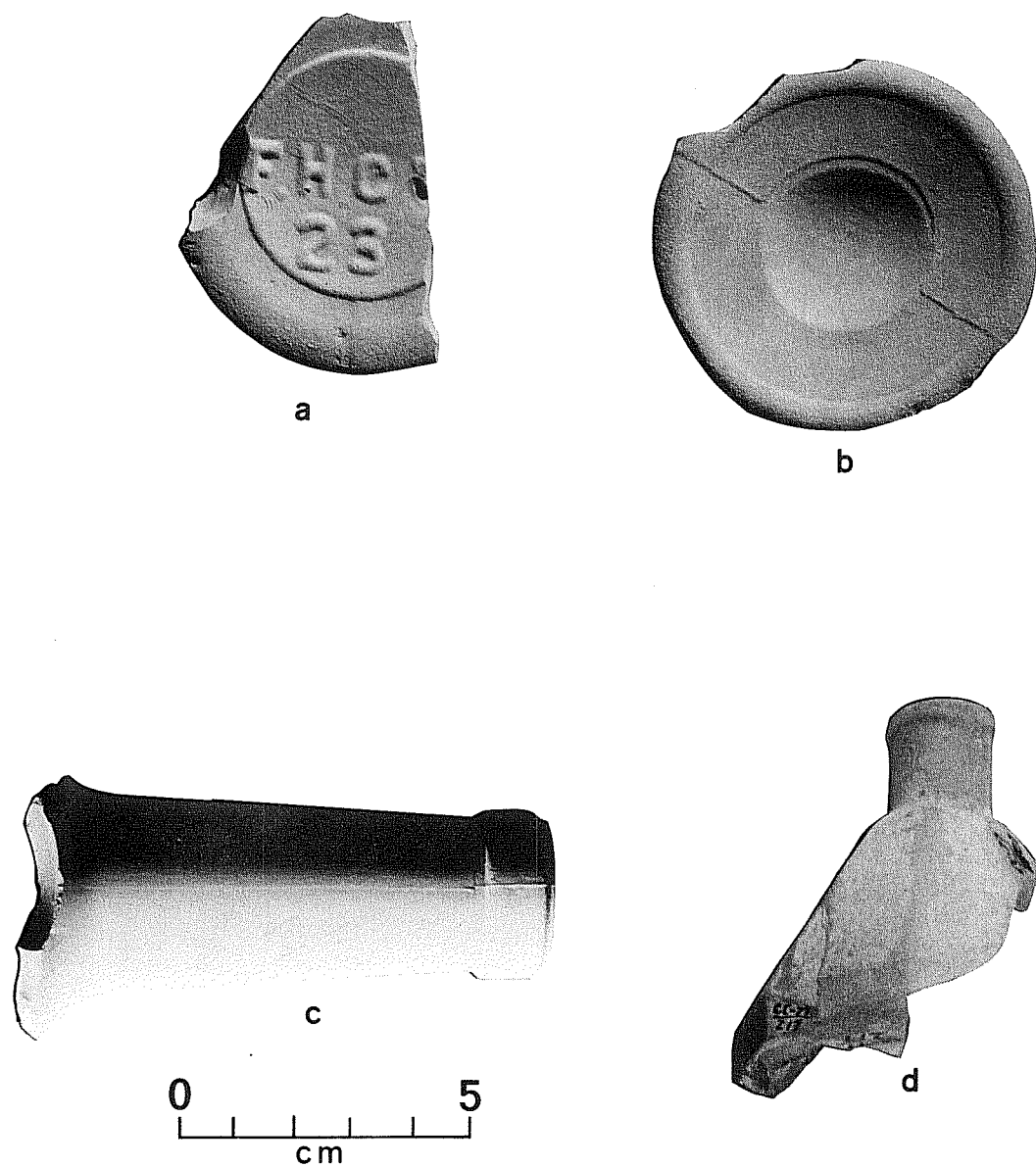


Figure 28. *Artifacts from 41MC168 and 41MC192.* a, bottle bottom with maker's mark and bottom hinged mold, 41MC168; b, bottle bottom with bottom hinged mold (unmarked), 41MC168; c, unidentified top of a bottle; d, ink bottle from 41MC192, has applied lip and made in a cup bottom mold.

