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Phase I Cultural Resources Investigations at Justiceburg Reservoir on the Double Mountain Fork of the Brazos River, Garza and Kent Counties, Texas

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Phase I Cultural Resources Investigations at Justiceburg Reservoir on the Double Mountain Fork of the Brazos River, Garza and Kent Counties, Texas

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PHASE I CULTURAL RESOURCES INVESTIGATIONS
AT JUSTICEBURG RESERVOIR ON THE
DOUBLE MOUNTAIN FORK OF THE BRAZOS RIVER,
GARZA AND KENT COUNTIES, TEXAS

VOLUME I

by

Douglas K. Boyd

Martha Doty Freeman

Michael D. Blum

Elton R. Prewitt

and

J. Michael Quigg

REPORTS OF INVESTIGATIONS, NUMBER 66

TEXAS ANTIQUITIES COMMITTEE PERMIT NUMBER 603

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REPORTS OF INVESTIGATIONS NO. 66

Submitted to

City of Lubbock,
Lubbock, Texas

by

Prewitt and Associates, Inc.
Consulting Archeologists
Austin, Texas

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ABSTRACT

In 1987, Prewitt and Associates, Inc. conducted a Phase I archeological reconnaissance of the proposed Justiceburg Reservoir located in Garza and Kent counties, Texas. The investigations included a 100% pedestrian survey, a preliminary geoarcheological study, and historic archival and field research. Three hundred and seventy-five sites were documented in the ca. 8600-acre project area. Two hundred and eighty-eight sites contain prehistoric archeological components consisting of: no Paleoindian or early Archaic, 4 middle Archaic, 10 late Archaic, 10 undefined Archaic, 24 Late Prehistoric, 204 undefined prehistoric, and 45 isolated finds (total components = 252). Thirty historic archeological sites identified include 1 site possibly affiliated with nonaboriginal Southern Plains buffalo hunting; 10 associated with early ranching and homesteading; 4 related to the railroad, oil industry, and early communities in Garza County; 1 cemetery; and 14 trash dumps or sites of unknown function. Seventy-four sites contain rock art comprised of 87 components: 54 historic nonaboriginal and 33 aboriginal.

Especially important is the concentration of 33 Late Prehistoric aboriginal rock art sites and the presence of stratified sites containing isolable components of various ages. Historic data indicate possible Euro-American presence prior to currently documented dates and reveal elements of late nineteenth-century activities not noted in standard archival sources. Geoarcheological investigations provide a temporal and spatial distribution of Quaternary landforms that indicates a near absence of late Pleistocene and early Holocene sediments. Analysis of the sites and materials suggests they contain significant data relevant to the investigation of numerous regional research problems. Based on their research potential, 238 sites are assessed to be eligible or potentially eligible for listing on the National Register, while 137 are not eligible. Those sites worthy of further attention and situated on lands to be purchased by the City of Lubbock will, if purchased, be eligible for State Archeological Landmark designations. A comprehensive treatment plan is recommended as a guide to future investigations of the cultural resources.

ACKNOWLEDGMENTS

Seldom is there a reservoir survey where the fieldwork proceeds smoothly as has this one. It is a welcome relief and a sincere pleasure that the fieldwork at Justiceburg Reservoir was accomplished in such an atmosphere. The people of Garza County and the Water Utilities Department of the City of Lubbock are thanked for their gracious hospitality. The landowners in the project area and the people of Post and Justiceburg made the short field season a pleasant one. We frequented the Miller's Fort Justice trading post to come in out of the rain, rendezvous with visitors, or to simply chew the buffalo fat. We were always greeted warmly and left well fed. Many of the landowners and local residents of Post, Justiceburg, and Polar supported our efforts and assisted us by providing useful information. Mrs. Pearl Nance, Mr. and Mrs. Ewell Morgan, Mr. John Ward, Mr. Billy Wayne Williams, Mr. and Mrs. Ernest Ford, Mr. Billy Huddleston, Mr. Walter Boren, and Mr. Giles McCrary were especially helpful. Local amateur archeologists Frank Runkles of Post, and Emmett Shedd, formerly of Post, were gracious enough to allow us to review their collections and shared their knowledge of the area. Shedd also provided valuable information on sites in and around the project area.

The staffs at the Garza County Museum, Garza and Kent county courthouses, Post Public Library, and Southwest Collection at Texas Tech University in Lubbock were cooperative and helpful, especially to the efforts of the Project Historian. In Austin, the staffs of the General Land Office, Texas State Library, and Barker Texas History Center at The University of Texas did their usual professional jobs.

The excellent job of advance planning done prior to the fieldwork by the City of Lubbock made our job much easier. Mr. Sam Wahl, Director of Water Utilities for the City, supervised the city's planning of the project. A very special thanks from the field crew goes to Mr. Mike Gilleland, Engineer Assistant in the Water Utilities Department, City of Lubbock, who served as the liaison among us, the City of Lubbock, and the landowners. Mike always saw to it that the City was informed of our progress, that landowners were properly notified, and that we were granted access when and where we needed it. He spent much of his time making sure everything ran smoothly, guiding visitors around the project area, running errands, or tracking down information or informants that saved us considerable amounts of time.

To the staff of Prewitt and Associates, Inc., I express my gratitude for the job that they have done. Elton R. Prewitt, the Principal Investigator, and the coauthors of this report are a competent and professional group of people with whom to work. It has been a pleasurable and valuable experience. The support staff of Prewitt and Associates, Inc. is likewise a very competent and professional team. The following individuals have contributed to the success of this project. Margaret Howard performed most of the prefield work. Jeanine Seay was responsible for the initial laboratory preparation of artifacts, field records, photographs, samples, etc. and did an excellent job of organizing the large quantities of paperwork and materials. The superb illustrations included in this report are the product of two individuals: Sandra Hannum did the cartographic work, and Ellen Atha did the artifact drawings. Typing of the drafts and final report was done by Carolyn LeMaster, Jerrilyn McLerran, and Linda Nance Foster. The report was edited by Prewitt and Foster. The patience and self-control exhibited by these two individuals while I learned company procedures is greatly appreciated.

The field crew deserves special recognition for their long hours and many sacrifices. Crew Chiefs Bill Bryan (Assistant Project Archeologist) and Colin Garvey spent much of their own time after hours on the paperwork which piled up each day. Wayne Chessser, Joseph Sanchez, Mark Thomas, and David Tucker were the field crewmembers. Your hard work and the exceptional job done are appreciated.

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A number of individuals visited the project area during the fieldwork: Susan Andrews and Barbara Nickerson of Freese and Nichols, Inc.; Skipper Scott and Jim Townsend of the Fort Worth District Corps of Engineers; Mark Denton of the Texas Antiquities Committee; and from the City of Lubbock, Bob Cass, Assistant City Manager; George Carpenter, City Councilman; Lee Osborne, Director, Parks and Recreation Department; and Vaughn Hendry, Public Relations. Meeks Etchieson and Ed Day provided welcome observations and suggestions. Special thanks to Dr. Jack T. Hughes, who shared his years of regional experience.

Special analyses of materials required the services of many individuals. Artifact analysis was aided by many people at different times, but Prewitt and Collins contributed most, providing their expertise and ideas. Ceramics, although few in number, required regional expertise. The Southwestern sherds were identified by Ms. Helene Warren. The more elusive Caddoan-like Texas sherds were examined by Dave Dorchester, Bob Mallouf, and Dr. Dee Ann Story. Faunal remains were identified by James Westgate of the Vertebrate Paleontology Laboratory of The University of Texas at Austin. Preliminary identification of selected charred wood specimens was done by Jack Jackson. Source identification of obsidian specimens was done by Archaeological and Historical Consultants, Inc. of Centre Hall, Pennsylvania. Molluscs and gastropods were identified by Dr. Raymond Neck of the Texas Parks and Wildlife Department.

The many people associated with this project have contributed much to its success and are commended for their efforts. The professionalism and team-spirit demonstrated by everyone involved helped the senior author to maintain some sanity and greatly improved the final product. Any errors or deficiencies in presentation, however, remain the responsibility of the authors.

Douglas K. Boyd
Staff Archeologist

CHAPTER 1

INTRODUCTION

by Douglas K. Boyd

Archeologists have found 5,000-year-old water wells at several locations in the Southern Plains. These wells, excavated in areas where springs once flowed, indicate prehistoric man's concern for maintaining a dependable water supply in an arid environment. Throughout prehistory, the distribution of water in the Southern Plains has been a primary factor controlling settlement patterns. Because of modern technology, water no longer controls settlement to the extent that it once did, but it remains an ever-present problem for a continually expanding population.

In anticipation of meeting its water needs in the twenty-first century, the City of Lubbock, Texas, has proposed that a water storage reservoir be constructed on the Double Mountain Fork of the Brazos River, ca. 97 km (60 miles) southeast of the city. Stored water will be transported by pipeline from the proposed reservoir to the city. Part of the planning process for the project involves the identification and assessment of the cultural resources within the area to be impacted.

Project Area

The proposed Justiceburg dam site is on the Double Mountain Fork of the Brazos River near the boundary between Garza and Kent counties (Fig. 1). It is approximately 5 km (3 miles) upstream from the confluence of the Double Mountain Fork and the North Fork of the Double Mountain Fork, and about 16 km (10 miles) east of the community of Justiceburg. The reservoir, as currently proposed, will inundate approximately 2,800 acres of land below the 2220-ft msl conservation pool. This will impound water from the dam site upstream for approximately 11 km (7 miles) to about 5 km (3 miles) southeast of Justiceburg. The maximum high water elevation (probable maximum flood) is 2257 ft msl. At this level, the reservoir will inundate approximately 8,600 acres and, from the dam site, will impound water upstream to U.S. Highway 84 at Justiceburg (Fig. 2).

The proposed Justiceburg Reservoir is located several kilometers to the east of the Caprock Escarpment in the Lower Plains region (Brown et al. 1982), which is synonymous with the Rolling Plains (Lobeck 1948) or the Osage Plains (Hughes 1978a). The first two terms are used interchangeably in this report. The Caprock Escarpment clearly marks the western edge of the Lower Plains, while the other physiographic boundaries are ill defined. The southern extent of the Lower Plains merges with the Edwards Plateau of Central Texas, the northern boundary is the Canadian River in Oklahoma, and the eastern boundary is generally marked by the western extent of the Western Cross Timbers.

The Llano Estacado, immediately to the west and northwest of the survey area, is a major physiographic feature comprising the southern extent of the High Plains. The east and west borders of the Llano Estacado are clearly marked by escarpments, respectively called the Caprock and Mescalero escarpments. The northern boundary of the Llano Estacado is formed by the Canadian River Valley, and the southern boundary is marked by the Edwards

Figure 1. General location map.

Figure 2. Project area map.

Plateau. Together, the Llano Estacado and Lower Plains are sometimes referred to as the Panhandle-Plains (Suhm et al. 1954:63) but more commonly as simply the Southern Plains.

Investigations

As part of the planning and development of the proposed Justiceburg Reservoir, the City of Lubbock initiated studies to identify and manage the cultural resources which would be impacted by the project. In January 1987, Prewitt and Associates, Inc. of Austin, Texas, entered into an agreement with the City of Lubbock to conduct a reconnaissance level (Phase I) cultural resources investigation of the proposed Justiceburg Reservoir. Field investigations were conducted from March to June 1987 and were followed by laboratory analysis, synthesis, and report preparation from June 1987 to February 1988. This report presents the results of these investigations.

Report Organization

The massive quantity of data gathered during Phase I requires that this report be printed in two volumes. Volume I begins with this introductory chapter. Chapter 2 attempts to place in perspective the variables which created and maintained the physical environment of the Justiceburg area during man's occupation there. The environmental setting is not a set of independent, descriptive characteristics but is a combination of many interrelated variables and is crucial to the understanding of human existence. Special emphasis is placed on the distribution of resources that relate to man's settlement. The variables discussed include geology, topography, hydrology, climate, soils, flora, and fauna.

A review of previous archeological work in the proposed reservoir and the surrounding area is presented in Chapter 3. It provides the background for understanding the current research problems and theoretical orientations of prehistoric archeological studies in the Southern Plains and summarizes the known prehistoric cultural sequence in the region. Chapter 4 describes the historic sequence in the region. It begins with the first proto-historic contacts between Europeans and Native Americans and extends to the development of the region's petroleum industry. Chapter 5 presents the research orientation and specific questions which relate to Southern Plains and Justiceburg archeology. Chapter 6 discusses the methods used during the field and laboratory investigations.

The remainder of the report describes the cultural resources found at Justiceburg, the information learned from them, and directions for future research. Chapter 7 discusses the results of the geoarcheological investigations. This section details the background for the geomorphological study, describes the actual field and laboratory investigations, and presents the results and interpretations of the work. Geoarcheological data are used to reconstruct the Quaternary history of the reservoir area, and recommendations for future investigations are considered. A detailed discussion of the prehistoric sites and artifacts in the reservoir area is found in Chapter 8. It examines sites and artifacts in their temporal, spatial, and cultural contexts, then relates them to interpretations of regional cultural development. Chapter 9 discusses the historic sites found in the reservoir area and reviews them in regional perspective. It also presents a project-specific history of the settlement of the reservoir area.

One type of site common in the Justiceburg Reservoir area could not be neatly classified as either historic or prehistoric. Many sites consist only of graphic images scratched into or painted onto rock faces. These "rock art" sites include both historic Euro-American inscriptions and artwork and Native American (aboriginal) artwork. All of the Euro-American works are historical, and many of the aboriginal works include historic elements. Other aboriginal rock art sites contain no indication of historical influence and must be considered as potentially prehistoric in age. Instead of trying to pigeonhole the rock art sites into inappropriate categories, they are dealt with as a single unit. Chapter 10 considers both aboriginal and nonaboriginal rock art sites. Aboriginal rock art is discussed in terms of the stylistic evolution of Plains Indian and Southern Plains rock art, and the nonaboriginal rock art is discussed in the context of local historical development.

Chapter 11 presents an overview of the data recovered during the current investigations. It summarizes the prehistoric archeology of Justiceburg Reservoir and its contributions to Southern Plains archeology. Specific questions posed in the Research Design are addressed. In Chapter 12, individual sites are assessed as to their potential for listing on the National Register of Historic Places, and anticipated reservoir impacts are discussed. Chapter 13 presents a recommended treatment plan that outlines how the identified cultural resources should be dealt with in order to mitigate damages expected to ensue during and subsequent to reservoir construction.

Appendix A describes the analyses of both the prehistoric and historic artifacts recovered. Appendix B is an inventory by site of all prehistoric artifacts collected. The faunal remains recovered are described and analyzed in Appendix C. Descriptions of the backhoe trenches excavated during the geoarcheological investigations are found in Appendix D. Appendix E lists all of the historic Anglo-American rock art inscriptions found in the project area.

Volume II contains two lengthy appendices that are essential to any future work at Justiceburg. Appendix F consists of detailed descriptions of all prehistoric sites recorded during the project. Similar descriptions of all historic sites are contained in Appendix G.

CHAPTER 2

ENVIRONMENTAL SETTING

by Douglas K. Boyd

Geology

The strata exposed along the eastern Caprock Escarpment of the Llano Estacado and out onto the Rolling Plains represent over 250 million years of the earth's history. The surface geology is basically a "layer cake" arrangement of horizontal beds (dipping slightly to the southeast) which are exposed by a relatively recent erosional trend which continues today. The geologic history of the Southern Plains controlled many variables which affected human habitation in the region, including the layout of the land and the distribution of resources as they relate to human settlement. Figure 3 illustrates the surface geology of the southern Llano Estacado and adjacent Rolling Plains. Information about the geologic outcrops is derived from Renfro (1973) and Barnes (1967, 1974). Evans and Brand (1956) present a brief introduction to the geology of the area.

The oldest strata exposed in the Rolling Plains are the Permian-age "red beds" which underlie the Llano Estacado and are exposed east of the Caprock Escarpment. It is these exposed and eroded layers which give the Rolling Plains its distinctive topography and its name. The Permian strata are thick beds of shale which are brick-red in color (hence the name "red beds") and are interbedded with layers of gray shales, clays, mudstones, and sandstones. These deposits resulted from millions of years of marine sediments accumulating in changing depositional environments. Dolomite beds and gypsum layers are interbedded in the Permian strata.

Above the Permian beds are the formations of the late Triassic Dockum Group. Early Triassic deposits are absent, presumably eroded away before the deposition of the late Triassic strata began. The Dockum Group is divided into two distinct formations, the Tecovas and the Trujillo (Gould 1906, 1907). The lower Tecovas Formation lies directly on the Permian red beds and is composed of multicolored (orange, lavender, gray, and white) shale layers with thin sandstone lenses interbedded and occasional outcrops of jasper. Above the Tecovas is the Trujillo Formation, which is dominantly red, maroon, and gray shales, and contains up to three major sandstone and conglomerate layers. These Trujillo sandstone layers are relatively thick and are well cemented. Unlike the shales and the lower sandstones of the Tecovas Formation, the Trujillo sandstones are resistant to erosion and are the "cliff-forming" sandstone layers below the eastern Caprock Escarpment (Matthews 1969:23). The Dockum Group strata exposed in Palo Duro Canyon are traditional examples, but the lithology takes on "a different appearance" in other areas along the Caprock Escarpment (Hood 1977:153). Occasional conglomerates found in the Dockum Group are rich in silicate gravels. Vertebrate fossils and silicified wood are also common. Like the Permian strata, the Triassic Dockum Group beds lie in the subsurface under the Llano Estacado and are exposed only in a thin strip along the eastern Caprock Escarpment. The depositional environment of the Triassic Dockum Group is thought to be a system of large lacustrine basins fed by meandering fluvial channels with deltas forming at the lake margins (McGowen et al. 1977).