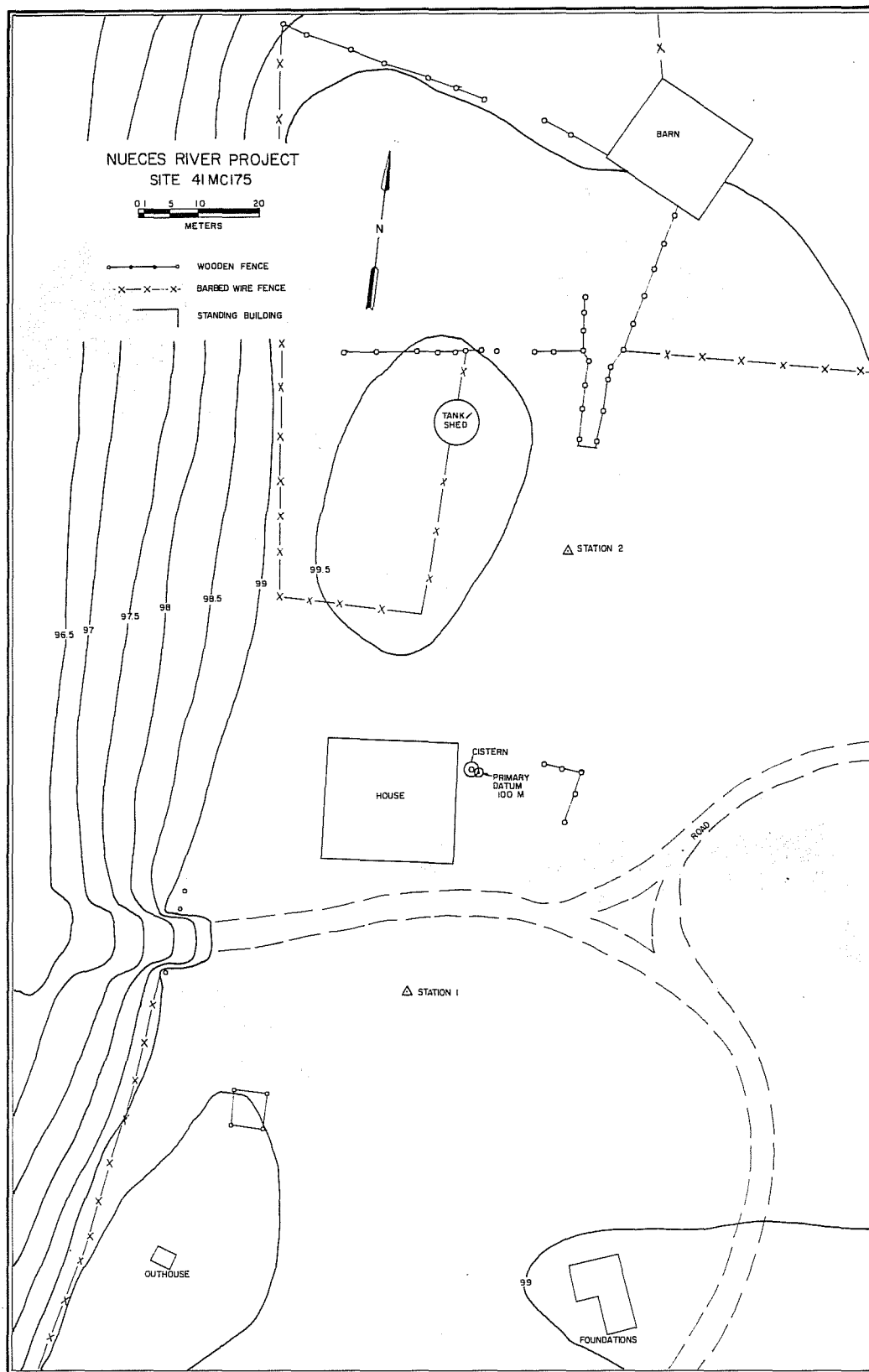


Figure 29. Site Map of 41MC175.

of concrete which could have been a shop or garage. On the south side of the barn is a wooden (pole, log and plank) fence with a cattle loading chute.

The house (Figs. 30, 31) is partially collapsed and is constructed on wooden piers. There are five rooms and a screened-in front porch with the middle two room sections of the house apparently having been built before the other three rooms and porch. The end elevation of the house contains a view of a seam in the wall which was probably the roof for the original smaller house, a new and larger roof being installed at the same time that the extra rooms were added on. The temporal separation between the two constructions is unknown. (The elevations and the floor plan do not exactly coincide in detail. The present drawings are made from field sketches. A photograph of the house appearing in Lynn, Fox and O'Malley (1977:181) suggests that the gable line, east windows, or the northern interior wall may be slightly mislocated in the drawing.)

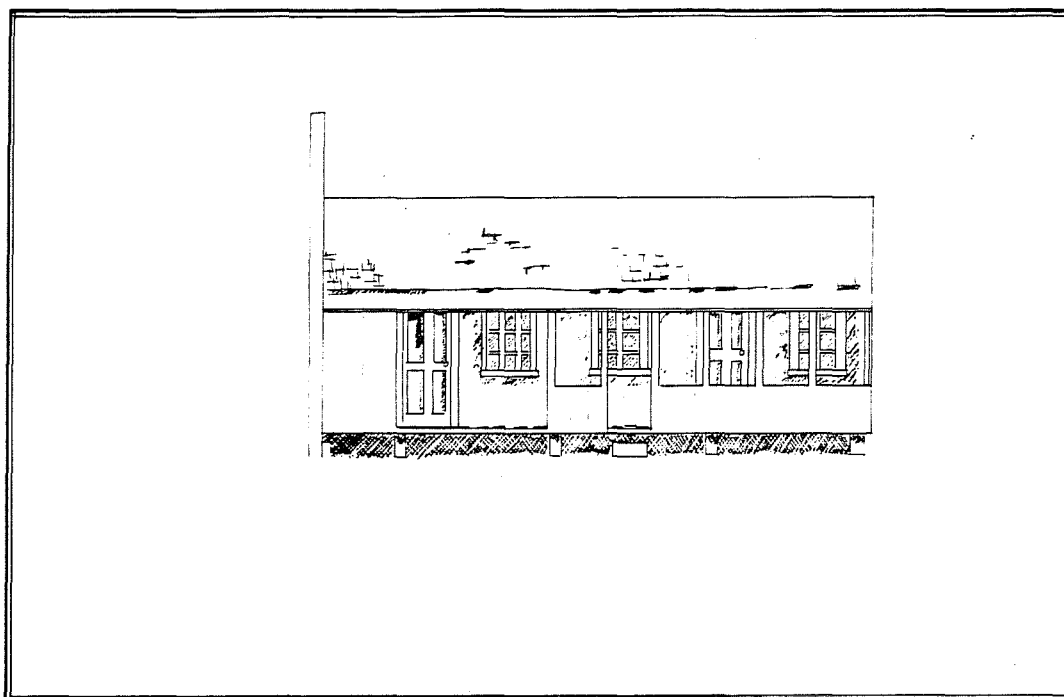
Surface collections were made of the area by extending a diagonal line out from each corner of the house and dividing the site into quadrants. Each quadrant included one specific house corner to the next corner, and from the house out to an arbitrary point at which the artifact density was significantly lower and collecting was not attempted. A dump area on the hillside to the west of the house, and areas around the barn and near the outhouse were collected separately. No areas were tested with excavation.

Artifacts

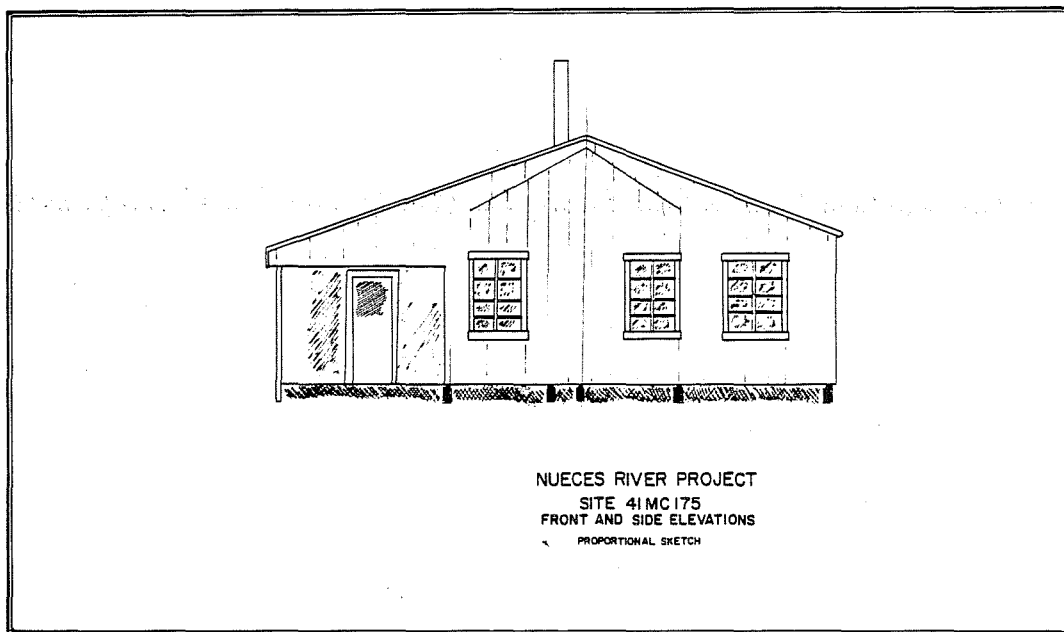
The artifacts (Table 7) indicate this house to have been a habitation since the early 20th century. There is a distinct lack of decorated ceramics, a trend pointed out at other sites also. The glass items include a "special" class of wares not recovered at other sites, specifically a mug and a goblet. There is an occurrence of brightly colored bottle and vessel glass, and a plethora of kitchen gadgets and other miscellaneous hardware items. There are several recent vintage cartridges, particularly the 7mm and the .222, which indicate the house to have been used most recently as a hunting camp, an activity which is a temporary habitation in the real sense of the term and probably is associated with some of the other household and hardware items. Plastic toys indicate a family may have lived in the house recently.

Chronology

Only a few artifacts can be dated (Table 8j): an applied bottle lip and some square cut nails (Table 9). Both of these items, however, date well into the 20th century. The balance of the items date the house as occupied as a regular family residence since the early 20th century until perhaps the 1960s, when it was apparently converted into hunting quarters.



a



b

Figure 30. Elevations of Extant House, 41MC175. a, front view; b, side view.

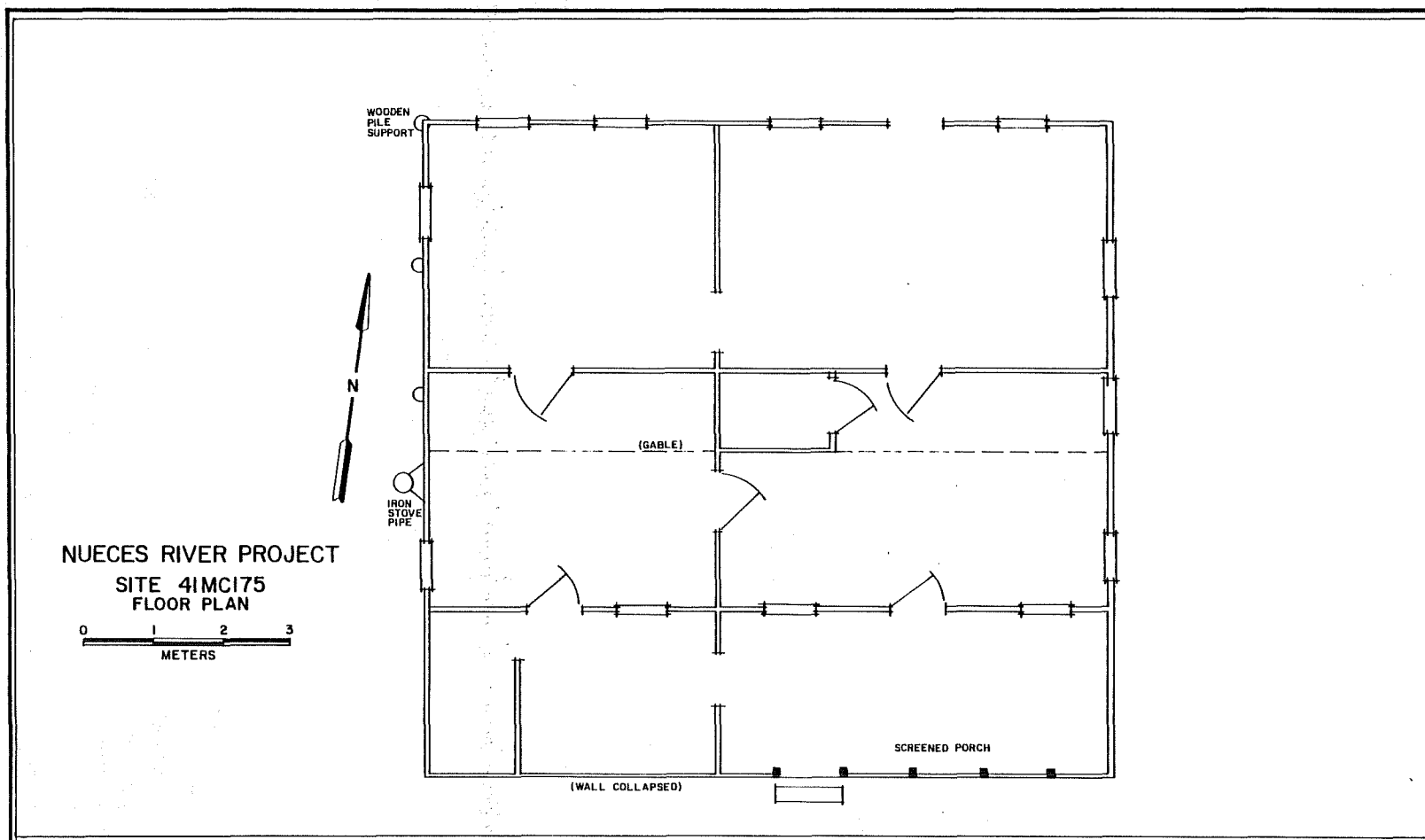


Figure 31. Floor Plan of 41MC175.

Eight bottle sherds with maker marks were examined from MC175. One sherd exhibits the Ball Bros. mark which was used in various styles from 1888 until the present (Toulouse 1971:66-68). Two glass sherds show the Hazel-Atlas Glass Co. mark which was used from 1920 through 1964 (Toulouse 1971:239-242). One sherd has the maker mark of Brockway Glass Co. of Brockway, Pennsylvania. This company started operations in 1925 (Toulouse 1971:5962). Four sherds have the Owens-Illinois Glass Co. mark. Of these sherds, two show the number of the plant at Alton, Illinois for 1929-1954; one shows the number of the plant at Newark, Ohio, and the production date of 1932; and the last refers to the plant at Bridgeton, New Jersey from 1929 through 1954 (Toulouse 1971:403, 405-8, 395). Seven ammunition cartridges from MC175 were examined and dated. A .45 Colt made by Union Metallic Co. exhibits a balloon head primer, thus dating between 1873 and 1930 (Barnes 1972:172). Two .222 caliber Remington Super X cartridges, introduced in 1950 (Barnes 1972:34), are among the variations of the cartridges. Two .30-06 Springfields make up the remainder of the collection from this site. This cartridge was adopted in 1906 for the model 1903 Springfield service rifle. The .30-06 is actually a slightly modified version of the original 1903 cartridge. This improved round was designated the "Ball Cartridge, caliber .30, Model of 1906, but in practice the nomenclature was shortened to .30-06" (Barnes 1972:38).

41MC185 (Surface Collection and Intensive Testing)

Description

The site (Fig. 32) has four sandstone rock concentrations and associated scattered historic occupational debris. The site is situated on a prominent point or ridge overlooking the Frio River, which is about 90m to the west. Covering an area of 60m x 120m, the site materials are concentrated mostly in the northern end of the site, where the two largest rock concentrations are located. The site has been disturbed by bulldozed senderos (local term for linear clearances) and perhaps some root plowing. Close examination and one test pit indicate that probably no architectural remains are intact enough for fruitful study.