Figure 3. Generalized surface geology map.

The proposed Justiceburg Reservoir area (see Fig. 3) falls almost entirely in Triassic Dockum Group exposures. The proposed dam site, at the east end of the reservoir area, is in the edge of upper Permian red bed outcrops. Just west of the dam site, the Permian beds disappear into the subsurface, and Triassic strata are exposed in the rest of the reservoir area. Geologically, the Justiceburg Reservoir area is similar to other canyon exposures along the eastern Caprock, such as Palo Duro Canyon (Matthews 1969; Hood 1977) and Mackenzie Reservoir (Hughes 1978a) in Tule Canyon, which exhibit extensive Triassic outcrops.

Above this is an unconformity, with the late Tertiary Ogallala Formation resting directly on the Triassic Dockum Group layers. The Jurassic, Cretaceous, and early Triassic strata are absent along most of the eastern Caprock Escarpment and are not present in the subsurface under most of the Llano Estacado. These strata are presumed to have been eroded away after being deposited and represent a hiatus of over 150 million years. At the southern end of the Llano Estacado, Cretaceous-age strata are exposed along the eroding Caprock Escarpment and as erosional remnants in the Rolling Plains. The northernmost substantial outcrop of Cretaceous-age strata along the Caprock Escarpment is found where the Double Mountain Fork heads at the Caprock near the boundary between Lynn and Garza counties, about 19 km southwest of Post. A limited exposure of Cretaceous limestone is found on the North Fork of the Double Mountain Fork of the Brazos River just north of Slaton (Barnes 1967). Cretaceous strata occasionally outcrop in playa lake beds in the southern Llano Estacado (Brand 1953). The presence or extent of chert outcrops in these northern Cretaceous remnants is not known.

The Ogallala sediments were deposited on the erosional surface left behind when the Jurassic, Cretaceous, and early Tertiary deposits were removed. The Ogallala Formation is a series of layered sands, gravels, and clays which can be roughly divided into upper and lower units (Holliday and Welty 1981:205). The lower unit consists of a conglomerate of sands and gravels, and the uppermost is unconsolidated sands, silt, and clays. The lower sediments are interpreted as fluvial and lacustrine deposits in an alluvial fan environment, and the upper strata are considered to be dominantly eolian (Gustavson 1986:2). The upper unit is capped by a well-developed caliche layer which forms the upper bluff edge of the Caprock Escarpment of the Llano Estacado (Baker 1915).

Much misunderstanding of the nature of the Ogallala Formation has been perpetuated in the literature. The Ogallala Formation was originally named in 1899 by Darton (1899). In Texas, part of the southern extent of the Ogallala was named the "Potter Formation" by Patton (1923:78-80) because it was not recognized as a continuation of a much larger unit. Depositional interpretations have also changed because of a better understanding of the nature of the formation. For many years, the Ogallala was thought to be exclusively an alluvial outwash plain off of the Rocky Mountains (e.g., Matthews 1969:24; Spiegel 1972:118). While this is partially correct, the current interpretation is more complex. Gustavson and Holliday (1985:28-32) suggest that the basal Ogallala sediments were fluvial valley fill on the middle Tertiary erosional surface and that thick eolian deposits make up the upper portions of the formation. The calichification of the massive Ogallala Caprock was the result of an extended period of landscape stability throughout the eolian depositional phase. Gustavson and Holliday (1985:8-9) provide a good summary of the previous work on the Ogallala Formation, which helps in understanding some of the confusion.

Of special importance to archeological studies in the Southern Plains is the confusion surrounding the use of the term "Potter Gravels" to describe the basal alluvial deposits of the Ogallala Formation. The confusion can be traced to Patton's (1923:78) misnaming of the

basal Ogallala in the Texas Panhandle as the Potter Formation. Eventually, Potter Gravels became the most commonly used local term describing the basal gravels of the Ogallala Formation. The term is still used by regional archeologists (e.g., Hughes 1978a:21), and geologists often refer to it as a "member" of the Ogallala Formation (e.g., Hood 1978:379; Hood and Wright 1979:381). The use and misuse of these terms has also caused confusion among archeologists because of the lithic source materials from the Ogallala Formation; this problem is discussed in more detail later in this report.

After the long stable period which formed the Caprock caliche, erosion began to dominate as the Canadian and Pecos rivers began cutting deep valleys, eventually forming the northern and western edges of the Llano Estacado. These drainages, the Pecos in particular, beheaded many ancient streams which ran southeastward across the Llano Estacado. The controlling factor in the development of these river systems seems to have been the dissolution of Permian salts in the underlying strata, causing surface subsidence which influenced the erosional pattern of the area (Gustavson and Finley 1985:34, 37). At about the same time, the eastern edge of the Llano Estacado began eroding westward as the major river systems to the east (i.e., Red, Brazos, and Colorado) became entrenched.

As the eastern edge of the Caprock eroded and retreated westward, sediments were redeposited in a series of alluvial fans that lie directly on eroded Permian and Triassic surfaces. These Quaternary sediments grade upward from coarse alluvial sand and gravel at the base to fine-grained clay lenses toward the top. The extensive nature of Quaternary sediments immediately east of the Caprock has been recognized only recently (Gustavson 1986:4-6) and are not yet thoroughly documented. Gustavson (1986:5) has mapped their known extent in the western Rolling Plains, but he includes only the northern portion of Garza and Kent counties. The Quaternary gravel exposures in the Justiceburg Reservoir area are a continuation of these deposits. Preliminary observations of the local gravel deposits in the reservoir indicate that they are predominantly redeposited Ogallala Formation gravels with some of the materials derived from other sources, possibly Triassic conglomerates. This lithology is very similar to that found in the Seymour Gravels at a location about 121 km (75 miles) northeast of the reservoir (Hood 1978; Hood and Wright 1979). The retreat of the Caprock is an ongoing process, and at one time the entire reservoir area was covered with the same overlying Ogallala strata. Recent studies of the retreat of the Caprock suggest that the escarpment was located at the proposed dam site somewhere between 223,000 and 366,000 years ago (Gustavson 1986:6-7), long before prehistoric peoples inhabited the area. This agrees well with the suggestion that the Seymour Gravels were deposited east of the reservoir area along the margin of the Caprock at about 600,000 years ago (Gustavson and Finley 1985:36) and accounts for the lithologic similarities of the Quaternary gravels in the Rolling Plains.

The Southern High Plains is capped with a veneer of Quaternary eolian sands which continue to accumulate today. Evans and Meade (1945), Frye and Leonard (1965), and Reeves (1976) provide detailed data on the Quaternary in the Southern High Plains. These wind-blown sands covering the Llano Estacado are designated the Blackwater Draw Formation (Reeves 1976:219). The surface of the Llano is dotted with numerous playa lake depressions (Barnes 1967) which contain various Pleistocene sediments designated the Blanco, Tule, Double Lakes, and Tahoka formations (Reeves 1976:219).

Because of the eroding Caprock and its Quaternary evolution, the Rolling Plains has an entirely different character. "Much of the Rolling Plains east of the Southern High Plains was probably covered with an alluvial veneer during the late Pleistocene and

Holocene" (Gustavson and Finley 1985:36). It is the erosional remnants of these alluvial sediments which are found in the Rolling Plains today. Late Pleistocene and Holocene depositional and erosional activities are of prime concern to archeological studies in the Southern Plains. These processes are only a small segment of the long and complex (and not fully understood) geological history of the region. An integral part of the reconnaissance of Justiceburg Reservoir consisted of preliminary geoarcheological work (see Chapter 7). Gustavson and Finley (1985:34-38) provide an overview of the development of the region's physiography as a background for the geomorphology, and Stafford (1981) provides a summary of the geoarcheological potential of the High Plains in Texas.

The geological history of the Texas Southern Plains has resulted in an abundance of lithic materials available for exploitation by prehistoric peoples. Holliday and Welty (1981) provide a review of lithic source materials for chipped stone tools in the eastern Llano Estacado. Permian dolomite beds in the northern Texas Panhandle contain a distinctive banded, multicolored agate known as Alibates agate. In most of the southern Llano Estacado and in the Rolling Plains, Alibates agate must be considered an imported material, but there are some problems with natural distribution and identification of this material.

The Triassic Dockum Group contains occasional outcrops of Tecovas jasper, a mottled, multicolored material which contains many impurities in the form of quartz vugs. Triassic conglomerates also contain a variety of siliceous gravels, most being too small to be utilized to any great extent. Tecovas jasper, however, is a popular local material in parts of the Lower Plains. Tecovas jasper outcrops are not present in the project area, and it was probably brought in from outcrops 80-160 km (50-100 miles) to the north.

Cretaceous outcrops in the far southern Llano Estacado contain fine-grained chert of a variety similar to the Edwards Formation chert from the Edwards Plateau area. This material did provide a usable lithic source, but it is inferior in quality to the Edwards chert of Central Texas. Various grades of this material are found in small quantities in the Quaternary gravels in the project area.

The most abundant lithic material in the Rolling Plains comes from the basal portion of the Ogallala. These materials consist of a fine-grained siltstone known as Potter Chert (Hood 1978:380; Willey and Hughes 1978a:47; Holliday and Welty 1981:208) and a variety of quartzites. While there are many materials of better quality than the Ogallala gravels, their abundance and easy accessibility made them an important lithic resource. Also present in the Ogallala gravel and in redeposited gravels are small quantities of undefined jasper, chert, chalcedony, and silicified wood. A quartzite similar in lithology to "Dakota" orthoquartzite has also been reported (Holliday and Welty 1981:209), but it is very difficult to distinguish from other quartzites.

Occasional silicified caliche deposits in the Ogallala Formation provided a usable lithic material, but it was utilized infrequently because of its poor quality. Opalized caliche and chalcedony from the Ogallala tends to be of a better quality and was utilized to some extent.

Obsidian is commonly found in Southern Plains sites but never in large quantities. It is an obvious import to the area, and most comes from New Mexico sources.

Lithic materials were also used for purposes other than chipped stone tools. Triassic sandstone outcrops along the Caprock Escarpment were commonly used for rock art surfaces

and bedrock mortars, while slabs of this material were used as hearth stones, grinding stones, and probably shelter construction (Hughes 1978a:23). In much of the Canadian River Valley in the northern Texas Panhandle and in other areas of Permian exposure, dolomite served similar purposes. Hematite from the Triassic strata seems to have been used to make pigment (Hughes 1978a:23), and other lithic materials were probably used in many capacities which have not been recognized.

Topography

The Southern Plains in Texas is dominated by two main physiographic areas. The Llano Estacado forms the southern extent of the Great Plains of the United States (Fenneman 1931: 9), and the eroded area east of the Llano Estacado Caprock makes up the Lower or Rolling Plains. The proposed Justiceburg Reservoir is in the Rolling Plains, but its proximity to the Caprock makes both of these landforms pertinent. The study area falls in the far southwestern portion of the Osage section of the Central Lowlands physiographic province (Lobeck 1948). Brown et al. (1982) refer to this area as the Lower Plains of Texas.

The Llano Estacado in its natural state is a flat, treeless, grass-covered plain, with the only relief being playa lakes and sand dunes which dot its surface and underfit ephemeral stream valleys dissecting it. To the east of the Llano Estacado is the classic Rolling Plains, which is an undulating, dissected, erosional badland topography of exposed Permian red beds.

The eastern edge of the Llano Estacado, formed by the Caprock Escarpment, forms yet another different type of topography. The exposed Ogallala caliche and Triassic Dockum sandstones are far more resistant to erosion than are the surrounding strata, and canyons are formed where drainages cut through these areas.

All along the break of the Caprock Escarpment and continuing eastward across the parallel strip of Triassic outcrops is a rugged canyon topography which is very distinctive from either the Llano Estacado or the Lower Plains. The Ogallala caliche forms the canyon rim along most of the Caprock Escarpment, with secondary bluffs, ledges, and erosional remnants being capped with Triassic sandstone layers. Along most of the Caprock Escarpment, Tertiary (Ogallala), Triassic, and Permian beds are exposed in a single canyon profile, such as those at Palo Duro Canyon (Matthews 1969:21). In other areas, such as Mackenzie Reservoir in Tule Canyon (Hughes 1978a), the Permian is not exposed; there, the canyon walls are Triassic, and the canyon rim is formed by Ogallala caliche. In the Justiceburg Reservoir area, however, the Ogallala Formation has eroded completely, and the upper layer forming the canyon rim is Triassic sandstone.

The typical Justiceburg Reservoir topography is a rugged, steep-sided, narrow valley canyon (Fig. 4) capped by Triassic sandstone strata with additional sandstone layers forming secondary benches and ledges. There are as many as three sandstone ledges in some exposures, but these cannot be correlated across the length of the project area. In places, the sandstone layers are relatively thin (3-4 m), while at other outcrops they form vertical bluffs over 20-30 m in thickness.

The upper sandstone layer forming the canyon rim generally outcrops at about 2240-2250 ft msl. The relief throughout most of the narrow portion of the reservoir area varies from

Figure 4. View of narrow, steep valley wall topography typical of the Justiceburg Reservoir area.

18.3-30.5 m (60-100 ft) from the river channel (average elevation, 2160 ft msl) to the top of the canyon rim (average elevation, 2240 ft msl). The valley slope is very often almost vertical.

Two parts of the reservoir area deviate from the steep-sided, narrow valley canyon topography. The lower (east) end is a steep-sided canyon capped by Triassic sandstone, but the valley widens out with an alluvial floodplain over 1 km wide. This contrasts with the narrow valley portions which typically have an alluvial floodplain of less than 200 m. Figure 5 is a view of the proposed dam area showing the wide alluvial floodplain. Relief in this portion of the reservoir is about 45 m (150 ft) from the river channel (average elevation, 2130 ft msl) to the top of the canyon rim (average elevation, 2280 ft msl), and the slope is nearly vertical. The river channel cuts into the upper portion of the Permian red beds near the dam site.

The other exception to the narrow valley topography is at the extreme upper (west) end of the reservoir area, near the community of Justiceburg, and at the upper ends of the larger tributary drainages. In these areas, the valley is shallow with much gentler slopes because the channels are dissected only into the upper Triassic sandstone layer. These areas have much less relief, sloping 12-18 m (40-60 ft) in about 0.4 km (0.25 mile). Alluvial terraces frequently overlap onto bedrock sandstone. Eolian dunes are not present in the narrow valley portion of the reservoir but are minimally developed in the wide valley near the proposed dam and are well developed in the upper end of the reservoir.

Figure 5. View of dam area showing wide, steep valley wall topography.

Figure 6 illustrates the different types of valley topography in the reservoir, and Figure 7 illustrates the landforms discussed in this report. The landform terminologies used to describe the topographic settings of sites are defined as follows:

Upland: Flat to gently sloping area above the canyon rim, usually more than 0.4 km away from the river. Surface includes both Quaternary gravel outcrops and eolian sand sheet accumulations. Site types in this setting include lithic procurement areas, lithic scatters, and open campsites.

Upland margin: Gently sloping area from canyon rim to approximately 0.4 km away from the river. Surface includes Quaternary gravel outcrops and eolian sand sheet accumulations. Site types in this setting include lithic procurement areas, lithic scatters, and open campsites.

Bluff: Vertical or near-vertical sandstone face; includes canyon rim and lower sandstone ledges. Sites on the bluffs are limited to rock art sites and crevice burials.

Bluff overhang: An area protected by a slight to moderate overhanging sandstone ledge. Sites in this setting include both rock art on sandstone faces and/or cultural deposits which are protected, as well as crevice burials.

Bluff shelter: An area which is completely covered and protected by a sandstone ledge. Sites in this setting include rock art and/or cultural deposits in completely sheltered areas and crevice burials.

Talus slope: Loose, active colluvial material along valley slopes. Sites in this setting are limited to lithic procurement areas.

Figure 6. Generalized valley topography.

Isolated mesa: Erosional remnant capped by sandstone layer, forming a flat-topped mesa. Site types include lithic procurement areas, lithic scatters, and open campsites.

Erosional remnant: Bedrock terraces, benches, ridges, and other features below canyon rim but above the floodplain. Surface includes redeposited Quaternary gravels and eolian sand accumulations. Site types include lithic procurement areas, lithic scatters, and open campsites.

Bedrock terrace: Bedrock at or near the level of a drainage channel onto which alluvial deposition may have occurred; the first terrace up from the channel which is

Figure 7. Generalized landforms.

predominantly formed by bedrock exposures. Site types include lithic procurement areas and open campsites.

Lower alluvial terrace: The first terrace above the active channel floodplain consisting of unconsolidated alluvium. Only lithic scatters, open campsites, and faunal localities are found in this setting.

Upper alluvial terrace: The second terrace above the active floodplain, generally distinguished from the lower alluvial terrace by a slight ridge. Open campsites, lithic scatters, faunal localities, and occasional lithic procurement areas are found in this setting.

Eolian dunes on alluvial terrace: Accumulation of unconsolidated eolian sands on an alluvial terrace. Open campsites and lithic scatters are found in this setting.

Hydrology

The Southern Plains slope in a generally east to southeast direction and are dissected by several major river systems which flow in the same direction. The Canadian River separates the Llano Estacado from the Great Plains. This river originates in the Rocky Mountains in northern New Mexico and is an old, well-entrenched river system. Three other major river systems, the Red, the Brazos, and the Colorado, head on the Llano Estacado and flow southeastward across the Lower Plains. These systems are less developed than the Canadian River but are the dominant erosional forces in the region.

The Southern Plains has a relatively low and unpredictable annual rainfall making surface water an unpredictable resource. Many of the tributary drainages in the region are ephemeral in nature. The three major rivers and most of their larger drainages cut into or through water-bearing formations (aquifers), providing a steady ground water flow into the stream channels. The sands and gravels of the Tertiary Ogallala Formation are the main water-bearing strata underlying the Llano Estacado. Along stream channels cutting into the Llano Estacado and along the eroding Caprock Escarpment, springs issue from the Ogallala Formation. While intensive agricultural irrigation during the past 50 years has severely impacted the ground water level, hundreds of springs still exist in the Southern Plains (Brune 1981). Many springs known in historic times have dried up, and others which once flowed large quantities of fresh water have slowed to a trickle. It is not unreasonable to assume that thousands of springs once existed in the region. Brune (1981:193-195, 269-271) describes 70 major springs in Garza County and 13 in Kent County, and mentions numerous other minor springs, some of which are now dry. These springs originate from ground-water reservoirs in the Triassic sandstones, Quaternary gravels, sands, and caliche, and in the Permian red beds.

Figure 2 shows the proposed reservoir area and the major named tributaries which flow into the Double Mountain Fork. Brune (1981:194-195) mentions four of these tributaries as being spring fed -- Gobbler, Rocky, Grape, and Little Grape creeks. He describes two major springs -- Reed Springs and Rocky Springs -- within the project area and mentions Indian sites at or near both of them. No attempt has been made to accurately document all of the springs in the reservoir area, but many active springs were encountered during the current survey. No springs in the project area are shown on the 1969 USGS 7.5' Justiceburg and Justiceburg S.E. quadrangles. Since the water-bearing strata in the immediate reservoir area are local in nature, the impacts of modern irrigation and development on the springs are not known.

The surface water supply in the project area originates from either rainfall or spring flow. These sources produce relatively fresh water, and the area is not plagued by natural salt pollution from the Permian strata. This contrasts with many streams which flow through the Permian red beds in the Lower Plains and contain an extremely high amount of salt, several times the amount found in seawater (Rawson et al. 1968).

Climate

Although they are still poorly understood, major climatic fluctuations have occurred several times in the past 20,000 years. These paleoclimatic changes undoubtedly impacted life in the Southern Plains as they fluctuated between wet and dry periods. For much of the prehistoric period, especially the last millenium, people in the Southern Plains probably lived in a climate very similar to that of today.

Accurate weather records for Kent and Garza counties have not been kept until recently, so the following data are derived from a 63-year record at Snyder in Scurry County (Pass 1981:122). The mean maximum temperature in July is 35° C (96° F), and the mean minimum temperature in January is -2° C (28° F), with extremes of 46° C (115° F) and -23° C (-10° F) recorded. The average growing season of 214 days extends from the last freeze in early April to the first freeze in early November. The average annual precipitation is 48.3 cm (19.32 inches), about 80% of which is in the form of rainfall during the growing season. The overall climate is relatively mild with short periods of extreme heat or cold. Fall and winter "blue norther" blizzards can be severe, as can spring and summer dust storms and thunderstorms. Droughts are not uncommon; the worst two droughts in recent history occurred in 1917 and 1956 (Pass 1981:113). The prevailing wind is from the south or southwest. At Lubbock, the mean annual wind speed is 20.5 kph (12.8 mph), but a maximum windspeed of 142.4 kph (89 mph) has been recorded.

Soils

The project area soils can be divided into three groups based on topography and are characterized by differing sediment origins. Upland soils are eolian; the steep valley walls and broken, rough topography are dominated by colluvial soils; and the valley floor soils are alluvial. The degree of soil development varies considerably, and several soils and soil associations are recognized.

Soil surveys for Garza and Kent counties indicate that the entire reservoir falls within the Vernon-Rough Broken Land association (Richardson et al. 1965) and the Vernon-Wichita association (Richardson and Girdner 1973). The majority of the project area is in the Vernon-Rough Broken Land association found along major streams. These soils are in areas characterized by rugged topography that is dissected by erosion and have a well-defined drainage pattern. About 33% of the association is composed of reddish brown clays of the Vernon Series on the uplands and eroded slopes. Approximately 20% is Rough Broken Land with poor to no soil development. The other 47% is composed of severely eroded Badland topography; level to gently sloping upland clay loams of the Abilene series; gently sloping upland calcareous soils of the Berda and Dalby series; and gently sloping upland fine sandy loams of the Latom, Miles, Olton, Spade, and Veal series; fine sandy loams of the Mobeetie series on gently moderately sloping uplands; and fine sandy loams of the Lincoln series and sandy clay loams of the Spur series which make up the level floodplains in the bottomlands.

Within the project area, the dominant soil series is Rough Broken Land, with Mobeetie, Vernon, and Olton series soils comprising most of the remainder. Limited bottomland soils (Lincoln and Spur series) and a small amount of Berda and Spade series soils are present.

Of the soils found in the project area, Vernon, Mobeetie, Berda, and Spade are classified as Inceptisols; Lincoln is an Entisol; and Olton and Spur are Mollisols. Only the Mollisols developed on surfaces which have been stable for a long period of time. Inceptisols are younger and represent surfaces stable since early to middle Holocene times, and Entisols are younger still. This means that late Archaic to Late Prehistoric deposits can be expected throughout much of the project area, but Paleoindian to middle Archaic deposits are likely to be found only in Mollisols. Mollisols in the project area occur on stable upland surfaces (Olton series) and in a limited area of bottomland floodplain (Spur series) near the mouth of Grape Creek.

Flora

As in other nearby areas, the flora of the proposed Justiceburg Reservoir area is not representative of what it was before large-scale historic alterations occurred. In Kent, King, and Stonewall counties, Kenmotsu (1981:341) notes that "the flora of the project area, both in species composition and distribution, reflects severe modification from current and previous land use practices." The flora in parts of the Justiceburg project area is seemingly unaltered, while in others entire plant communities have been destroyed, added to, or modified in recent times. For this reason, it is more appropriate to treat the flora from a regional perspective.

The Justiceburg project falls in an area which has been classified into a number of ecological regions based on vegetation types (Wulfschle 1986:31). The area is referred to most commonly as the Mesquite Plains district of the Kansan biotic province defined by Blair (1950). Regardless of the particular classification scheme used, the region is recognized by distinct natural plant community associations. In a study of the Brazos Natural Salt Pollution Control Project area in Kent, King, and Stonewall counties located some 40 km (35 miles) northeast of the Justiceburg project, three floral assemblages which occupy differing topographic settings were recognized: (1) the juniper-mesquite/upland-slopes; (2) the mesquite-oldfield/terrace-floodplain; and (3) the saltcedar/riparian floral assemblages (Kenmotsu 1981:343-346). These are analogous to those observed in the Justiceburg study area, and sharp boundaries between the plant communities do not occur.

The juniper-mesquite assemblage occupies the level to gently sloping uplands, the canyon rim edge, and the valley slopes. It is dominated by the redberry juniper (Juniperus pinchotii); mesquite (Prosopis glandulosa); a number of woody scrub species, the most common being lotebush (Ziziphus obtusifolia), wolfberry (Lycium sp.), littleleaf sumac (Rhus microphylla), and catclaw (Acacia greggii); and smaller shrubs such as broomweed (Xanthocephalum dracunculoides), featherplume (Dalea formosa), fragrant sumac (Rhus aromatica), and elbowbush (Forestiera pubescens). While groundcover around junipers is sparse, the main species include threeawns (Aristida spp.), Indian blanket (Gaillardia pinnatifida), spike phacelia (Phacelia congesta), dakota vervain (Verbena bipinnatifida), centaury (Centaureum calycosum), and blackfoot (Melampodium leucanthum). Kenmotsu (1981) also notes agarito (Berberis trifoliolata), Mormon tea (Ephedra antisiphilitica), sideoats grama (Bouteloua curtipendula), skeleton plant (Lygodesmia texana), prickly pear cactus (Opuntia sp.), and stork's bill (Erodium texanum). Wulfschle (1986:36) also lists plants occurring in the mesquite-juniper association, and her list includes a few not noted by Kenmotsu (1981). These are tasajillo (Opuntia leptocaulis), kidneywood (Eysenhardtia texana), redbud (Cercis canadensis), yucca (Yucca sp.), Lindheimer silk-tassel (Garrya

lindheimeri), sotol (Dasyilirion sp.), Mexican persimmon (Diospyros texana), Texas grama (Bouteloua rigidisetata), hairy grama (Bouteloua hirsuta), buffalograss (Buchloe dactyloides), curlymesquite (Hilaria belangeri), and hairy tridens (Erioneuron pilosum).

While these plants represent the most common species likely to occur in the region, a number of them are especially prolific throughout the upland-slopes topographic setting in the Justiceburg project area. Juniper is very abundant, and agarito, catclaw, yucca, prickly pear, and Mormon tea are common. Cholla (Opuntia imbricata) is also abundant but is particularly prolific in areas that have been mechanically cleared of vegetation.

The mesquite-oldfield/terrace-floodplain (Kenmotsu 1981:344) is characterized by plants which are native to the alluvial floodplains and terraces bordering present stream channels and a host of invader species. The invader species dominate in previously cleared or cultivated areas in all topographic settings. Particularly notable invader species include mesquite, prickle-poppy (Argemone polyanthemos), common sunflower (Heliathus annuus), threeawns, and windmillgrass (Chloris spp.) (Kenmotsu 1981:346). Tasajillo and cholla were also noted as invader species of oldfields and bottomlands in the project area. Kenmotsu (1981:344) notes other plants common to this assemblage, including buffalograss, silverleaf nightshade (Solanum eleagni folium), buffalobur (Solanum rostratum), pepperweeds (Lepidium spp.), lemon beebalm (Monarda citriodora), and rescuegrass (Bromus unioloides). Several species of trees were also noted in the Justiceburg Reservoir area. Cottonwoods (Populus sargentii) are present but tend to cluster near springs, and hackberry trees (Celtis spp.) are scattered throughout the project area. Justiceburg Reservoir may be the northernmost extent of live oaks (Quercus virginiana) in Texas; isolated groves of live oaks are found on the Grape Creek floodplain near its mouth, and larger groves cover protected slopes farther upstream.

Kenmotsu's (1981:346) saltcedar/riparian assemblage is almost totally dominated by an invader species of Mediterranean saltcedar (Tamarix gallica), which forms dense stands along stream channels and chokes out most other species. Mesquite, western soapberry (Sapindus drummondii), and desert seepweed (Suaeda suffrutescens) are also occasionally found in association with saltcedar.

Kenmotsu (1981:348-351) presents a detailed list of flora representative of the region. Other researchers have taken a different approach and have itemized the plants by their known or probable use by humans. Etchieson et al. (1979:25-32) list 44 plant species extant in the Lower Plains which have known historic uses. The authors acknowledge that the list does not include grasses and that many of the plants were probably introduced into the region in historic times.

Wulfschle (1986:40-44) compiled a similar list of plants which could have been utilized by humans and suggests their possible uses. Her list contains 79 species (20 tree, 1 cactus, 10 grass, and 48 forb); however, it is confined to vascular plants native to the region. The plants could have been utilized in three primary ways: as food, as medicine, or as sources of raw materials (wood, fiber, dyes, and soap) to be used for various purposes.

Fauna

Wulfkuhle (1986:39, 45-54) provides a comprehensive list of animals native to the Lower Plains region. Included are at least 50 mammal species, 11 amphibian species, 32 reptile species, 23 fishes, "fewer than a dozen fresh water mussels," and "a great many species of birds." Wulfkuhle's list includes those animals which occur in the region today or are known to have been exploited by aboriginal populations in the past (excluding Pleistocene fauna).

Large mammals include bison (Bison bison), white-tailed deer (Odocoileus virginianus), pronghorn (Antilocapra americana), collared peccary (Pecari tajacu), black bear (Ursus americanus), coyote (Canis latrans), gray wolf (Canis lupus), cougar (Felis concolor), and bobcat (Lynx rufus). Smaller mammals included jack rabbit (Lepus californicus), two species of cottontail rabbit (Sylvilagus floridanus and S. auduboni), porcupine (Erethizon dorsatum), gray fox (Urocyon cinereoargenteus), red fox (Vulpes fulva), badger (Taxidea taxus), striped skunk (Mephitis mephitis), ringtail (Bassariscus astutus), raccoon (Procyon lotor), shrew (Cryptotis parva), opossum (Didelphis virginiana), nine species of bats (order Chiroptera), two species of ground squirrels (Spermophilus mexicanus and S. spilosoma), black-tailed prairie dog (Cynomys ludovicianus), prairie pocket gopher (Geomys bursarius), and 11 species of rats and mice. The rats and mice include two species of pocket mouse (Perognathus merriami and P. hispidus), kangaroo rat (Dipodomys ordii), plains harvest mouse (Reithrodontomys montanus), pygmy mouse (Baiomys taylori), deer mouse (Peromyscus maniculatus), white-footed mouse (P. leucopus), Texas mouse (P. attwateri), cotton rat (Sigmodon hispidus), and two species of wood rat (Neotoma micropus and N. albigula).

Amphibians include seven species of toads (Scaphiopus bombifrons, S. couchi, S. hammondi, Bufo cognatus, B. debilis, B. punctatus, and B. speciosus) and four species of frogs (Acris crepitans, Pseudacris clarki, Rana blairi, and R. catesbeiana). Reptiles include four species of turtles (Chelydra serpentina, Kinosternon flavescens, Chrysemys scripta, and Terrapene ornata), nine species of lizards (Crotaphytus collaris, Holbrookia maculata, H. texana, Phrynosoma cornutum, P. modestum, Uta stansburiana, Eumeces obsoletus, Cnemidophorus sexlineatus, and C. tasselatus), and 19 species of snakes (Leptotyphlops dulcis, Arizona elegans, Diadophis punctatus, Elaphe guttata, Gyalopion canum, Heterodon nasicus, Hypsiglena torquata, Lampropeltis getulus, L. triangulum, Masticophis flagellum, Natrix erythrogaster, Rhinocheilus lecontei, Sonora episcopa, Tantilla nigriceps, Thamnophis marcianus, T. proximus, Crotalus atrox, C. viridis, and Sistrurus catenatus).

CHAPTER 3

REGIONAL ARCHEOLOGICAL BACKGROUND

by Douglas K. Boyd

Southern Plains prehistory has advanced greatly in the past decades, but in spite of this, only a minimally defined cultural history exists for much of the region. In 1983, the computerized archeological site data base for Texas contained records on 1,302 prehistoric archeological sites in the 37-county Lower Plains region and 1,197 sites in the 31-county High Plains region that includes the Llano Estacado (Biesart et al. 1985:76-77). These statistics reflect a lack of systematic investigations and reporting rather than low archeological site density. Most of the site records provide minimal information, and few sites have been scientifically studied. Even fewer sites have been subjected to intensive excavation using rigorous techniques to reveal intrasite relationships and to provide data for a regional chronology. As a consequence, much of the prehistoric record in the Southern Plains is viewed through cultural chronologies established for other regions (e.g., Central Texas).

Traditionally, reviews of Southern Plains prehistory have either concentrated on the Llano Estacado and included information from the Lower Plains (e.g., Kelley 1964; Collins 1971) or have combined the Llano Estacado and the Lower Plains (e.g., Suhm et al. 1954:63-73; Hughes and Willey 1978:24-31). While the Llano Estacado and Lower Plains are physiographically very different, the archeology of the two areas appears to be similar and related. It is appropriate to consider the two areas as subdivisions within the Southern Plains region.

Early Research in the Southern Plains

Archeological interest in the Southern Plains of Texas dates to well before the turn of the century. Lieutenant A. W. Whipple (Whipple et al. 1856) recorded Indian rock art on the Canadian River in 1853 (Kirkland and Newcomb 1967:203), and another army Lieutenant named Woodruff probably conducted the first subsurface investigation of an Indian ruin in the Texas Panhandle in 1876 (Baker 1985:20, 116). The first systematic archeological investigations, although crude by today's standards, began after the turn of the century with T. L. Eyerly and continued to the 1930s with the work of Warren K. Moorehead. These early investigations centered around the impressive village ruins along the Canadian River valley of the Texas Panhandle. Through the Depression Era, much of the archeological work on the Llano Estacado concentrated on these Late Prehistoric village sites. Krieger (1946:17-84) provided the first comprehensive synthesis of the Late Prehistoric Antelope Creek Focus.