The largest of the sandstone concentrations, feature #1, is a possible chimney foundation. This feature is situated in the northern part of the site and is very badly disturbed by a road cut ("sendero"), which goes right through where the house itself probably was, and possibly by root plowing too. Figure 26, c, shows feature #1 as an accumulation of sandstone rocks about 4m x 5m, many of which are semi-shaped and therefore similar to rocks used in other area site chimney foundations. There is enough rock present to indicate that robbery of stones was probably not the primary cause of the disturbance. The rocks appear to be still present, only jumbled. This evidence as well as the relatively uniform small size of the brush on the site indicates the area may have been chained and then root plowed.

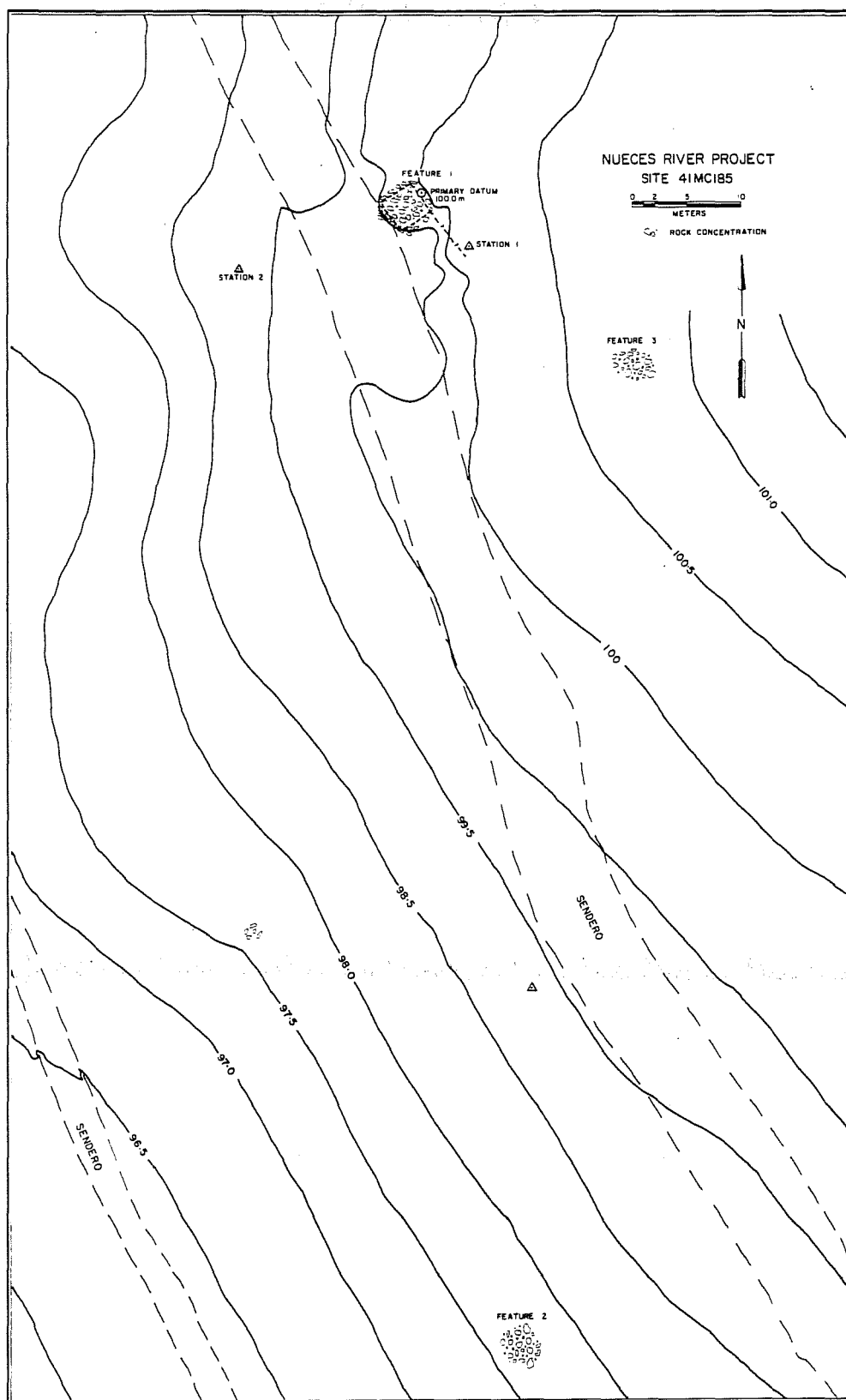


Figure 32. Site Map of 41MC185.

Feature #3 is a sandstone rock concentration 24m southwest from feature #1 which is of unknown function. The rocks in this feature, unlike feature #1, are not buried or embedded, but are scattered on the ground surface. Feature #2 (Fig. 26, d), in the south end, is shallow, as is a very small and unlabeled rock concentration 45m northwest from feature #2. Feature #2 is a group of slabs 0.5m x 2m in size. There are numerous scattered rocks nearby which indicate that it is also disturbed and was probably much larger than the present concentration would indicate. All rock concentrations except feature #1 are of unknown function. They could be pieces of the original chimney that have been pushed or pulled from feature #1 to their respective locations by bulldozing and chaining activity, or they could represent outbuilding structures of some type that are associated with the original house structure represented by feature #1. These concentrations probably do not represent other habitation structures due not only to their dissimilarity of structure (or lack of it), but also due to a distinct absence of occupational debris compared to the feature #1 area.

Artifacts

This site is a habitation locality with evidence (Table 7) of a structure and associated outbuildings. There are a few decorated ceramic sherds and some majolica tin enameled ware indicating some type of ties with Mexico. Most artifacts, including all "habitation" type debris and nails (Table 9), are associated with the house location.

Chronology

The items indicated on the chronology chart (Table 8k) place the probable period of occupation in the late 19th century. The chronological significance of majolica ware is discussed extensively by others (e.g., Lynn, Fox and O'Malley 1977:188, 191) but will be considered here only as a broad time indicator.

The temporal span for MC185 was indicated by several factors. The .44 caliber Henry Flat was again present, indicating a date post-1860. A ceramic maker mark, probably that of Bridgewood and Clarke of Burslem, England, was produced between 1857 and 1865 (Godden 1964: 101). Of two identifiable tin cans from this site, one is a body portion with a soldered side seam which was produced from 1815 to 1920 when fold locked seams started replacing the soldered seam (Fontana and Greenleaf 1962:73). The other example is a body portion of the tapered "corned beef type" can which started about 1875 (Fontana and Greenleaf 1962:73). Two marked panel glass sherds, which were not produced until the 1860s, are present in the collection.

41MC192, Dusek Site (Surface Collection and Intensive Testing)

Description

This site (Fig. 33), named the Dusek site after Melvin Dusek, foreman for the ranch on which the site is located, is situated on a point of land about 120m south of the Frio River. Remains at the site include scattered sandstone blocks, a rectangular house foundation, chimney foundation (Fig. 34, a) and scattered historic occupational debris. A total of three test pits was excavated, recovering occupational debris and encountering architectural remains. In addition, controlled surface collections were made.

The sandstone rubble is scattered broadly over the site; much of it is surface scatter, but there is some aligned distribution pattern (Fig. 34, a). The chimney foundation is situated in a central part of the east edge of the stone rubble and oriented with a long axis aligned with the rubble. The hearth is about 2m x 3m in size and has two or perhaps three courses of slabs remaining (Fig. 35). If the rectangular stone rubble is representative of the original house dimensions, the chimney would be situated in the middle of the east wall of a rectangular structure measuring about 5m x 15m.

The degree to which the surface rubble represents the actual house architecture is not known except in one test pit, #3, (Fig. 34, b). Situated on the west side of the structure opposite the chimney foundation, the 1m x .75m pit encountered a feature at about 8cm below the ground surface which is apparently some type of wall footing or other architectural feature. The ground surface in this area was littered with sandstone blocks, as can be seen in Figure 34, c. Stone blocks like those outside pit #3 were present within the pit, but were not buried to any depth and were removed prior to the photograph. In the same Figure (34, b), there is visible a clustering of small sandstone rocks in the northwest floor corner of the pit. This is the footing feature which extends outside the pit to the north and west, is relatively circular in outline on the edge excavated, and is about 8-10cm thick. The top surface of the gravel feature increases in height to the NW, which is toward the central area of an extensive sandstone block concentration. The floor of test pit #3, subsequent to excavating to 20cm level, was brushed, troweled, and dampened with water spray, revealing several soil stains which may also be architectural features. One linear dark stain was oriented northwest/southeast across the floor of the pit, parallel in axis to the chimney foundation. Another stain (10-15cm, circular) was located to the west of the linear stain under the edge of the overlying gravel lens feature (Fig. 34, d). These stains may represent a post and wall trench associated with the structure or may be merely a rodent burrow with a fortuitous orientation. The stone scattered on the surface of the site could also have been fortuitously aligned by a bulldozer cut, but the surface features in test pit #3 indicate that this is not the case. More testing should disclose the correct answer.

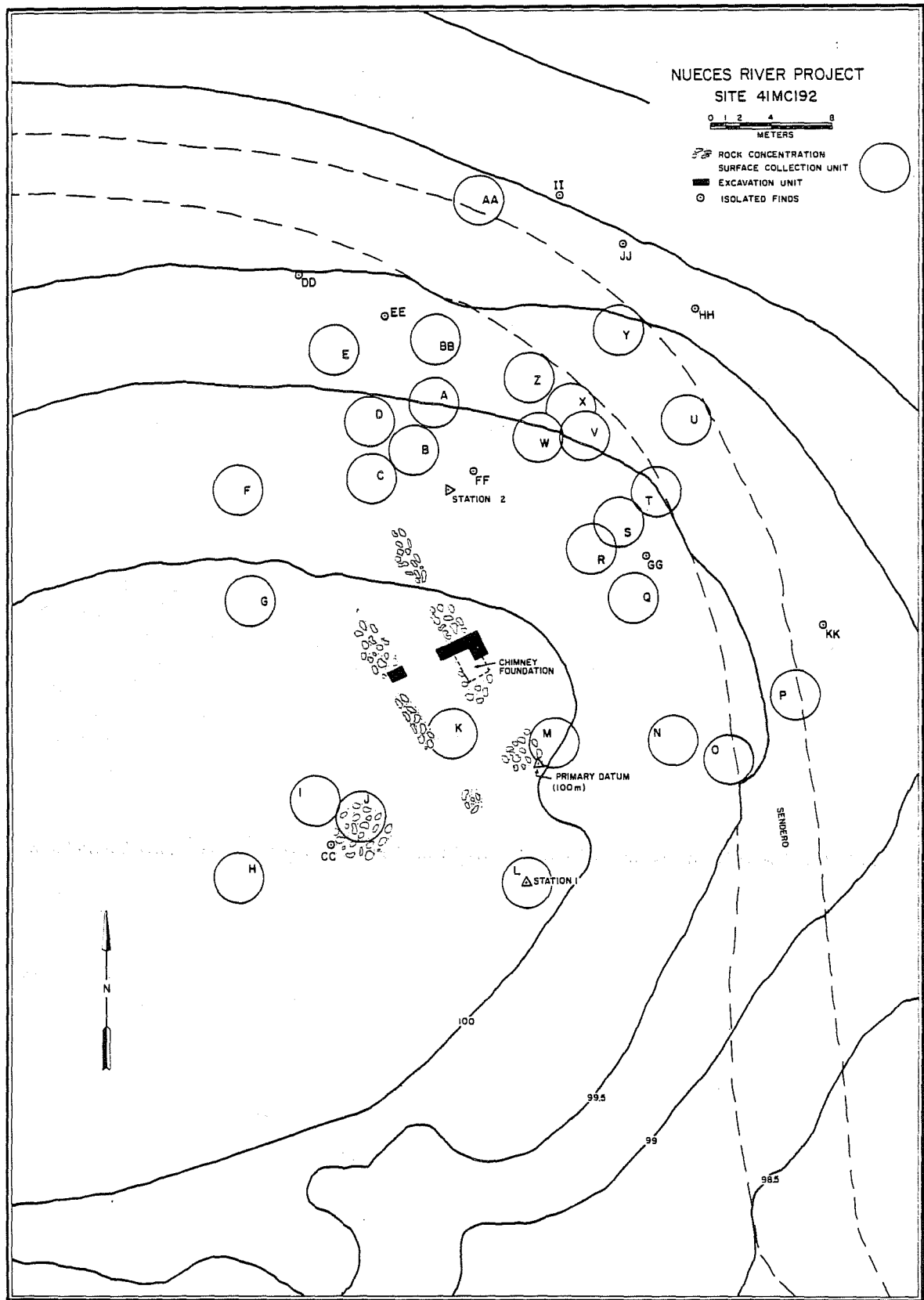
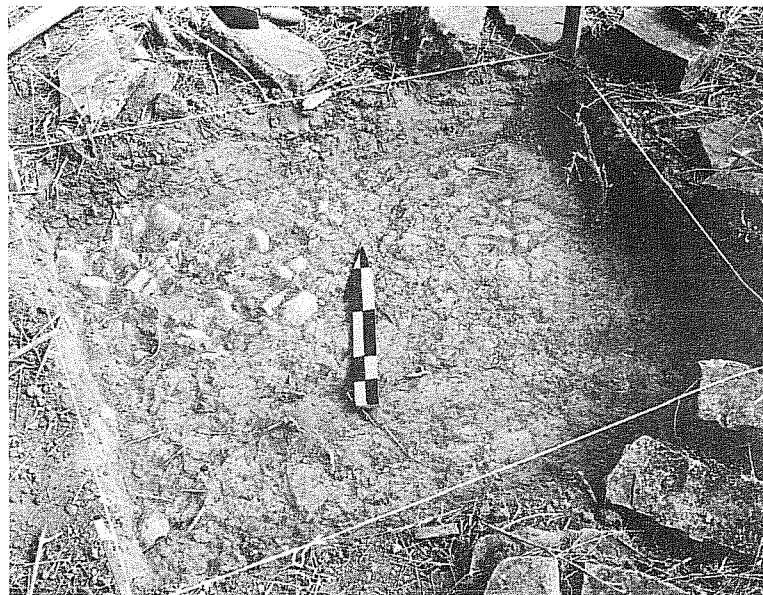


Figure 33. Site Map of 41MC192 (the Dusek Site).