In the 1920s, as man's antiquity in North America became apparent, intense interest in Early Man in the Southern Plains was aroused. Cyrus Ray (1937, 1939) began investigating "Abilene Man" sites in the Lower Plains which he thought to be of great antiquity. There are many unresolved questions about the age of these sites in spite of a long and arduous debate (Suhm 1958:54). Ray did, however, create much of the interest in Early Man studies in the region. Wulfkuhle (1986:55-69) summarizes the history of the Abilene site

investigations and debate and the interest that was generated by the controversy. Many well-known figures in Texas archeology became involved in different aspects of Southern Plains research at this time, including A. T. Jackson, Forrest Kirkland, E. B. Sayles, E. H. Sellards, G. L. Evans, Alex D. Krieger, and J. Charles Kelley (Wulfschlegel 1986:58).

A number of extremely important Paleoindian sites have been investigated in the Southern Plains, and many of the recognized Paleoindian cultural traditions were first discovered and defined there. Kelley's (1964) review of Llano Estacado archeology summarized the excavated Paleoindian sites on the Llano Estacado prior to 1958; these consisted of the Clovis Site (Blackwater Draw Locality No. 1), the San Jon Site, and the Milnesand Site in New Mexico; and the Plainview Site, the Lubbock Lake Site, and the Midland Site (Scharbauer Ranch Site) in Texas. Suhm et al.'s (1954:64-66) review included three additional Paleoindian sites in Texas -- the Miami Site, the Lipscomb Site, and the Colorado City Site.

In 1954, the only cultures defined for the Texas Panhandle-Plains area were the Clovis and Folsom traditions of the Paleoindian Period and the Antelope Creek Focus of the Late Prehistoric period (Suhm et al. 1954). No Archaic cultures were defined and no Archaic sites were discussed, although Archaic projectile points were known to be commonly found throughout the region. Suhm et al.'s (1954:73) only mention of Historic Period Indian sites refers to occasional crevice burials being found in the region. The cultural chronology for the Texas Southern Plains was only slightly more refined in 1954 than it was at the time of Sayles' (1935) review of Texas archeology. Jelks et al.'s (1958) review of Texas archeology did not include any information on the Panhandle-Plains region, but their Central Texas overview did include the Abilene area.

Other investigations were conducted in the Southern Plains prior to the publication of Suhm et al. (1954), but these were not published or were not available at that time. Works Project Administration (WPA) investigations at the Beidleman Ranch Site, a Paleoindian kill site in Stonewall County, were not published until 1960 (Suhm 1960). WPA investigations were also conducted at the Johnson Creek Site and a nearby shelter but were not reported until 1955 (Wheat 1955). Holden (1929, 1938) describes other investigations, including excavations at the Blue Mountain Rock Shelter near Midland in Winkler County. Quinn and Holden (1949) reported on excavations at two rockshelters in Dawson and Borden counties, one of which contained pictographs. Kirkland (1942) and Jackson (1938:308-317) both reported aboriginal rock art sites in the Texas Panhandle. Kirkland (1941) also described rock art near Abilene. The Smithsonian Institution conducted a survey of the Colorado City (Lake J. B. Thomas) Reservoir in Mitchell County (Jelks 1952) and the Paint Creek Reservoir in Haskell County (Jelks and Moorman 1953). Playa lake sites on the Llano Estacado also have been recognized as important resources for many years (Watts 1939; Jennings 1952).

Recent Research in the Southern Plains

Since 1954, archeological research in the Southern Plains has increased dramatically as a result of improved cultural resource legislation, an increased awareness and interest in archeology by local avocational groups, and increased research-oriented investigations by professional archeologists.

In 1952, the Panhandle-Plains Historical Museum began recording and investigating sites through the efforts of Jack T. Hughes. An Archaic bison kill, the Twilla Site, was first investigated in 1953 (Tunnell and Hughes 1955). Subsequent investigations and analyses of Archaic bison kills, including the Twilla Site, are reported by David T. Hughes (1977). J. Hughes (1955) also reported the 1954 investigations of Little Sunday, an Archaic site in Randall County, and proposed that it represented a definable late Archaic cultural complex (1955:72). He later defined a transitional Woodland "Lake Creek Focus" on the basis of test excavations at the Lake Creek Site in Hutchinson County in the northern Panhandle (Hughes 1962:83). This focus dates to transitional late Archaic-Late Prehistoric times and was defined on the basis of "Woodland" affiliations. J. Hughes (1977) compiled a bibliography of Texas Panhandle archeology which is current through the mid 1970s.

Federally funded reservoir salvage projects (e.g., Lake Meredith, Truscott and Crowell reservoirs, and Salt Fork of the Brazos) contributed substantial archeological data to the Southern Plains. Salvage archeology at Lake Meredith (Canadian River) in the Texas Panhandle was conducted in 1967 but was not published until years later (Green 1986). Testing of four Antelope Creek Focus sites and two Plains-Woodland (Lake Creek Complex) sites are reported. The original survey of the reservoir was done by the Texas Archeological Salvage Project in 1961, but again the data were not published until years later (Davis 1985).

Archeological work has been done at several reservoirs in the Rolling Plains/Central Texas transitional area. Nine sites are mentioned in a brief report on the Texas Archeological Salvage Project survey of Champion Creek Reservoir in Mitchell County (Tunnell 1960).

Several reservoir investigations have been conducted by the U.S. Army Corps of Engineers as part of its salt pollution control projects. Two reservoirs, Truscott and Crowell, on the North and South Wichita rivers, were surveyed initially by Hughes (1972). Later investigations at Truscott Reservoir (Etchieson et al. 1978) in Knox and King counties included surface collecting (selective and controlled) and testing at 70 sites. This study is of special interest because Etchieson et al. (1978:86) proposed a sequence of five substages within the Rolling Plains Archaic Period. This chronology is based on projectile point styles and is correlated with Weir's (1976) chronology for Central Texas. Investigations at Crowell Reservoir were also conducted as part of the same chloride control project. Etchieson et al. (1979:348-349) report that 184 sites were recorded and investigated.

Another salt pollution control study was conducted on the Salt Fork of the Brazos River in Kent, King, and Stonewall counties. A preliminary reconnaissance by Southern Methodist University identified 30 sites (Skinner 1973). A 25% sampling survey of the same project was conducted by Prewitt and Associates, Inc. in 1981, and 138 sites were recorded (Thurmond et al. 1981). Over 75% of the identifiable components were Archaic in age (Thurmond et al. 1981:77).

Other federally funded studies include an overview of the archeology of the Brazos River Basin (Thoms and Montgomery 1977) and investigations at Mackenzie Reservoir in Swisher and Briscoe counties (Malone 1970; Hughes and Willey 1978). The latter study involved the testing of nine sites, three of particular importance: the Rex Rodgers Paleo-indian bison kill site contained distinctive "side hollowed" lanceolate points (Hughes and Willey 1978:68); the Deadman's Shelter became the type site for the distinctive "Deadman's point" (Hughes and Willey 1978:187) and defined the "Palo Duro" culture complex; and the

Sand Pit Site, a campsite of probable Comanche affiliation (Hughes and Willey 1978:253). Petroglyphs were also found in Mackenzie Reservoir (Hughes and Willey 1978:258). A partial survey of the Buffalo Lake National Wildlife Refuge in Randall County is reported by Hays (1986).

Katz and Katz (1976) reported survey work in lower Tule Canyon, just downstream from Mackenzie Reservoir. Ninety sites were recorded, representing only late Archaic and Late Prehistoric occupations. One site is attributed to an Apachean group (Katz and Katz 1976: 54-56).

The Texas Parks and Wildlife Department (TPWD) has been involved in archeological research at Caprock Canyons State Park in Briscoe County for a number of years. Three surveys of different portions of the park have been conducted. Willey and Hughes (1975) surveyed an isolated tract; they recorded 25 sites and conducted subsurface testing at 41BI62 (see also, Harrison 1975). This tract has since been traded and is no longer administered by the TPWD, but some of the sites are listed as State Archeological Landmarks (Mercado-Allinger and Ralph 1982:18).

A second survey of portions of the Caprock Canyons State Park was conducted in 1976 (Etchieson et al. 1977), and a third survey of another portion of the Park was conducted in 1978-1979 (Bagot and Hughes 1979). The second survey located 184 archeological sites, of which 45 are Archaic, 6 are Late Prehistoric, 6 are mixed Archaic-Late Prehistoric, 126 are undefined prehistoric, and 1 is historic. The third survey located 147 archeological sites (25 Archaic, 2 mixed Archaic-Late Prehistoric, 117 undefined prehistoric, and 3 historic) and documented various types of burned rock features.

Excavations have been conducted at several Caprock Canyons State Park sites. The Lake Theo Site is an important Paleoindian bison butchering and camping site. It was tested in 1974 (Harrison and Smith 1975), and more-intensive excavations were conducted in 1977 (Harrison and Killen 1978). The Lake Theo Site is stratified and contains a Folsom bone bed, a Plainview/Eden bone bed, an Archaic component, and some historic materials. Excavations at two other Caprock Canyons sites, both thought to be Archaic but with no diagnostic artifacts or associated dates, are reported by Mercado-Allinger (1982) and Mercado-Allinger and Ralph (1982).

Bagot (1981) presents a brief summary of the archeology of the Caprock Canyons State Park. All cultural stages, Paleoindian, Archaic, Late Prehistoric, and Historic, are represented. The Lake Theo Site is the only Paleoindian site, but 91 sites are Archaic in age. A cache of Edwards chert blades (the McWilliams Cache) is thought to be Archaic in age (Tunnell 1978:44). Seven Late Prehistoric sites are recorded, three of which are Palo Duro Culture sites. Two of the Late Prehistoric sites are Antelope Creek Focus (Panhandle Aspect) sites and are among the most southerly occurrences of this culture. Five historic dugouts are also recorded within the Park.

Hughes (1978b) reported a site on a tributary of the Red River in Palo Duro Canyon State Park. No comprehensive survey has been done in this Park, but a number of limited investigations have been conducted by the Panhandle-Plains Historical Museum and by West Texas State University. Most of the sites are in and near the Park, and only surface materials were collected. Some of them have been tested but only two have been reported, site A148 (Pearson 1974) and the Little Sunday Site (Hughes 1955). Other test excavations nearby in the Palo Duro drainage which have been reported include the Canyon Country Club

Cave (Hughes n.d.) and Chalk Hollow (Wedel 1975) sites. Both are stratified sites with late Archaic to Late Prehistoric components.

The Office of the State Archeologist tested three sites and excavated a fourth site in Crosby and Dickens counties (Parsons 1967). The excavated Pete Creek Site is stratified with late Archaic to Late Prehistoric components containing both Southwestern and Caddoan-like ceramics. A study of the Gibson Lithic Cache in Coke County by the Office of the State Archeologist (Tunnell 1978) also reviewed other lithic caches in the Southern Plains. The Adair-Steadman Site is a Paleoindian (Folsom) campsite exposed in a sand dune area on the Clear Fork of the Brazos River in Fisher County. The site has been collected for many years, but only one report on the site, which describes the production of fluted Folsom points on the basis of surface collections, has been written (Tunnell 1975). The Office of the State Archeologist also conducted a survey on the Clear Fork of the Brazos in Fisher and Jones counties. Wulfschle (1986) analyzed and reported the data from the 1971 survey. She presents a detailed overview of the environment and archeology of the Lower Plains region, documents 33 sites, and describes the excavation of a Late Prehistoric hearth. The Texas Department of Highways and Public Transportation tested late Archaic site 41KT32 in Kent County (Denton 1983).

Local archeological societies have been very active in the Southern Plains. In the Lower Plains, several important sites have been investigated by members of the South Plains Archeological Society. Jim Word has reported two sites in Floyd County. The Floydada Country Club Site (Word 1963) is a stratified site with evidence of late Archaic and Late Prehistoric components. Both Southwestern and Caddoan-like ceramic types were found at the site, as were probable historic Comanche materials. The Montgomery Site (Word 1965) has a Late Prehistoric component with both Southwestern and Caddoan-like ceramics, and the occupation extends into early Historic times. Word (1965:100) attributes the occupations to Apaches. Northern (1979:113) has also reported investigations at the Montgomery Site and concluded that it was occupied by an Apachean group.

Other members of the South Plains Archeological Society have reported a number of investigations. Shedd (1968) reported a possible Jornada burial in Garza County. Riggs reported excavations at Reed Shelter (1966) and describes rock art in Garza County (1965b, 1969) and Scurry County (1982). Riggs (1965a) also reported Late Prehistoric surface materials from a site in Lynn County, while Harper and Shedd (1969) reported excavations at a small unnamed shelter in Garza County.

Three archeological sites in Garza County were listed on the National Register of Historic Places in 1978 (Steely 1984:68). The Cooper's Canyon Site (41GR25) and the Post-Montgomery Site (41GR188) are both stratified sites with Paleoindian and Late Prehistoric remains. The O.S. Ranch Petroglyphs (41GR57, also called Yellowhouse Crossing Mesa by Riggs [1969]) is a major rock art site reported originally by Riggs (1969). None of these sites have been intensively investigated.

Brown (1968) excavated a double fire pit with associated Late Prehistoric debris, including Southwestern ceramics, near Lubbock. Portis et al. (1968:62) describe surface materials from a site in Scurry County which yielded Paleoindian, Archaic, and Late Prehistoric lithics, a glass trade bead, and a lock plate from a "seventeenth-century French trade gun" manufactured about A.D. 1730. There are also petroglyphs at the site.

The South Plains Archeological Society conducted excavations at the Slaton Dump Site in Lubbock County. This Late Prehistoric site yielded possible "Anasazi" sherds and "locally produced" wares (Booker and Campbell 1978:30). Cockrum (1963) reported a multiple cairn-type burial from Garza County. Another avocational archeologist reported an experiment in which pottery was fired in a kiln patterned after two excavated prehistoric "earthen kilns" (Hart 1980:1-13; see also Hart 1976). The features, one in Lynn County and one in Martin County, are illustrated and briefly discussed. The author, however, does not describe them in detail or present any substantial data to support the interpretation. The experiment did successfully produce ceramic vessels from local clays.

Perhaps the most important research conducted by the South Plains Archeological Society was the excavation of portions of the Garza Site, directed by Earl Green and David Kelley of Texas Tech College (now University) and under the field supervision of Frank "Chief" Runkles, which revealed a single occupation zone with 10 features and associated lithic and bison bone debris (Runkles 1964). On the basis of their finds, Runkles (1964:107) proposed the name "Garza" for the distinctive, basal-notched triangular arrow points at the site. The site has become the type site for a "Garza Complex" (Johnson et al. 1977; Hughes 1984), which has been suggested as representing protohistoric Apache peoples. Baugh's (1986) recent work in southwestern Oklahoma suggests that the Garza Complex is a western extension of the Wheeler Phase (redefined to include the Edwards Complex), which he proposes represents not Apachean peoples but the western periphery of Plains Caddoan village peoples into the Southern Plains (Baugh 1982:217, 1986:181). A Garza burial is also reported from Martin County (Gates and Hart 1977).

Runkles has investigated another Late Prehistoric site near the Garza Site for many years. Runkles and Dorchester (1987) report controlled surface collecting and limited testing of the Lott Site which contains horizontally distinct areas yielding three different arrow point types: Lott, Garza, and Perdiz. A large number of locally made but stylistically Caddoan ceramics were found on the site, but only in association with Garza and Lott points. The authors conclude that the site is an important link in understanding the Caddoan Southern Plains interaction in the A.D. 1300-1500 period (Runkles and Dorchester 1987:108-112). They cannot yet, however, adequately explain the presence of the Perdiz component at the site.

The Lower Plains Archeological Society excavated a similar site in Midland County. Garza, Lott, and Perdiz points were found at the Bull Hill Site, indicating a strong Central Texas influence (Shawn 1976). Randall (1970) describes the material culture of Lamb County; all cultural periods are represented but are known almost exclusively from surface collections.

Another important Southern Plains site is the Bridwell Site in Crosby County (Parker 1982). This Late Prehistoric Garza Complex site yielded Southwestern and Caddoan-related (or locally made?) ceramics. Parker (1982:75) believes the site is Apachean and compares it with the Edwards I Site in Oklahoma (Baugh 1982). The Bridwell Site also has a late Historic Comanche occupation. Cruse (1982) surface collected and tested the Late Prehistoric Bobby Clay Site in Motley County, which yielded obsidian and Puebloan ceramics. He interpreted it as a Washita River Focus site, and Baugh (1986:168) considers it to be a Wheeler Phase site which is related to and includes Garza Complex sites.

Members of the Panhandle Archeological Society have tested and excavated one important site with a Woodland component. Couzzourt's (1985) preliminary report on the Tascosa Creek

Site on the Canadian River discussed the findings and the importance of Plains Woodland/Plains Village transitional sites. Testing of the Short Creek Site in Potter County, also by the Panhandle Archeological Society (Etchieson 1986), indicates that this stratified Archaic site may have a Woodland component.