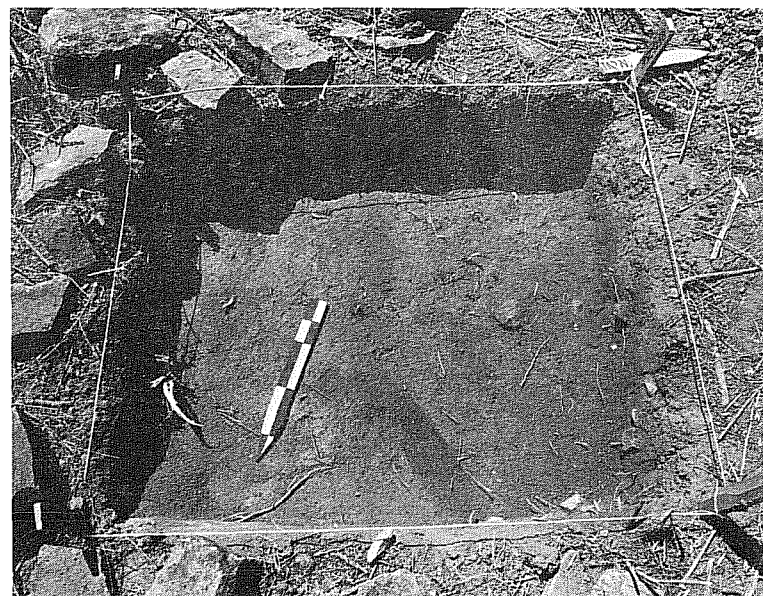
a



b



c



d

Figure 34. *Photographs of 41MC192.* a, chimney foundation; b, test pit #3, level 1, showing lens feature; c, general view of site; d, test pit #3, level 2, showing stain in floor.

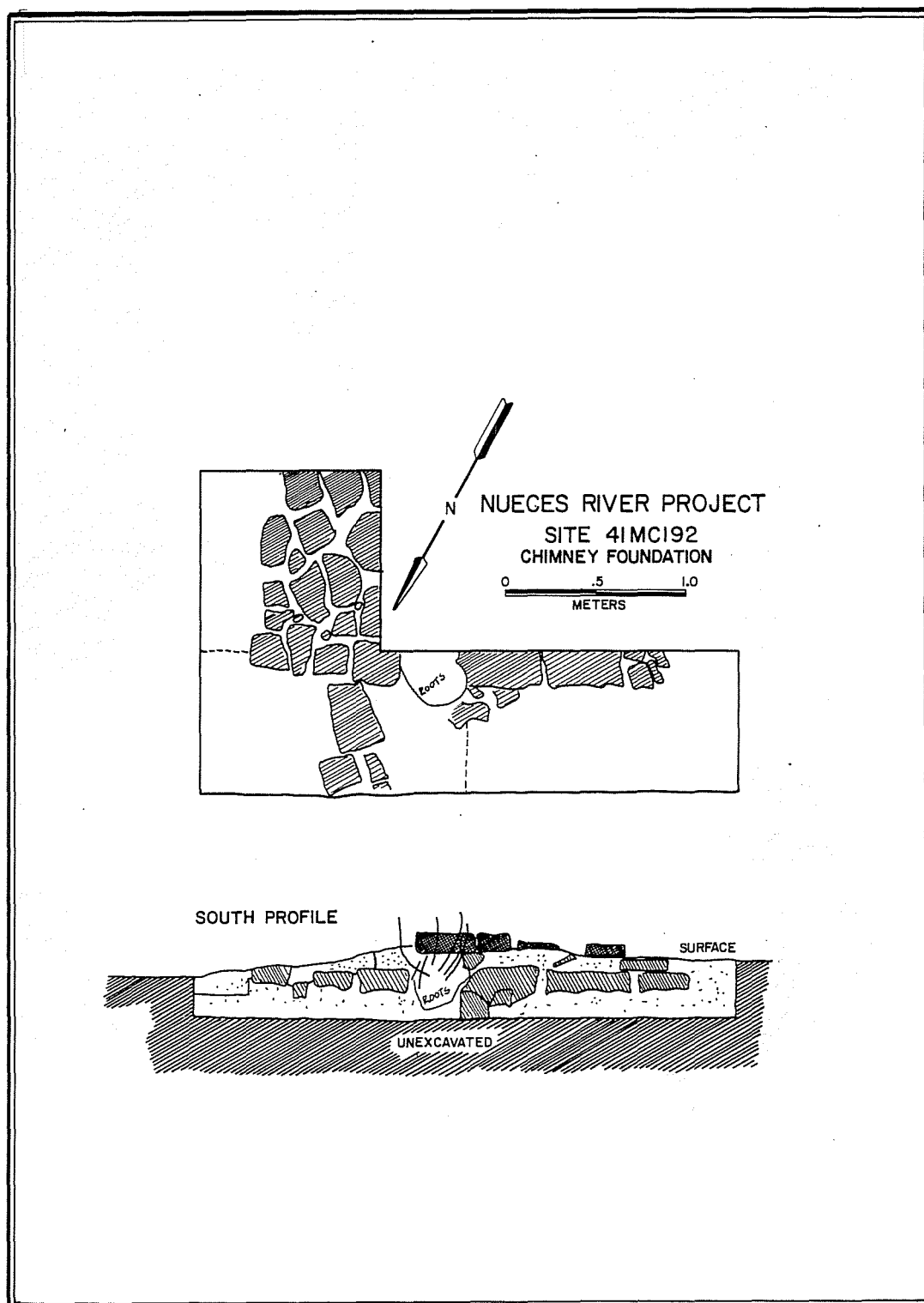


Figure 35. Chimney Foundation and South Profile, 41MC192.

Another architectural detail of note is the northward extension of slabs adjacent to the chimney foundation. Having only one course of flat aligned slabs, this feature was not delineated enough to warrant calling it a wall, but it may be a wall feature comparable to those at 41MC15 and 41MC46. The position of this wall feature indicated that the chimney extended into the room over one meter. The presence of a wall trench inside the structure from a layer of gravel may indicate an interior jacal or picket wall and an external rock wall (the gravel being a footing for the stone wall).

An isolated concentration of stone in surface collection unit J, to the southwest of the main structure, may represent an outbuilding, but the structure of this feature was not investigated. Other stones were scattered over the entire area, but these are due mainly to the disturbance of the site by brush clearing. Sheet erosion is evidenced over the whole site area, but is most pronounced in the northeastern part of the site where the majority of occupational debris is found. The prolific occurrence of this material in such a restricted area may be due to having been the original dumping area or may be a function of differential exposure by erosion. If the concentration is due to actual material distribution, the location of the house doorway is suggested as being on the northeast part of the structure. South (1977:47) has reported the Brunswick refuse disposal pattern in North Carolina which reflects elements of site structure, content, context and function. One element of this phenomenon is the association of certain classes of refuse with structure doorways or gates. The applicability of this British-American pattern to the south Texas frontier is rather tenuous, but the idea should certainly be further explored. As the door location is presently unknown, resolution of this problem must await subsurface archaeological investigations.