One of the most widely known and most extensively excavated sites in the Southern Plains is the Lubbock Lake Site located near a spring on Yellowhouse Draw, a tributary of the North Fork of the Double Mountain Fork of the Brazos River. The site was first tested in the 1930s (Wheat 1974). A wide range of interdisciplinary investigations (archeological, geological, paleoenvironmental, faunal, pedological, etc.) have since been carried out at the site. This stratified site has yielded a chronological record which spans from Clovis to historic times. The Paleoindian deposits contain all the major traditions -- Clovis, Folsom, Plainview, and Firstview (Johnson 1983). Stratified deposits at Lubbock Lake include the Archaic period (Johnson and Holliday 1986), and a Late Prehistoric Garza Complex occupation is well documented (Johnson et al. 1977). Numerous radiocarbon dates have been obtained from Lubbock Lake (Holliday et al. 1983, 1985), providing a cultural chronology for the southern Llano Estacado. Antevs's (1955) proposed climatic changes are supported by the data from Lubbock Lake (Johnson and Holliday 1986:48-49).

Mustang Springs, on a tributary of the Colorado River near Midland, is at the far southern end of the Llano Estacado. Excavations at this site have revealed the presence of prehistoric water wells dug at times when the spring no longer flowed because of drought conditions (Meltzer 1986; Meltzer and Collins 1987). Similar prehistoric wells at Blackwater Draw Locality No. 1 and at Rattlesnake Draw are also documented (Meltzer and Collins 1987). These data are important to understanding the paleoclimatic record of the Southern Plains and seem to support Antevs's (1955) proposed Altithermal drought period.

Specialized studies which synthesize and interpret the Southern Plains archeological data have been undertaken. Dillehay (1974) proposed a series of late Quaternary bison population changes on the Southern Plains which postulate that bison populations fluctuated with past climatic changes and that this should be reflected in the archeological record. Lintz has compiled a bibliography of the Antelope Creek Phase (1982a), an overview of these sites (1982b), and an in-depth analysis of the structural remains (1986).

Interaction between the Southern Plains and other regions has been studied. Thomas (1940), Gunnerson (1979), Spielmann (1982, 1983), Baugh (1986), and many others have studied the Puebloan/Plains relationship. Interaction and influence from the Mogollon area of New Mexico are recognized but poorly understood. Corley (1965) has demonstrated that the Mogollon influence extends well into the Southern Llano Estacado. Excavations at the Salt Cedar Site (Collins 1968) revealed Mogollon-type structures and material culture in Andrews County, Texas. Although not yet reported, Brett Cruse (personal communication 1986) has excavated Southwestern-style pithouses at 41HL66 near Turkey in Hall County, Texas.

W. C. Watts has studied the distribution of certain artifact types in the Southern Plains of Texas. One study (Watts 1965) of "scored or incised stones" has reported these types of specialized artifacts from Garza and surrounding counties. Another study (Watts 1972) examined the distribution of "token and multi-notched points" and includes examples from Garza and surrounding counties. Watts (1972:30) suggests that some of these specialized points may be similar to the Huffaker type and that one point from Dawson County is a Hohokam variety.

Of special interest in the Southern Plains are "lunate stones," made of an exotic greenstone material, which are often found associated with burials. Most occurrences of these artifacts are not reported in the literature, but Cockrum (1963) reported one in association with a cairn burial, and Parker and Redding (1987) reported them associated with an Archaic burial in the Lower Plains region. Holden (1929) notes that one of these artifacts was found with a cairn burial in Kent County.

The distribution of exotic items in the Southern Plains is extremely important in establishing exchange systems and settlement patterns. Ceramics are the most obvious choice for these types of studies since they often can be readily identified as to source and date. Watts (1963) did a study of the distribution of pottery on surface sites in the Southern Plains, but it is now badly outdated. Campbell and Judd (1977b:45) list a number of exotic ceramic types found in parts of the Lower Plains, as does Northern (1979:120). Runyan and Hedrick (1973) identify the common pottery types in the Southern Plains, and Collins (1969) has speculated on the significance of Southwestern ceramics on the Llano Estacado.

Lithic studies are also helpful in understanding prehistoric patterns. Lithic caches in the Southern Plains of Texas have been reported by Tunnell (1978) and by Hart (1983). Studies of the distribution of lithic types, such as a short paper on the distribution of Alibates by Weehler (1974), have been done, but no comprehensive studies have been attempted. Obsidian distributions have been used to demonstrate Southern Plains exchange systems since obsidian can now be sourced accurately (e.g., Baugh and Terrell 1982).

Many interdisciplinary studies have been very beneficial to research in the prehistory of the Southern Plains. Paleoenvironmental studies (e.g., Bryant and Shafer 1977; Hall 1982; Bryant and Holloway 1985), geoarcheological work (e.g., Haynes 1975; Stafford 1981), and paleoenvironmental reconstructions (e.g., Wendorf and Hester 1975) are crucial to a more complete understanding of the archeological record.

Previous Investigations in the Justiceburg Reservoir Area

The Justiceburg area has been the focus of archeological investigations for over 30 years. Members of the South Plains Archeological Society (SPAS) began documenting sites there in 1955 under the direction of Emmett Shedd. Seven sites (41GR30-33, 41GR64, 41GR163, and 41GR172) were recorded between 1955 and 1960.

Another member of SPAS, Aaron D. Riggs, Jr., conducted a survey of rock art sites in Garza County during the mid 1960s. He reported three rock art sites in the project area (Riggs 1965b, 1966): the Dorward Ranch Site (41GR51), Reed Shelter (41GR54), and a pictograph on the west bank of Gobbler Creek (41GR390). Riggs traced the petroglyphs at 41GR51 and 41GR54 and made a drawing of the pictograph at the third site.

Riggs (1966) directed excavations of Reed Shelter in January 1966, assisted by Shedd and other members of the SPAS. A 4.6x7.6-m (15x25-ft) area was excavated in 15.2-cm (6-inch) levels to bedrock, which varied from less than 12.7 cm (5 inches) to nearly 60.9 cm (2 ft). This area constituted most of the interior of the shelter. Materials recovered include Late Prehistoric arrow points (Harrell, Fresno, and Garza) and a sparse amount of other chipped lithic tools and debris. Petroglyphs and bedrock mortar holes were the only

features noted. These could not definitely be associated with the remains found inside the shelter, but Riggs (1966:57) speculates that the features and cultural deposits are associated. He attributes the site to "nomadic peoples of an undefined culture," ca. A.D. 1500-1700.

SPAS members, including Shedd and Kirkpatrick, also were active in the Justiceburg area during the 1970s. Shedd recorded six more sites (41GR203-208) in 1977. Kirkpatrick (1978) conducted a study of bedrock mortar holes; included in the 13 sites studied were 4 in the Justiceburg Reservoir area, 41GR30, 41GR31, 41GR54, and 41GR205, all of which were previously recorded.

The most recent professional archeological investigations in the Justiceburg Reservoir area were conducted in January 1984 by the Llano Estacado Museum. Five segments, ca. 32 km (20 miles), along a proposed overhead electrical line between Post and Justiceburg were surveyed; no cultural resources were found along these alignments (Guffee 1984:4, 5).

In 1973-1974, the South Plains Association of Governments (SPAG) initiated archeological studies of selected areas within its 15-county jurisdiction. These selected areas were chosen because of their high potential for future development. The purpose of the archeological investigations was to assess, in advance of any development, the nature and extent of the cultural resources and to evaluate the probable impacts of any proposed development. SPAG contracted with the Department of Anthropology at Texas Tech University in 1974 to conduct the investigations. Archeological reconnaissance of several selected areas within the SPAG region was conducted in 1974 and 1975. These are reported in a series of short progress reports (Campbell 1975a, 1976; Judd 1978) and in a series of four reports submitted to SPAG (Campbell 1975b, 1977; Campbell and Judd 1977a, 1977b). Judd's (1977) master's thesis also describes SPAG investigations, including Justiceburg.

One of the areas selected for investigation was the proposed Justiceburg Reservoir located in the southern portion of the SPAG region. The reconnaissance, under the field direction of Dr. Robert Campbell, was the first professional work in the project area. Regrettably, the research was of limited value to the current investigations because of limitations in the methodology and poor reporting of the results. Subsequent to the SPAG investigations, the field records and collections were lost, and the only data available on their work are contained in the SPAG report series.

In order to fully understand the problems encountered in trying to utilize the SPAG data for Justiceburg, one must realize the limitations of the methodology employed. Their fieldwork at Justiceburg was conducted by the Field Director and a crew of from 3-10 student helpers (Campbell 1975b:1-4, 12) beginning in mid April 1975 and completed by June 1. All fieldwork was done on a "part-time" or "spare-time" basis (Campbell 1975b:1-2). For the entire SPAG 15-county region, "approximately 70 square miles were investigated" but only "117 man-days" of fieldwork were expended. More specifically, in regard to the survey in the Justiceburg area, 11,000 acres (the report contains an obvious typographical error and actually states "110,000 acres") were surveyed with only "61 man-days of labor" (Campbell 1975b:18). At that level of effort, each person surveyed about 180 acres per day in extremely rugged terrain.

The SPAG survey located 145* sites, made collections from many of them, and recorded them on site cards. The collections and site records could not be relocated during the current work. Site records were never filed with the Texas Archeological Research Laboratory. The only data which exist for the sites are those published in the SPAG reports (Campbell 1975b, 1977; Campbell and Judd 1977a, 1977b). Data on individual sites are presented in tabular form and are of very limited usefulness in relocating sites in the field. When site locations were revisited, the existing data usually could not be correlated consistently with physical evidence in the field, and many sites were found to be misplotted. It soon became obvious that it was not feasible to try to correlate the SPAG sites with the resources found during the current investigations. Perhaps the most disturbing aspect of the SPAG-funded research is the recommended actions which were suggested to mitigate the loss to the cultural resources should the project be constructed. Within the entire Justiceburg Reservoir area surveyed, and out of the 145 sites located, Campbell (1975b:19) recommended that only 12 sites be surface collected and that only one site be excavated.

The next professional archeological study in the reservoir area came about as a result of these recommendations. Local landowners funded archeological studies which were conducted by Grand River Consultants, Inc. (Grand Junction, Colorado), under the direction of Dr. Robert Alexander. These investigations were conducted to reevaluate the archeological resources within the reservoir area. Alexander (1982:3-4) states:

The following report is a re-evaluation of some of the archaeological [sic] resources in the proposed Justiceburg Reservoir area. A number of problems with the original SPAG report and its conclusions have been found. In brief, it is our position that the cultural resources to be affected by the proposed Justiceburg reservoir are significantly more important than indicated by the SPAG report and, furthermore, the data potential of sites recorded by the SPAG survey have not even begun to be realized. The SPAG management [sic] recommendation that 132 sites not be investigated further is particularly challenged [sic].

Therefore, the purpose of the present study is to present evidence that the area will require considerably more archaeological effort than [sic] stated in the site evaluations contained in the SPAG reports. In particular, it is the purpose of this report to demonstrate to the Texas State Antiquities Committee and to the officials involved in the decisionmaking actions concerning the proposed Justiceburg Reservoir that considerably more time and money will be required to adequately [sic] mitigate the adverse impacts of reservoir construction on the cultural resources protected by state and federal law. Furthermore, a complete intensive survey program including testing for subsurface materials and deposits will have to be completed before adequate [sic] estimates for an historic and prehistoric site mitigation plan can be made.

*The report (Campbell 1975b:18) states that 145 sites were found, but Appendix I (Campbell 1975b:34-59) lists 144.

Alexander (1982:7) did not attempt a resurvey of the reservoir area. Using a crew of two to five people, 12 days in the spring of 1982 were spent in the field revisiting and rerecording nine sites originally recorded by SPAG. Sixteen additional sites were located and recorded from data provided by local informants. Two sites were investigated further, and controlled surface collections were made. On the basis of their work, Alexander (1982:34) disagreed with the previous recommendations and suggested that before the cultural resources could be properly evaluated "a thorough survey and documentation of the resources of the proposed reservoir area needs to be conducted using currently acceptable methods of ground coverage, documentation, and artifact sampling."

Site Designation Systems at Justiceburg Reservoir

Previous investigations at Justiceburg Reservoir have employed four different systems of site designation. Considerable overlap in numbering systems and even multiple assignments of numbers within the same system have resulted. For this reason, a brief chronological account of site numbering at Justiceburg Reservoir is given here.

Emmett Shedd was the first person to record sites in the Justiceburg area and continues to record them to the present. Shedd's system of site designation employs a single number (e.g., 25) for a site or site cluster, assigning subdesignations (e.g., 25a, 25b) to each location if they are separated by space, water, or topography.

Aaron Riggs visited most of the sites that Shedd recorded and assigned his own numbers to them. Riggs conducted his research under the acronym of ITARDE (Independent Texas Archeological Research Data Exchange). His site numbers are prefaced by the abbreviation "GR."

In addition to these systems of designation, Shedd and Riggs both entered their sites into the records of the SPAS, for which Riggs was the registrar. The SPAS numbering system is more or less chronologically ordered and employs the prefix "GA."

In the early phases of the SPAG project, Dr. Robert Campbell contracted with Riggs to provide information on the SPAS sites in the 15-county SPAG area. When the field phase of the SPAG project began, Campbell decided to employ the SPAS numbering system for the sites he found. Included among the 145 sites found by Campbell at Justiceburg are 6 previously known SPAS sites: GA11 (41GR31), GA13 (41GR33/402), GA198 (GA310; 41GR206/247/394), GA199 (GA304; 41GR207/241), GA249 (41GR54), and GA253 (41GR51). The SPAS numbers used by Campbell range from GA301 through GA316 and GA318 through GA441 (except GA317). Campbell assigned new SPAS numbers to GA198 (GA310) and GA199 (GA304) because he was not aware that they had already been recorded by Shedd.

During the final phases of the SPAG project, Riggs began to coordinate SPAS numbers with the Smithsonian trinomial system employed by the Texas Archeological Research Laboratory (TARL). When he first learned that the TARL system used the abbreviation GR for Garza County, he simply translated SPAS numbers into "TARL" numbers by changing the county abbreviation (e.g., GA312 = 41GR312; see Campbell and Judd 1977a:85-137, 213-271). Later in 1977, Riggs began to work with Carolyn Spock of TARL to assign Smithsonian trinomial numbers to SPAS sites GA1 through GA230.

Campbell's SPAG sites remained without TARL numbers until April 1982, when Alexander began his survey of the Justiceburg area. He reserved 175 TARL numbers for this survey and assigned the first 140 TARL numbers to Campbell's SPAG sites (i.e., 41GR238-377 to GA301-441, except GA317). Alexander assigned 16 new TARL numbers (41GR387-401) to sites that his crew observed during the survey; however, 4 of these sites were previously recorded. One site (GA161, 41GR13/398) had been recorded by Shedd, two sites (GA13, 41GR33/402; GA405, 41GR341/389) had been recorded in the SPAG survey, and one site (GA310, 41GR206/247/394) had been recorded by Shedd and the SPAG survey. Nineteen of the TARL numbers reserved by Alexander (41GR378-386 and 41GR403-412) were never assigned to sites.

During the current Prewitt and Associates, Inc. survey of the reservoir area, it was clear that only sites which had been previously recorded by the South Plains Archeological Society or by Grand River Consultants, Inc. could be relocated. After completion of the survey and consultation with the Texas Archeological Research Laboratory, it was decided that any TARL site numbers assigned to SPAG sites which had not been previously or subsequently recorded could be reassigned since the numbers had never been published and TARL had no records on file for the sites. In a few cases, sites with multiple TARL site numbers which had been published were discovered. These sites were designated by their lowest TARL number with each higher TARL number being permanently voided. Nine TARL site numbers (41GR241, 41GR247, 41GR252, 41GR389, 41GR394, 41GR398, and 41GR400-402) were permanently voided in this manner. Table 1 lists the 24 previously recorded sites and cross-references the various designations.

Cultural Chronology and Research Orientation

The chronology of the Texas Southern Plains has been reviewed many times. Suhm et al. (1954) provided the standard accepted cultural chronology comprised of four distinct stages: Paleo-American, Archaic, Neo-American, and Historic. Published reviews of the cultural sequence (or segments of it) in the Texas Southern Plains since that time include Kelley (1964), Collins (1971), Hughes (1976), Bandy (1977), Hughes and Willey (1978:26-28), and Wulfkuhle (1986:74-89). It is not necessary to restate all of the previous reviews here; it is more appropriate to review some of the important sites and the recent research orientations and advances. For the purposes of this review, the major chronological stages used are Paleoindian, Archaic, Late Prehistoric, and Protohistoric. Figure 8 presents a cultural chronology for the Southern Plains as referred to in the ensuing discussions.

Paleoindian Period

Abstaining from the "pre-Clovis" debate, the author knows of no sites of suspected pre-Clovis age in the Texas High Plains or Lower Plains. The earliest generally accepted cultural tradition is Clovis, which is well represented in the Southern Plains. The Paleoindian period begins at ca. 11,000 B.C. and continues until ca. 5000-6000 B.C. This period is characterized by subsistence patterns that utilized large game animals. Sites typically fall into one of three categories: (1) campsites where people actually lived; (2) kill sites where animals were killed and initial butchering took place; and (3) processing stations where later stages of butchering and food processing were done (Johnson 1983:81). Sellards (1952) provides a general introduction to the Paleoindian period and many of the important associated sites.

The Paleoindian period is subdivided into shorter periods based on changes in the tools used, specifically the projectile point styles. There is also a shift in emphasis on the animals which were hunted as different species became scarce and eventually extinct. Clovis man was known to have hunted mammoth and mastodon along with Bison antiquus. Later groups depended mainly upon Bison antiquus or other forms of giant bison after mammoths and mastodons became extinct.

The Paleoindian sequence defined at the Lubbock Lake Site is the most complete stratified sequence in the Southern Plains and is supported by numerous radiocarbon dates and associated artifacts. As defined at Lubbock Lake (Johnson 1983), the Paleoindian sequence for the Southern Plains consists of Clovis, Folsom, Plainview, and Firstview, spanning over 6,000 years of prehistory.

Clovis is represented by several sites in the Southern Plains -- Blackwater Draw Locality No. 1 (Hester 1972) in New Mexico, the Miami Site (Sellards 1952:18-29) in Texas, the Domebo Site (Leonhardy 1966) in Oklahoma, and the lowest cultural stratum at Lubbock Lake (Johnson 1983). The Rex Rodgers Site in Briscoe County (Willey et al. 1978a) is a bison kill with Bison antiquus or B. occidentalis remains found in association with "Rex Rodgers" projectile points. These points exhibit Clovis as well as Folsom and Plainview traits but are most similar to the southeastern San Patrice type. The Rex Rodgers point style does not correspond neatly with the established cultural styles, but the dates fall roughly within Folsom or Plainview times.

The Folsom culture is represented at several major sites in the Southern Plains -- Lipscomb (Sellards 1952:58-59), Lubbock Lake (Johnson 1983:87), Blackwater Draw Locality No. 1 (Hester 1972), San Jon (Kelley 1964:6), Lake Theo campsite and bison kill (Harrison and Killen 1978), and Adair-Steadman (Tunnell 1975). The Adair-Steadman Site yielded a lithic series which revealed the lithic reduction techniques used to produce the fluted Folsom points (Tunnell 1975). Human skeletal remains found at the Scharbauer Ranch Site near Midland possibly may be of Folsom age or earlier (Suhm et al. 1954:66); however, these remains were found in a sand blowout, and there are continued questions as to their geologic context and antiquity.

Plainview was first recognized as a distinctive point type and cultural manifestation at the type site in the City of Plainview, Texas (Sellards et al. 1947; Guffee 1979). Other Southern Plains Plainview sites which have been investigated include Colorado City (also called the Lone Wolf Creek Site), San Jon, and Milnesand (Suhm et al. 1954:66; Kelley 1964). Plainview is also represented at Lubbock Lake (Johnson and Holliday 1981; Johnson 1983), Blackwater Draw Locality No. 1 (Hester 1972), and Beidleman Ranch (Suhm 1960). Plainview has been referred to as the "Portales Complex" (Sellards 1952).

The Firstview culture, as defined at the Olson-Chubbuck Site, is represented at Lubbock Lake and at Blackwater Draw Locality No. 1 (Johnson and Holliday 1981). Firstview is a late Paleoindian culture, and the campsite at Lubbock Lake is "the only well-documented late Paleo-Indian camping locality on the Llano Estacado" (Johnson and Holliday 1981:189).

Paleoenvironmental data for the Paleoindian period indicate that the Llano Estacado may have been a conifer forest which was replaced by grassland during the late glacial period, about 14,000 to 10,000 years B.P. (Bryant and Holloway 1985:50). As an alternative, it is also interpreted as a grassland with a cooler, moister climate (Hall 1988:

TABLE 1
PREVIOUSLY RECORDED SITES IN THE JUSTICEBURG RESERVOIR AREA

TARL Site No.	Previous Investigations and Other Site Designations
41GR13	Shedd (site 24) was the original recorder and had TARL number assigned. GRC rerecorded site as 41GR398; this TARL number has been permanently voided.
41GR31	Shedd (site 20) was the original recorder and had TARL number assigned. GRC rerecorded site but kept the same number.
41GR33	Shedd (site 25) was the original recorder and had TARL number assigned. GRC rerecorded the site as several sites and had the TARL numbers 41GR400, 41GR401, and 41GR402 assigned. These TARL numbers have been permanently voided.
41GR51	Riggs (1965b) was the original recorder (ITARDE site GR31) and had the TARL number assigned.
41GR54	Riggs (1966) was the original recorder (ITARDE site GR34) and conducted excavations in this shelter. GRC noted this site, keeping the same TARL number.
41GR203	Shedd (site 22) was the original recorder and had the TARL number assigned.
41GR204	Shedd (site 23) was the original recorder and had the TARL number assigned.
41GR205	Shedd (site 23a) was the original recorder and had the TARL number assigned.

NOTE: Two sites, 41GR391 and 41GR397, recorded in the project area by GRC could not be relocated. These numbers were retained for the respective sites. 41GR389 was a duplicate site number assigned to a site outside the project area; this number has been permanently voided.

GRC = Grand River Consultants, Inc.
 ITARDE = Independent Texas Archeological Research Data Exchange (acronym to designate sites)
 P&AI = Prewitt and Associates, Inc.
 Shedd = Emmett Shedd, member of the South Plains Archeological Society
 Riggs = Aaron Riggs, member of the South Plains Archeological Society

Table 1, continued

TARL Site No.	Previous Investigations and Other Site Designations
41GR206	Shedd (site 23b) was the original recorder and had the TARL number assigned. GRC later had 41GR247 assigned to this site and subsequently rerecorded the site as 41GR394; these TARL numbers have been permanently voided.
41GR207	Shedd (site 23c) was the original recorder and had the TARL number assigned. GRC later had 41GR241 assigned to this site; this number has been permanently voided.
41GR239	GRC was the original recorder. This site was later combined with site 41GR252, and the later TARL number was permanently voided.
41GR243	GRC was the original recorder and had the TARL number assigned.
41GR263	GRC was the original recorder but recorded 41GR263 and 41GR264 as one site which was later separated out into two sites by P&AI.
41GR264	GRC was the original recorder, but this site was included as part of 41GR263. The two sites have been designated separately.
41GR302	GRC was the original recorder and had the TARL number assigned.
41GR309	GRC was the original recorder and had the TARL number assigned.
41GR388	GRC was the original recorder and had the TARL number assigned.
41GR390	Riggs (1966:51, 52, 56) reported bedrock mortars and pictographs at this site, but these were only noted as being across the creek from 41GR54. GRC later recorded this site and had the TARL number assigned.
41GR392	GRC was the original recorder and had the TARL number assigned.
41GR393	GRC was the original recorder and had the TARL number assigned.
41GR395	GRC was the original recorder and had the TARL number assigned.
41GR396	GRC was the original recorder and had the TARL number assigned.
41GR528	Shedd (site 24d) was the original investigator, but no TARL number was assigned at the time. P&AI assigned the TARL number in 1987.
41GR563	Shedd (site 24c) was the original investigator, but no TARL number was assigned at the time. P&AI assigned the TARL number in 1987.

PHASE I INVESTIGATIONS, JUSTICEBURG RESERVOIR

Years B.P.	CULTURAL STAGES	CULTURAL UNITS	POSSIBLE PALEOENVIRONMENTAL CORRELATIONS	PROPOSED FAUNAL POPULATION CHANGES	DOMINANT SUBSISTENCE STRATEGIES
0	Protohistoric ⁴	Comanche Apache	Modern climate established ¹⁰	Bison abundant on Southern Plains ^{8,11,12}	Bison hunting
1000	Late Prehistoric ³	Garza/Tierra Blanca Antelope Creek	Drying period ¹⁰	Bison scarce on Southern Plains ⁸	Nomadic foraging and/or horticulture/ agriculture ¹⁴
2000		Plains Woodland/ Palo Duro	Mesic period or drying trend ^{6,10,13}		
3000		Late	Brief mesic period ^{6,13}		Bison hunting ⁷
4000	Archaic ²		Cooler, moister modern climate established ⁷	Bison abundant on Southern Plains ⁸	
5000			Altithermal Drought II ^{7,9}		Plant processing ⁷
6000		Middle	Brief mesic period ⁷		Bison hunting ⁷
7000			Altithermal Drought I ⁷		Plant processing
8000		Early	Stable grassland established ⁶	Bison scarce on Southern Plains ⁸	Bison hunting ⁷
9000		Firstview		Extinction of giant Bison	Big game hunting ⁷
10,000	Paleoindian ¹	Plainview Folsom	Late Pleistocene unknown conditions ^{5,6}		
11,000				Extinction of mammoth & mastodon	
12,000		Clovis			Mammoth hunting
13,000			?		
14,000	?	?			

||||| transitional period

1 = Lubbock Lake data (Holliday et al. 1983, 1985)

2 = Lubbock Lake (Johnson and Holliday 1986)

3 = Plains Woodland (Couzzourt 1985)

Palo Duro (Willey and Hughes 1978b; Couzzourt 1985)

Garza (Runkles 1964; Johnson et al. 1977)

Antelope Creek (Lintz 1982b)

4 = Apache - (Newcomb 1961:104-109)

Comanche - (Newcomb 1961:156-158)

5 = Holliday (1986)

6 = Bryant and Holloway (1985:59-60)

7 = Johnson and Holliday (1986:46-47)

8 = Dillehay (1974)

9 = Stafford (1981:563)

10 = Hall (1982)

11 = Lynott (1979:98)

12 = Gunnerson (1972)

13 = Bryant and Shafer (1977:15-18)

14 = Couzzourt (1985)

Figure 8. Cultural Chronology for the Southern Plains.

203-204). The environmental changes which took place are still not fully documented but were undoubtedly responsible for many of the faunal extinctions at the end of the Pleistocene; both influenced cultural adaptations apparent in the archeological record.

Archaic Period

Few sites of the Archaic period have been investigated in the Southern Plains of Texas, and until very recently, interpretations of Archaic lifestyles and cultural development were based largely on surface data and comparisons with other regions. The most commonly encountered site type throughout the Texas Southern Plains is the Archaic lithic scatter or campsite, yet the Archaic period is still the most poorly understood segment of prehistory in the region. For many years Archaic sites were neglected by researchers in favor of the more impressive sites of the Paleoindian and Late Prehistoric periods. The Southern Plains Archaic chronology is not refined to the extent of chronologies for other parts of Texas. For example, a detailed cultural chronology, consisting of 11 phases, has been proposed for the adjacent Central Texas region (Prewitt 1981, 1985). It cannot, however, be directly correlated with the Southern Plains.

The Little Sunday Complex proposed by Hughes (1955) is the only attempt to define an early or middle Archaic culture in the Texas Panhandle. The complex is based solely on surface-collected artifacts from that one site which also yielded a Folsom point. It is possible that this is a multicomponent site occupied for a long span of time. If this is the case, the Little Sunday Complex is not a valid designation.

The most recent and detailed excavations of Archaic-age materials have been at the Lubbock Lake Site where Johnson and Holliday (1986) defined a well-stratified sequence for the entire period. The sequence correlates a wealth of sedimentological and paleoenvironmental data with distinct, datable cultural strata containing discrete activity-specific features. Lubbock Lake yielded only a few diagnostic Archaic projectile points that can be used for comparisons with adjacent regions. The temporal structure of the Archaic period (see Fig. 8) is based on the dated cultural and paleoenvironmental history of Lubbock Lake. Sites reported to contain Archaic components, including surveys and surface-collected sites, are listed by Johnson and Holliday (1986:42-43) and are not repeated here.

Blackwater Draw Locality No. 1 and Mustang Springs (Hester 1972; Meltzer 1986; Meltzer and Collins 1987) both have Archaic period water wells, presumed to have been dug during drought times. Diagnostic dart points recovered from Blackwater Draw Archaic levels include the Darl, Pandale, Pedernales, Travis, and Williams types; however, no specific dates could be ascribed because they were found in a reworked sand lens. Chalk Hollow (Wedel 1975) yielded late Archaic Marcos and Ensor points which date to around 2500 years B.P. Little Sunday (Hughes 1955) yielded Ellis, Refugio (Hughes believes these are probably preforms), Palmillas, and Lange points. The site also contained a variety of chipped stone tools, including two Clear Fork gouges, and a number of grinding slabs and handstones. Also found at Little Sunday were small amounts of Edwards chert and fragments of a conch shell pendant, indicating exchange to the south or southeast.

The Old Tom burial in Dickens County is probably a late Archaic interment (Parsons et al. 1979). This cairn-covered, slab-lined burial pit contained grave offerings that included conch shell pendants and a "cariniform atlatl weight" made of greenstone (Gomez

rhyolite) from the Davis Mountains. A Harrell arrow point found with the burial is thought to be intrusive. The cariniform artifacts (also called "lunate stones") are commonly found with cairn burials in the region. According to Parsons et al. (1979:77), 10 lunate artifacts have been found at nine sites and all but one of these sites were burials (see Cockrum 1963). One burial, a slab-covered cremation containing two cariniform artifacts, also contained three late Archaic dart points, suggesting a similar age in general for slab-lined burials and the cariniform greenstone artifacts.

Gouges are another artifact class which is often presumed to be associated with the Archaic period. Several studies in the Lower Plains (Etchieson et al. 1977:16-17, 1978:348-349, 1979:353-355) suggest that gouges are dominantly early Archaic in age and become less abundant throughout the middle and late Archaic periods. Gouges are generally considered diagnostic of the late Paleoindian through the middle Archaic periods (Turner and Hester 1985:205). The early Archaic is "characterized by limited numbers of variable dart points, and an abundance of gouges, choppers, hammers, and boiling pebbles. Later sites may be characterized by corner-indenting or corner-notched points, ovate to trianguloid knives, thick end scrapers, small manos, thin grinding slabs and hearth stones" (Etchieson et al. 1978:348-349). These two opposing ideas, that human habitation in the early Archaic was sparse or that early Archaic subsistence strategies resulted in few diagnostics and unrecognizable sites, are intriguing.

Gouges have been found in datable contexts in the region, leaving researchers with a very distinctive tool type which is temporally and functionally undiagnostic. It is not known how gouges were used, if the utilization was very specific or multipurpose, or if the use changed through time. The dominant theory is that gouges were utilized for some sort of woodworking (Hester et al. 1973) or processing of fibrous plants, but not enough use-wear studies have been done to come to any definite conclusions. Gouges seem to be plentiful in some parts of the Lower Plains but are relatively scarce in the upper Clear Fork basin (Wulfkuhle 1986:436). More research is needed on their distribution in the Southern Plains. In short, gouges are still a mystery in terms of when, where, and how they fit into the cultural scheme.

Late Archaic bison kills are reported at several locations in the Lower Plains (D. Hughes 1977). The Twilla Site contained late Archaic points (typed variously as Ellis, Marcos, Castroville, Ensor, Palmillas, and Trinity) directly associated with butchered bison remains. The other Archaic kills all are similar to Twilla, indicating that bison were an important resource to late Archaic peoples in the Southern Plains. Four radiocarbon dates obtained from these kills average 1387 ± 112 B.P. (A.D. 563 ± 112) (Johnson and Holliday 1986:43), which is very late, but they were obtained from bone samples and may not be totally reliable.

The terminal Archaic is a poorly understood period that immediately precedes the introduction of ceramics and the bow and arrow into the Southern Plains. Deadman's Shelter (Willey and Hughes 1978b) contains a terminal Archaic component represented by Edgewood, Lange, Elam, Kent, and Ellis points. These were found in the lowest stratum, which yielded radiocarbon dates of A.D. 210 and 120; however, this stratum also contains early arrow points and either Alma Plain or Jornada Brownware pottery. Arrow points were found to the exclusion of dart points in the upper levels. This led Willey and Hughes (1978b) to suggest that the occurrence of all these items together in one stratum indicates that transitional Archaic dart points were used contemporaneously with early arrow points and ceramics. If this interpretation is correct, then this is the earliest dated occurrence of

pottery in the Texas Panhandle and represents a truly transitional period from the Archaic into the Late Prehistoric.

Table 2 lists the Archaic point types which have been found at selected sites in the Southern Plains. This list is intended only as a guide to the more common types of Archaic points which might occur in the Justiceburg Reservoir area. The generalized age assignments are based on Turner and Hester (1985), and much of the data are extrapolated from Central Texas. The overwhelming fact remains that too few diagnostic points have been found in datable contexts in the Southern Plains, precluding a one-to-one correlation of point types in other regions. Etchieson et al. (1978:86) correlated the Archaic point types found during their survey in the Rolling Plains area with the Archaic point types of Central Texas according to Weir's (1976) five-stage chronology. This is useful, but since few of the Rolling Plains point finds are dated, it must be considered tentative. A synthesis of all radiocarbon assays and the associated material culture, especially diagnostic points, is needed. A cultural chronology for Central Texas was devised in this manner by Prewitt (1981, 1985). The Southern Plains data are probably insufficient at present to develop such a detailed chronology. For the present, the simple Archaic sequence derived from Lubbock Lake is used as a basic regional chronology. According to Johnson and Holliday (1986:46), "the Archaic is subdivided into Early (8500-6400 B.P.), Middle (6400-4500 B.P.), and Late (4500-2000 B.P.), following for the most part the three general climatic stages noted" (see Fig. 8).