In October, Bandy visited the site, and because recent rains had exposed more artifacts, a few of the more significant items were collected. Each collected item was mapped relative to the still-exposed chimney foundation and plotted on the site map. The exact positions were determined by standing a ranging pole at the exposed corner of the chimney foundation and then standing over the artifact to be mapped in. The distance back to the ranging pole was measured with a range finder optical instrument and an azimuth reading made with navigational compass. Items which were located in original surface collecting circles were included with those previously collected items, and items collected outside of original circles were mapped as isolated finds (Fig. 33).

Artifacts

The wide variety and quantity of items recovered at this site (Tables 7, 9) are unusual for the project sites and are apparently the result of the economic affluence of the inhabitants. The occurrence of many decorated ceramics has certainly the highest frequency at any of the project sites. The scarcity of window glass is interesting

because it indicates that the assumption that windows are a status commodity may not be a valid concept in this mid-19th century setting. Noteworthy in the metal class is the fish hook (Fig. 9, g). This is the only evidence in the project area to date of any inhabitants exploiting the Frio River for other than water. Note also the metal kitchen utensils.

Chronology

The abundance of materials at this site allows for a much better date estimate (Table 81) than is possible at most of the project sites. The most notable item is the coin (Fig. 11, d), which is a Mexican five centavos piece dated 1870. Not only is this date useful, but the fact that it is Mexican in origin confirms the Mexican contact indicated by the presence of majolica at 41MC185 and indicates that this contact may be more than just a casual association or "tourist visit." Another unusual item is the tumbler part of a muzzle loading percussion rifle which has been suggested to date post-1830 (personal communication, Guy Wilson).

Two ceramic sherds with maker marks are present from this site. The first (Fig. 6, j) represents Bridgewood and Clarke of Burslem, England which operated from 1857 through 1864 (Godden 1964:101). The second example has two possibilities: first, Alfred Meakin of Tunstall, England which operated from 1875 through 1897 (Godden 1964:425), and second, J. and G. Meakin of Hanley, England which has operated since 1851 (Godden 1964:427). Three marked glass panel sherds represent post-1860 manufacture. An ink bottle (Fig. 28, d) has an applied lip and was made in a cup bottom mold.

Three top portions of tin cans show hole-in-the-top manufacture which was used from approximately 1815 to 1900. The can, at this early period, was laboriously cut from tinplated sheet iron by hand or footpowered scissors; the body then was formed around cylinders and the seam soldered. Separate pieces for the top and bottom were cut and soldered. A hole was left in the top through which the food was forced. A smaller cap was finally soldered in place after filling. A pin hole in the cap allowed gases to vent. One last drop of solder sealed the job. This type of can became known as the "hole in top" or "hole and cap" (Fontana and Greenleaf 1962:68-69). Two body portions of tin cans show soldered side seams which were used from 1815 to about 1920 (Fontana and Greenleaf 1962:68-69, 73).

41MC193, Bracken Site (Surface Collection and Mapping)

Description

This site (Fig. 36), named after Sam Bracken, the landowner, is located on a hill overlooking the Frio River which is about 150m to the north. The site has two main parts: 1) a habitation locality

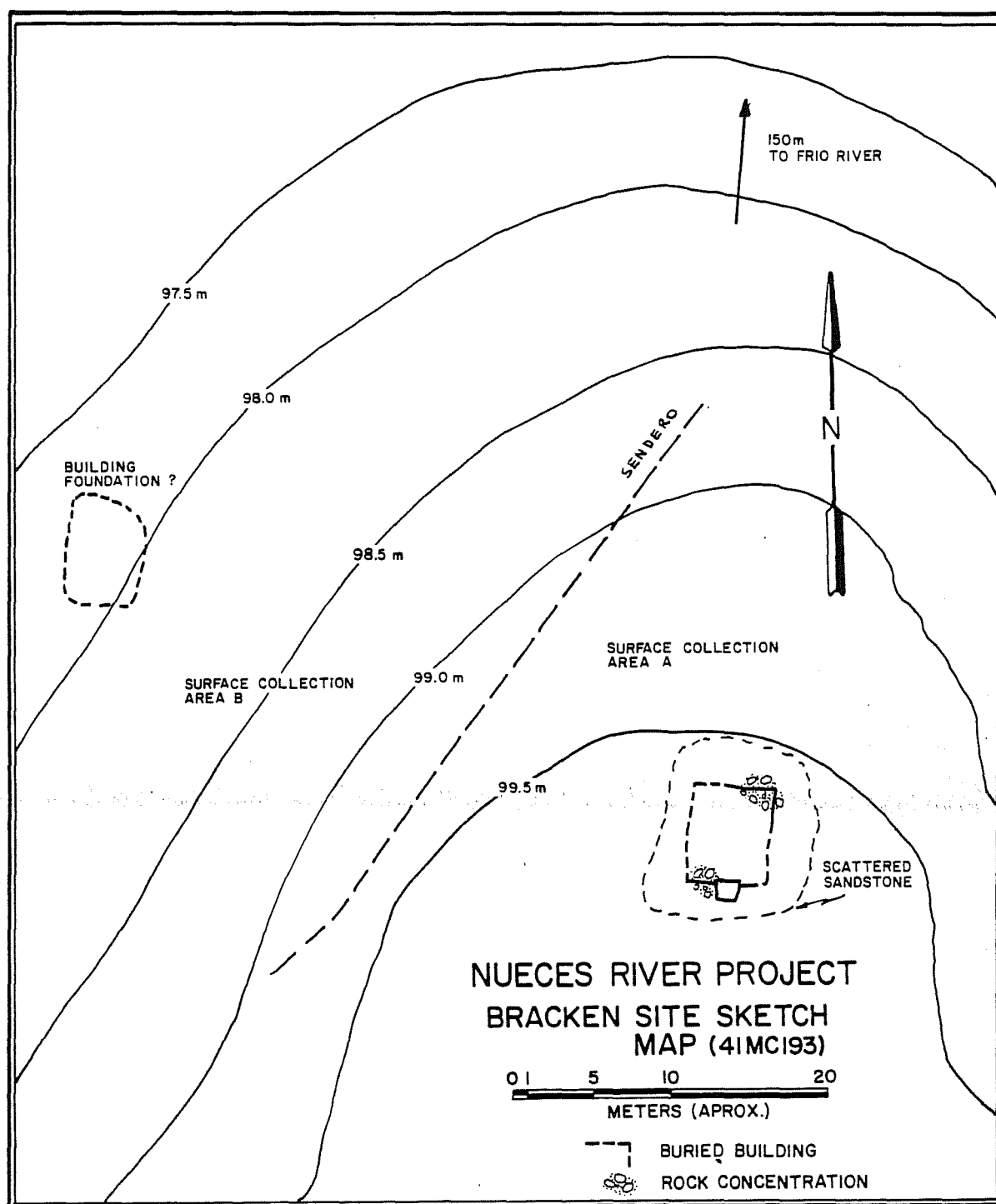


Figure 36. Bracken Site Sketch Map, 41MC193.