Perhaps the most intriguing research question relating to the Archaic period is the problem of paleoenvironmental/paleoclimatic changes which affected human occupation in the Southern Plains. These studies have many implications for archeologists trying to interpret a scant and confusing Archaic record. The Archaic chronology proposed for Lubbock Lake (Johnson and Holliday 1986:47-49), about 80 km (50 miles) northwest of the Justiceburg Reservoir area, seems to be a logical interpretation of the data. It is not yet known if this chronology is valid for all of the Llano Estacado or for the Lower Plains.

Paleoenvironmental, geomorphological, pedological, and archeological studies in the Southern Plains suggest a gradual but continual warming and drying trend from late glacial times to the present (Bryant and Holloway 1985:56). This trend, however, is punctuated by regional variations. In the Llano Estacado and Lower Plains regions of Texas, this xeric trend seems to hold true (Bryant and Holloway 1985:59), and a glacial parkland environment was gradually replaced by scrub grassland early in the Holocene. The pollen record for the region is poor, and subtle environmental changes are not well documented. The record indicates a brief mesic interval around 2500 years B.P. (Bryant and Holloway 1985:60) on the Llano Estacado, but for much of the post-glacial period, especially the 7000-4000 B.P. span, other data must be relied on to reconstruct the regional paleoenvironment (Bryant and Shafer 1977:16).

Antevs (1955) proposed a major Holocene climatic event for the Southwest which he called the Altithermal. Antevs considered the Altithermal, which lasted from 7000-4500 B.P., to be a long warm and dry period. It has often been interpreted as a widespread drought, and the concept has been extensively debated. Many researchers consider the Altithermal to be a useful concept in interpreting the archeological data from the Archaic period (Hall 1988:204-205).

One synthesis of Southern Plains paleoenvironmental data is provided by Wendorf and Hester (1975). In that volume, Vance Haynes (1975:83) concludes, based primarily on the stratigraphic record at Blackwater Draw Locality No. 1, that:

TABLE 2
ARCHAIC POINT TYPES FOUND AT SELECTED SITES
IN THE TEXAS PORTION OF THE SOUTHERN PLAINS

Type Name	Source	Early Archaic	Middle Archaic	Late Archaic	Transitional Archaic
Bulverde	1, 3	X	-	-	-
Carrizo	1	-	X	X	-
Carrolton	2	-	X	-	-
Castroville	1, 4	-	-	X	-
Catan	1	-	-	X	X
Darl	1, 2, 7	-	-	-	X
Edgewood	2, 4, 8	-	-	-	X
Elam	1, 8	-	-	X	-
Ellis	1, 3, 5, 8	-	X	X	X
Ensor	1, 2, 4	-	-	-	X
Fairland	1, 2	-	-	-	X
Frio	1	-	-	-	X
Gower	4	X	-	-	-
Kent	1, 8	-	X	X	X
Lange	1, 5, 6, 8	-	-	X	-
Marcos	1, 3	-	-	X	X
Marshall	4	-	X	-	-
Martindale	4	X	-	-	-
McKean	1	temporal affiliation not given			
Nolan	4	-	X	-	-
Palmillas	1, 2, 5	-	X	X	-
Pandale	7	X	-	-	-
Pedernales	1, 7	-	X	-	-
Tortugas	1	X	X	-	-
Travis	7	X	-	-	-
Trinity	1, 3, 4	-	X	-	-
Wells	1	X	-	-	-
Williams	1	-	X	X	-
Yarbrough	1	X	-	-	-

SOURCES:

1. North Wichita in King and Knox counties (Etchieson et al. 1978:86, 246-266)
2. Clear Fork of Brazos in Fisher and Jones counties (Wulfkuhle 1986:434)
3. North Double Mountain Fork of Brazos at Lubbock Lake Site (Johnson and Holliday 1986:40, 42)
4. North Double Mountain Fork of Brazos in Kent, King, and Stonewall counties (Thurmond et al. 1981:77)
5. Little Sunday Site, Palo Duro Canyon (Hughes 1955:67)
6. Twilla Bison Kill Site, Hall County (Tunnell and Hughes 1955:66)
7. Blackwater Draw Locality No. 1, Portales, New Mexico (Hester 1972:144)
8. Deadman's Shelter Site, Swisher County (Willey and Hughes 1978b:165)

Some time between 5,000 and 7,000 years ago there occurred a period of wide-spread drought and erosion on the Llano Estacado as evidenced by extensive deflation, missing sediments, and prehistoric wells dug to intersect a fallen water table. People of the early Archaic stage apparently combined gathering and hunting as a way of life, and the earlier larger game gave way to essentially modern forms. Climatologically the stratigraphic-pedologic relationships are evidence for the Altithermal being first warm-dry and then warm-moist compared to the period immediately preceding and following.

Haynes goes on to state that:

From 4,000 years ago to the present the stratigraphy of the Llano Estacado preserves a record of cycles of erosion, deflation, and dune activity alternating with alluvial deposition and soil development, but amplitudes of the cycles did not approach those of the previous cycles, and the timing of events is obscure because of a lack of attention by geochronologists.

Others, such as Baerreis and Bryson (1965), suggest a drought in the Southern Plains around A.D. 1350-1400 may be responsible for many of the cultural changes which took place at that time. Stafford (1981:563) states that:

Sedimentology, palynology, and invertebrate paleontology indicate increasing aridity between ca. 13,000 and 4900 B.P. with maximum aridity occurring between 5000 and 4000 B.P. How severely this drying cycle affected the environment for man and animals on the Llano Estacado is unknown. Scarcity of archaeological and paleontological remains between 8000-6000 and 2000 B.P. implies decreased use, if not selective abandonment, of the valleys during that interval. Between 1000 and 600 B.P., occupation of the valleys increased significantly. . . .

Dillehay (1974) synthesized the archeological data and proposed a model indicating that bison were absent or scarce on the Southern Plains from ca. 6000-5000 to 2500 B.C., and again from A.D. 500 to 1200-1300. Dillehay (1974:185) suggests that the bison "Absence Period 1" correlates well with the concept of an Altithermal dating about 5500 to 2000 B.C. During the absence periods, the scarcity of bison remains in archeological sites indicates that the inhabitants of the Southern Plains shifted subsistence strategies away from bison hunting. Dillehay (1974:187) states that the most logical "primary cause of an absence of bison is climatic change, which reduced the population density and/or caused significant range shifts."

Data from Lubbock Lake suggest that bison were present in the Southern Plains throughout Dillehay's first bison absence period but also indicate two major droughts (a "two-drought Altithermal") in the period. During these droughts, bison at Lubbock Lake were minimally exploited, and there is a 500-year interval between them in which bison do appear to have been the main subsistence (Johnson and Holliday 1986:43-49). It is unfortunate that Dillehay (1974) chose the words "absence" and "presence" to describe his model of bison population changes because "scarcity" and "abundance" are more appropriate. During times of environmental stress, bison probably became very scarce but probably were never

completely absent. Dillehay's model does seem to be supported by the archeological evidence at Lubbock Lake. During droughts, people shifted away from a bison hunting subsistence, probably because bison were scarce, in favor of plant foods.

The paleoenvironmental data, varied bison populations, and subsistence strategies shown in Figure 8 do not necessarily contradict each other. As more data are gathered, the models may be refined. Certainly, the Altithermal triggered changes in bison populations and shifts in human utilization of bison and other food resources which seem to be very real phenomena visible in the Archaic archeological record. A model of this variable Archaic economy proposed for the Llano Estacado (Johnson and Holliday 1986:47-48) is as follows (see also Fig. 8):

Shift 1 (8500-6400 years B.P.)

Bison are more important than plant resources. (A stable grassland environment is suggested by the pollen record for this period [Bryant and Holloway 1985:59-60]).

Shift 2 (6400-5500 years B.P.)

Plant resources are more important than bison during Altithermal Drought I. (Dillehay's [1974] Bison Absence I period begins roughly around 7000 B.P.)

Shift 3 (5500-5000 years B.P.)

Bison are relatively important again for a brief 500-year period when mesic conditions return. (This period may be so short that the return of bison is not recognizable in the archeological record; hence, Dillehay [1974] shows this as still in the Bison Absence I period.)

Shift 4 (5000-4500 years B.P.)

Altithermal Drought II, plant resources are again more important than bison. (This period correlates well with Dillehay's [1974] Bison Absence I period.)

Shift 5 (4500-1000 years B.P.)

Bison again dominate the resource base. Toward the end of this period (and at the end of the Archaic) other resource utilization patterns emerge. (Dillehay [1974] suggests that bison again abandon the Southern Plains for a brief 700-800-year period from about 1500 to 800-700 B.P.)

Late Prehistoric Period

The Archaic period ends and the Late Prehistoric period begins with the introduction of ceramics and the bow and arrow. Agriculture is also considered to be a hallmark of the Late Prehistoric period. Agriculture, ceramics, and the bow and arrow do not necessarily all arrive at the same time. In Central Texas, Prewitt (1981, 1985) recognizes an initial Neoarchaic phase (equivalent to the early Late Prehistoric) in which the bow and arrow and some ceramics were adopted but there is no evidence of agriculture. Ceramics appear later

in the Neolithic, and agriculture even later, if at all. This is justified on the basis that agriculture is a substantial cultural development but that the technological innovations of pottery and the bow and arrow probably had little effect on the general subsistence strategies (Prewitt 1981:68).

In the northern Texas Panhandle, the Antelope Creek Focus (the Buried City Complex) and related Plains Village peoples in Oklahoma are considered to have been at least partly agricultural. In the southern Panhandle and Lower Plains, however, there is no good evidence either for or against the practice of agriculture. It is possible that a Neolithic period (Late Prehistoric with no agriculture) is valid for this region, but the possibility that agriculture was adopted by some groups remains.

Ceramics and projectile points are the most consistent chronologically and culturally diagnostic artifacts of the Late Prehistoric period. Ceramics in the Southern Plains originate primarily from the southwestern United States (i.e., Puebloan areas of New Mexico and Texas) and, to a lesser degree, from central or eastern Texas. Oklahoma is also a possible source for some undefined ceramic types. Limited wares may have been manufactured locally, but possible indigenous ceramics have been identified only recently in the region. Table 3 lists the Southwestern ceramic types most commonly found in the Lower Plains area. Table 4 lists the more common arrow point types found at selected locations in the Lower Plains. Neither table is a complete listing of all types that are present, and both should be considered as including only the most commonly identified types.

TABLE 3
SOUTHWESTERN CERAMIC TYPES COMMONLY FOUND IN THE
SOUTHERN LLANO ESTACADO AND THE LOWER PLAINS

Ceramic Type	Reference
Undifferentiated southeastern	
New Mexico Brownwares	Watts (1963)
El Paso Brown	Runyan and Hedrick (1973)
Jornada Brown	Watts (1963); Runyan and Hedrick (1973)
El Paso Red-on-Brown	Runyan and Hedrick (1973)
Three Rivers Red-on-Terracotta	Watts (1963); Runyan and Hedrick (1973)
El Paso Polychrome	Watts (1963); Runyan and Hedrick (1973)
Chupadero Black-on-White	Watts (1963); Runyan and Hedrick (1973)
Ocho Indented Brown	Runyan and Hedrick (1973)
Lincoln Black-on-Red	Runyan and Hedrick (1973)
Mimbres Bold Face Black-on-White	Runyan and Hedrick (1973)
Mimbres Classic Black-on-White	Runyan and Hedrick (1973)
Gila Polychrome	Runyan and Hedrick (1973)
St. Johns Polychrome	Runyan and Hedrick (1973)
Ramos Polychrome	Runyan and Hedrick (1973)
Playas Red Incised	Runyan and Hedrick (1973)
Tewa Polychrome	Watts (1963)
Rio Grande Glaze Polychromes I-VI	Watts (1963); Honea (1973)

TABLE 4
LATE PREHISTORIC ARROW POINT TYPES COMMONLY FOUND
AT SELECTED LOCATIONS IN THE LOWER PLAINS

Point Type	Location	Reference/Comments
Alba	North Wichita, King and Knox counties	Etchieson et al. (1978:243)
Cuney	North Double Mountain Fork of Brazos, Kent, King, and Stonewall counties	Thurmond et al. (1981:77); classification is made with reservations
Deadman's	Deadman's Shelter, Swisher County Kent Creek Site, Hall County	Willey and Hughes (1978b:187) Brett Cruse (personal communication 1987)
Fresno	Clear Fork of Brazos, Fisher and Jones counties Montgomery Site, Floyd County Garza Site, Garza County Bridwell Site, Crosby County Pete Creek Site, Crosby County	Wulfkuhle (1986:434) Word (1965:65) Runkles (1964:107) Parker (1982:19) Parsons (1967:22)
Garza	Montgomery Site, Floyd County Floydada Country Club Site, Floyd County Pete Creek Site, Crosby County Garza Site, Garza County Bridwell Site, Crosby County Garza occupation at Lubbock Lake Site, Lubbock County Lott Site, Garza County	Word (1965:68) Word (1963:51) Parsons (1967:26) Runkles (1964:107) Parker (1982:23) Johnson et al. (1977:106) Runkles and Dorchester (1987:94)
Harrell	North Double Mountain Fork of Brazos, Kent, King, and Stonewall counties Montgomery Site, Floyd County Floydada Country Club Site, Floyd County Pete Creek Site, Crosby County Garza Site, Garza County Bridwell Site, Crosby County Garza occupation at Lubbock Lake Site, Lubbock County Lott Site, Garza County	Thurmond et al. (1981:77) Word (1965:65) Word (1963:51) Parsons (1967:19) Runkles (1964:107) Parker (1982:20) Johnson et al. (1977:106) Runkles and Dorchester (1987:96)
Huffaker	North Double Mountain Fork of Brazos, Kent, King, and Stonewall counties Garza County	Thurmond et al. (1981:77) Watts (1972:27-28)

Table 4, continued

Point Type	Location	Reference/Comments
Lott	Floydada Country Club Site, Floyd County Bridwell Site, Crosby County Garza occupation at Lubbock Lake Site, Lubbock County Lott Site, Garza County	Word (1963:53) Parker (1982:24) Johnson et al. (1977:106) Runkles and Dorchester (1987:93)
Perdiz	Clear Fork of Brazos, Fisher and Jones counties Montgomery Site, Floyd County Bridwell Site, Crosby County Lott Site, Garza County	Wulfkuhle (1986:434) Word (1965:68) Parker (1982:22) Runkles and Dorchester (1987:94)
Scallorn	Clear Fork of Brazos, Fisher and Jones counties North Double Mountain Fork of Brazos, Kent, King, and Stonewall counties Deadman's Shelter, Swisher County North Wichita, King and Knox counties Montgomery Site, Floyd County Floydada Country Club Site, Floyd County	Wulfkuhle (1986:434) Thurmond et al. (1981:77) Willey and Hughes (1978b:187) Etchieson et al. (1978:243) Word (1965:68) Word (1963:53)
Talco	North Wichita, King and Knox counties	Etchieson et al. (1978:243); appears to be misidentified
Toyah	Floydada Country Club Site, Floyd County	Word (1963:51); appears to be misidentified
Washita	Clear Fork of Brazos, Fisher and Jones counties Montgomery Site, Floyd County Floydada Country Club Site, Floyd County Pete Creek Site, Crosby County Bridwell Site, Crosby County	Wulfkuhle (1986:434) Word (1965:68) Word (1963:50) Parsons (1967:18) Parkers (1982:21)
Young	Deadman's Shelter, Swisher County Pete Creek Site, Crosby County	Willey and Hughes (1978b:187); may be preforms Parsons (1967:27)

PLAINS WOODLAND AND PALO DURO CULTURES

The two earliest Late Prehistoric Southern Plains cultural manifestations are the Plains Woodland and the Palo Duro cultures. Couzzourt (1985) provides a succinct overview of these two cultures, from which much of the following discussion is derived. The Plains Woodland and the Palo Duro cultures are contemporaneous but represent two separate groups which were similar in many ways. Couzzourt (1985:76) states that "about the only significant thing separating the Palo Duro culture and the Plains Woodland peoples is the Canadian River -- and the pottery types."

Plains Woodland culture in the Texas Panhandle is defined on the basis of only a few tested sites -- the Lake Creek Site (Hughes 1962), two unreported sites (Couzzourt 1985: 69), and the Tascosa Creek Site (Couzzourt 1985:69). Palo Duro culture was defined at Deadman's Shelter in Mackenzie Reservoir (Willey and Hughes 1978b) and has since been recognized at other sites. At least three previously investigated sites in the Palo Duro drainage, Canyon Country Club Cave, the Blue Spring Shelter, and Chalk Hollow (Hughes 1978b:43), contain similar components. The most recently investigated Palo Duro culture site, the Kent Creek Site, was excavated in Hall County in 1986, after publication of Couzzourt's (1985) overview. Excavations at this site are not yet reported but are in preparation as a master's thesis at Texas A&M University (Brett Cruse, personal communication 1987).