(Fig. 37, a) with sandstone chimney foundation (Fig. 37, b), scattered sandstone, and historic occupational debris, and 2) a small scattering of sandstone which may represent an outbuilding foundation to the west of the house. The habitation structure is rectangular in outline, with remnants of slab alignments. Sheet erosion has been moderate, with probable past disturbance by brush clearing and much recent damage by hog rooting. A sendero crossing the site between the outbuilding and the house was used as a demarcation line to surface collect the site in two areas, A and B. Area B is associated with the outbuilding foundation, and area A is on the south side of the sendero and associated with the habitation site. As at site 41MC192, surface collections were made subsequent to the summer field season, with the collected items incorporated with those previously collected by areas. No test excavations were made, but animal burrow profiles and backdirt indicate this site to be very similar to 41MC192, which is only about 390m to the west.

Artifacts

The artifact assemblage (Table 7) is very similar to that of 41MC192 except that there are not as many decorated ceramics nor such a wide variety of items. This site is a habitation structure dating in the mid-19th century. There is a prehistoric site component.

Chronology

Datable objects (Table 8m) include the common ceramic and glass types of the late 19th century, square cut nails (Table 9), tin cans, and a gun part. This particular gun part (Fig. 11, b) is a trigger assembly of a muzzle loading type rifle which was probably mass produced from a stock pattern. The exact type of gun is unknown, except that it is not a Sharp's rifle; it is probably a Civil War era piece, dating from perhaps as early as 1850 but most probably later. This type of gun part is still made today, but is not commonly used except as a novelty (Guy Wilson, personal communication).

A single top portion of a hole in top tin can appears at this site suggesting a manufacture date for this specimen circa 1815 to 1900 (Fontana and Greenleaf 1962:68). A marked panel glass sherd, produced after 1860, is also present.

41MC194, Horton Site (Surface Collection and Mapping)

Description

The Horton site, 41MC194, is approximately 120m south of the Frio River and 630m west of Black Hill Hollow (approximately 110m west of Horton/Bracken fence line). Roughly round, the



a



b

Figure 37. *Site 41MC193.* a, general view of site; b, chimney foundation.

site has a 30m diameter. Features are indicated by the foundation stones of a late 19th century jacal and/or frame house, and surface scatter of historic mixed with prehistoric artifacts.

The site is positioned on a flat portion of upland margin sloping into the Frio River valley. The present condition indicated possible disturbance by clearing, with some erosion and animal activity. Due to time restrictions, only limited work (sketch map and surface collection) was carried out.

Artifacts and Chronology

The materials (Table 7) reported on the survey form seem much the same as for the other sites of the project area, consisting of 19th century glass, ceramics, and metal (square nails). The absence of wire nails (Table 9) along with the other material indicate a general date during the late 19th century for this site.

41MC195, Teal House. (Surface Collection)

Description

This site, known as the Teal House, appears to be a late 19th century habitation and ranch house. All that remains above surface are the scattered sandstone blocks of the now destroyed house foundation and the usual remains of cultural debris, including ceramics, glass and metal. The site, with a sandy clay surrounding soil, is situated in the Frio River drainage system.

Artifacts

Although the limited amount of material (Tables 7, 9) makes it difficult to elaborate on the functions carried on at the Teal House, the artifacts represent the typical late 19th century (Table 8n) homestead assemblage. A unique item recovered was a porcelain door knob. This was the only one found in the entire project area.

Chronology

The Teal House collection exhibits a .44 caliber Henry Flat which was used after 1860 with the Henry repeating rifle (Logan 1959:68). Also, a ceramic sherd with the E. and C. Challinor maker mark of Fenton, England is present. The Fenton Pottery operated from 1862 through 1891 (Godden 1964:137-8).

SUMMARY AND CONCLUSIONS

The historic sites investigated during this project recall a way of life during American frontier expansion and development that has almost been forgotten in its "nitty-gritty" details, although it has been romanticized in popular memory and lore. Such details are recovered through both archeological and historical research, each contributing information to be used in answering questions about "who lived here and when?" and "how did they live?"

Attempts to answer such questions about the inhabitants of these sites were made by three independent investigators during this project. Daniel E. Fox, with his considerable experience in south Texas historic archeology, directed the field work and, while he and his crew worked at the sites, suggested cultural and chronological possibilities. Dianna Everett, working in libraries, county court houses and other archives, visiting cemeteries, and interviewing descendants of frontier families, contributed her answers (see Part I of this report). Philip A. Bandy, directing the lab work on collected specimens from the sites, tried to enable these material culture remains to "speak for themselves." The three sets of "answers" are presented side by side for each site in Table 5.

It is interesting to note which sets of data answered which questions in this project. Actual ways of everyday life were evidenced in the archeological record. The locations, sizes and construction details of the houses and the amounts and types of household goods remaining indicate a "life style" pretty "near the bone," even for those times. Differences in standards of living between urban and rural dwellers are suggested; we know (see South 1977:232) that many people in even the earlier frontier towns had some of the material luxuries of the time. People living directly on the outlying farms and ranches probably could not afford them.

None of the archeological data suggested "ethnicity." So far as can be told at this stage of analysis and interpretation, nothing in the archeological record says "an Anglo-American family lived here" or "a Black family lived here" or "a Mexican family lived here," although we know from historical sources that these statements can be made about most of the sites at particular times (Table 5 and as reported in Part I). As far as material culture goes, environmental requirements, subsistence activities and levels of affluence were greater factors than ethnic identities and customs. Being a rather poor south Texas stockraiser dependent on regional and even national market demands was a common experience for persons of various origins, languages, religions and traditions; this common experience is reflected in the material remains of their homes.

In summary, archeological research is valuable for answering questions about how people really lived in this area (and roughly when), but historical research is necessary to tell us who they were, both as individuals and as members of cultural groups. This is probably true of all archeology and leads us to hazard several generalizations. First, from the historical point of view, studies of material culture (of any time period) are necessary to "flesh out" our knowledge of any people's actual way of life. Second, from the archeological point of view, when historical sources are available, they can offer information not preserved or only faintly detectable in the archeological record. Third, also from the archeological point of view, when historical sources are not available, we must remember that great diversity in ethnic identity, language, politics, religion and in other realms may be reflected very poorly or not at all in the archeological record. This project suggests two major reasons for this last generalization: the ordinary household does not contain much preservable evidence within those realms just mentioned, and, the demands of subsistence may override much of the diversity and help produce a relatively uniform economic way of life for people who are quite different in other important ways.

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