The Plains Woodland and Palo Duro cultures have many traits in common. Both are comprised of late Archaic artifact assemblages to which pottery and arrow points have been added, and both appear in the first few hundred years A.D. Plains Woodland dates range from ca. A.D. 1 to 1000 (Couzzourt 1985:77), while at Deadman's Shelter, a stratified sequence of radiocarbon dates for Palo Duro ranges from A.D. 120-710 (Willey and Hughes 1978b:190). Both cultures exhibit a notable scarcity of bison bones and an absence of diagnostic bison hunting/processing tools characteristic of later cultures. Also absent is evidence of agriculture. Brett Cruse (personal communication, 1987) found charred plant remains (not yet identified) at the Kent Creek Site, and Couzzourt (1985:70) points out that agricultural evidence is found occasionally at late Plains Woodland sites outside Texas. Early arrow points of two types are generally found at both Plains Woodland and Palo Duro sites. These are corner-notched Scallorn points and the basally notched, long-barbed, expanding- or bulbous-stemmed Deadman's points. Deadman's points are more common in Palo Duro sites, and Scallorn or Scallorn-like points are more common in Plains Woodland sites. Late Archaic dart points are also common, probably as a result of slow depositional processes and subsequent mixing or contemporaneous use with early arrow points.

Plains Woodland and Palo Duro cultures are distinguished primarily on the basis of their differing geographic distributions and ceramic types. The Plains Woodland sites in Texas are the southernmost extension of the widespread Great Plains Woodland tradition. They are not found south of the Palo Duro drainage in Texas and are clustered along the Canadian River. Cord-marked ceramics diagnostic of the Eastern Woodland tradition are their hallmarks (Couzzourt 1985:68-69). In contrast, the Palo Duro culture contains Mogollon brownwares (early types may be Alma Plain; later types seem to be Jornada Brownware) and are centered in the Palo Duro drainage, although the geographic range is not yet fully defined (Willey and Hughes 1978b:186-190; Couzzourt 1985:66-68). Palo Duro culture extends as far north as the Canadian River and southward along the Eastern Caprock Escarpment. The east and west dimensions are unknown. The Plains Woodland culture seems to have originated in the east, while the Palo Duro culture seems strongly influenced from the

Southwest. Palo Duro components are recognized at several sites on the Canadian River (Couzzourt 1985:67), including the South Ridge Site (Etchieson 1979). It seems that the two cultures overlapped both geographically and temporally between the Palo Duro drainage and the Canadian River and that they interacted to some degree. The Tascosa Creek Site in Oldham County (Couzzourt 1985) appears to be one location where this interaction may have taken place. Couzzourt (1987) obtained two thermoluminescence dates from the site, one from a Woodland sherd and another from a brownware sherd. The Woodland sherd date was A.D. 400 to 640. The brownware sherd date was A.D. 1350 to 1450, suggesting that at least some of the brownwares were much later.

Couzzourt (1985:67, 70) states that no structures are found at Palo Duro or Plains Woodland sites in Texas. He speculates that structures are likely to exist but that they have not been found due to a lack of appropriate archeological excavations. He suggests that when Woodland structures are found in Texas they will be similar to structures of the Plains Woodland tradition but does not speculate on Palo Duro structures. At the Kent Creek Site, Brett Cruse (personal communication, 1987) has subsequently discovered pithouse structures which are decidedly Mogollon in style. This adds credence to the hypothesis of a Southwestern origin for many Palo Duro culture traits, or possibly for the Palo Duro people themselves since it is known that the Mogollon extends as far east as Andrews County (Collins 1968) only 241.5 km (150 miles) southwest of the Kent Creek Site.

The Palo Duro culture is supplanted by the Garza Complex. Palo Duro sites are not known to date after A.D. 800-1000, while Garza sites begin ca. A.D. 1300-1400. What happened in the Lower Plains during the A.D. 800-1000 to 1300-1400 period is not known. A climatic trend proposed for southwestern Oklahoma (Hall 1982) suggests that a gradual drying trend began at ca. A.D. 1000 and continued to ca. A.D. 1300, by which time an essentially modern climate was established. The preceding period, ca. 700 B.C. to A.D. 1000, is suggested to have been a wet period. This overlaps with a period of scarce or absent bison in Plains Woodland and Palo Duro sites, corresponding with Dillehay's (1974) Bison Presence Period II beginning ca. A.D. 1200. Lynott (1979) sees a similar situation in north-central Texas at that time, with a notable increase in bison in the archeological record at about A.D. 1200. It is possible that a climatic shift triggered a bison resurgence in the Southern Plains, which then resulted in the disappearance of the Palo Duro culture and its replacement by the Garza Complex.

A similar situation may have occurred with the Plains Woodland to Plains Village transition in the northern Texas Panhandle. The Plains Woodland sites on the Canadian River date as late as ca. A.D. 1000 and are replaced by about A.D. 1200 by the Plains Village Panhandle Aspect (includes Antelope Creek Focus and Buried City Complex). Again, it is possible that this transition was spurred by a climatic shift and the return of bison into the region. Lintz (1984:336-339) speculates on the cultural origins of the Antelope Creek peoples and offers a number of theories. Although he comes to no definite conclusions, he suggests that a local origin for Antelope Creek is "an appealing idea" (Lintz 1984:338). He goes on to state that there is a lack of reported "transitional- and intermediate-stage sites" to support this theory. The Tascosa Creek Site may be just that type of transitional site. Couzzourt (1985:99) favors a local origin for the Antelope Creek Focus and sees Tascosa Creek as an intermediate site, "one representing a stage in the transition between lifestyles, where Southwest and Great Plains meet both geographically and culturally and coalesce into the Panhandle Aspect." In light of the very late thermoluminescence date from a brownware sherd at the site (Couzzourt 1987), however, the contemporaneity of the Woodland and Southwestern groups at Tascosa Creek is still in question.

The Buried City Complex, recently defined in the Wolf Creek valley in Ochiltree County (Hughes and Hughes-Jones 1987:101-106) is a similar variation of the Panhandle Aspect. The main difference, however, is that the Buried City Complex material culture is heavily influenced from the east, unlike the Puebloan influence found in the Antelope Creek culture. There is also evidence that the Buried City Complex may be a locally evolved manifestation of the Plains Woodland tradition.

Many Late Prehistoric sites in the Southern Plains cannot be assigned to a specific culture. Rockshelters in the region reveal evidence of occupation during Late Prehistoric times. Excavations at Reed Shelter (Riggs 1966) in the Justiceburg Reservoir project area yielded Late Prehistoric artifacts, and petroglyphs were also found in the shelter; nearby bedrock mortar holes and pictographs may be of similar age. Two shelter sites, one in Dawson County (Fingerprint Caves) and one in Borden County (Moore's Rock Shelter), are also Late Prehistoric in age (Quinn and Holden 1949). Fingerprint Caves produced an unidentified potsherd, a few scrapers, a mano and metate fragment, and a fair amount of perishable items, including cordage, matted grass, and vegetal remains. Twenty negative-image white handprint pictographs were found on the walls of the shelter. Moore's Rock Shelter produced arrow points (including a Washita or Harrell point), lithic debris, a tubular bone bead, miscellaneous cordage, and three woven fiber baskets. An infant burial wrapped in matting was also found in this shelter. Tunnell (1964) reports two burials from the Jim Arnold Site in Hall County which are probably Late Prehistoric in age, but no diagnostics were found. Shedd (1968) reported a slab-covered burial in Garza County which contained a large sherd of "Jornada Polychrome" which dates to A.D. 1100-1200. Witte (1955) reported a double cairn burial in Donley County which had Deadman's-like points (probably the cause of the deaths) associated. These latter two sites possibly are probably associated with the Palo Duro culture.

ANTELOPE CREEK FOCUS

By about A.D. 1000-1200, the previous cultures in the Texas Panhandle were replaced by one other culture. The Antelope Creek Focus (and related Buried City Complex) of the Canadian River valley represents a true Plains Village culture, with sedentary villages, horticulture, and a strong dependence on bison hunting. The Antelope Creek peoples ranged along the Canadian River Valley in Texas and along the Eastern Caprock as far south as Mackenzie Reservoir in Briscoe County (Malone 1970). Since the southern extent of the Antelope Creek Focus is over 161 km (100 miles) to the north of the Justiceburg Reservoir area, no further consideration of this culture is given here. The reader is referred to an overview of the Antelope Creek Focus (Lintz 1982b, 1984) and a bibliography of literature pertaining to Antelope Creek (Lintz 1982a).

GARZA COMPLEX

A Late Prehistoric cultural manifestation in the southern Llano Estacado and Lower Plains is the Garza Complex, first proposed by Runkles (1964). Runkles excavated a campsite on an alluvial terrace on a small tributary to the Double Mountain Fork of the Brazos where for many years collectors reported finding distinctive triangular, basal-notched arrow points. Thirteen of these Garza points, named for Garza County, were found in a single cultural layer which contained 10 features, including 6 hearths, 2 concentrations of bison bone splinters, a mano and metate found together, and a concentration of chipped

lithic debris. Besides Garza points, other identifiable arrow point styles included Harrell points and triangular preforms, some resembling Fresno points. Distinctive alternately beveled knives (both two- and four-bevel), associated with bison hunting, are common. Bison bones were abundant in association with the hearths, suggesting that the main activity at the site was the processing and cooking of bison. No radiocarbon dates were obtained from the site, but Runkles compared it with similar materials from Lubbock Lake and considers the occupation at the Garza Site to date just prior to A.D. 1500.

Other previously investigated sites containing Garza Complex materials include the Blue Mountain Rockshelter in Winkler County (Holden 1938) and the Johnson Site in Lubbock County (Wheat 1955). Table 4 lists several sites where Garza points have been recovered, but few of these have dates associated. Two radiocarbon dates obtained from the Garza occupation at Lubbock Lake are A.D. 1635 and 1665, but these dates are not calibrated and may be as much as 50 years too young (Johnson et al. 1977:104-105). The Garza occupation features at Lubbock Lake represent two primary activities -- camping and bison butchering/processing. Garza, Harrell, and Lott points were associated with the features. While the dates for the Garza Complex at Lubbock Lake are within the Historic Period, there is no evidence of European contact. Johnson et al. (1977:105-106) consider Garza peoples to be Apachean. Excavations at the Pete Creek Site in Crosby County revealed the same types of features, hearths, and bison-processing features (Parsons 1967:13); and Word (1963:46) excavated an "area where bison were butchered" at the Floydada Country Club Site.

Baugh's (1986) summary of Garza sites in Texas compares them to Wheeler Phase sites in southwestern Oklahoma. Baugh sees many similarities between Garza and Wheeler but notes minor differences in ceramic types. Garza sites contain higher percentages of Puebloan trade wares than do Wheeler sites. Baugh (1986:182) suggests that Garza may be a western extension of the Wheeler Phase but that more work is needed to confirm this connection.

Runkles and Dorchester (1987) describe controlled surface collections and minor test excavations conducted over the past 20 years at the Lott Site, situated on an alluvial terrace near the Garza Site in Garza County. This probably single-component site has horizontally separate activity areas associated with diagnostic cultural materials. Features include 10 hearths, 2 lithic workshops, and a poorly preserved bison skeleton. Point types include Garza, Lott, and Perdiz, with each type of point being concentrated in separate areas of the site. Ceramics include 1 sherd thought to be related to the Edwards Complex (or Wheeler Phase, in southwest Oklahoma), 3 sherds of Agua Fria (Rio Grande Glaze 1) from New Mexico, and over 600 sherds of a bone-tempered ware which Runkles and Dorchester (1987) think were made locally from Triassic clays. These wares either are undecorated, fingernail punctated in a "U" pattern, or have parallel incised lines and are believed to represent Caddoan traits brought onto the Southern Plains.

Runkles and Dorchester (1987) suggest that the spatially separated areas of the site containing Garza, Lott, and Perdiz points represent occupations at different times. They further suggest that the Lott point is ancestral to and somewhat earlier than the Garza point but offer no explanations for the occurrence of concentrations of Perdiz points. Three radiocarbon dates, calibrated according to Klein et al. (1982), have been obtained from the Lott area of the site. These dates are: (1) A.D. 1390-1505, (2) A.D. 1335-1435, and (3) A.D. 1325-1435 (Runkles and Dorchester 1987:107). The second date is from a hearth containing a Lott point. These dates average about A.D. 1400, but when calibrated by newer calibration curves such as Stuiver and Pearson (1986), the dates are 20-30 years younger. The radiocarbon dates for the Lott points, ca. A.D. 1400 or later, seem to support the

assumption that the Lott point is earlier than the Garza point, which dates to ca. A.D. 1600 (if calibrated) at Lubbock Lake (Johnson et al. 1977:104).

The Bull Hill Site in Midland County (Shawn 1976) is similar in some ways to the Lott Site. Harrell, Garza, and Lott points and southwestern ceramics dating to A.D. 1450-1525 suggest that this site has a Garza component. There is, however, a strong representation of Perdiz points and Central Texas ceramics. A possible Garza burial (Gates and Hart 1977) in Martin County produced Garza and Perdiz points. The Bobby Clay Site in Motley County tested by Cruse (1982) and the "multiple fire-pit" in Lubbock County excavated by Brown (1968) also produced Southwestern ceramics and Garza-related artifacts.

The Garza Complex is characterized by Baugh (1986:176-181) as representing a mixed economy based on horticulture, bison hunting, and trading. The evidence for horticulture is very scant, i.e., an undocumented bison scapula hoe and digging stick from the Montgomery Site and the occurrence of ground stone manos and metates in surface collections from Garza sites. No evidence of horticulture has come from an excavated context. The importance of bison hunting is well documented in Garza sites. Numerous arrow points, beveled knives, and end scrapers are considered to be bison-hunting/processing tools. Bison bones and bone-marrow processing features are common at Garza sites.

No structures have been found at Garza sites. Two 3x3-m wattle-and-daub structures, each with a central fireplace, were identified at a Wheeler Phase site (Goodwin-Baker) in southwest Oklahoma, and horticultural evidence is more abundant in Wheeler Phase sites (Baugh 1986:173-174). If Garza peoples had more-permanent villages during part of the year, it is likely that these sites might have evidence of structures and horticulture. Circular rings about 50 m in diameter have been recognized at two Wheeler Phase sites, the Edwards I and Duncan sites in southwestern Oklahoma. A similar circular ridge is noted at the Bridwell Site (Parker 1982). These features are suggested as being fortifications (Baugh 1986:175) or eolian sand ridge accumulations where a brush enclosure had been (Jack Hughes, personal communication 1988). Word (1965:65) noted post holes at the Montgomery Site, but too limited an area was excavated to determine if a pattern existed.

Several sites yielding Garza Complex materials are compared in Table 5. Bearing in mind that much of the data are from surface collections or very limited excavations, these sites have many similarities in their material culture. Notable is the abundant evidence of interregional trade. Small quantities of obsidian are common in Garza sites, occurring at the Bridwell, Montgomery, Pete Creek, Garza, Lott, and Floydada Country Club sites. Only materials from the Lott Site have been analyzed by X-ray fluorescence to determine the source. Two specimens are from the Valles Caldera area of northern New Mexico, and three specimens are from an unknown source. Other source studies indicate that most obsidian found in Southern Plains sites comes from the Jemez Mountains of northern New Mexico and that the material probably was transported by way of the Picuris and Pecos pueblos (Baugh and Terrell 1982:1-2).

Turquoise is another Southwestern trade item found at the Bridwell and Montgomery sites. Olivella shell beads, also obtained through Southwestern trade, have been found at the Floydada Country Club and Montgomery sites. Other exotic shell items are reported at the Bridwell, Floydada Country Club, and Lott sites (see Table 5).

The most diagnostic trade items in Garza sites are ceramics; these often can be traced to a particular place of origin and were manufactured within a limited time span. Wheeler

Phase sites and Garza sites share many types of Southwestern and Southeastern ceramics, but the Southwestern ceramics are more dominant in the Garza Complex sites than in the Wheeler Phase sites (Baugh 1986:182). Two indigenous ceramic types, Edwards Plain and Little Deer (decorated and plain), are found in Wheeler Phase sites (Baugh 1986:169-172). Southwestern Puebloan influence is moderate in Oklahoma (Lawton 1966). Southeastern ceramics, including the Wheeler Phase varieties, have been found at the Bridwell, Floydada Country Club, Lott, Montgomery, and Pete Creek sites (see Table 5). The dominant influence at Garza Complex sites, however, is Southwestern; Rio Grande Glaze wares and Puebloan utility wares are the most common ceramics found at the Bridwell, Floydada Country Club, Montgomery, and Pete Creek sites. The only Garza site which yielded probable indigenous ceramics is the Lott Site. The ceramic assemblage there is completely dominated by a stylistically Southeastern (Caddoan) ware which seems to have been made locally (Runkles and Dorchester 1987:103).

With regard to the Lower Plains region, Krieger (1946:126) questioned the validity of defining a culture complex on the basis of pottery types. This is especially true when dealing with the Garza Complex which has many ceramic types of various origins -- Southwestern, Southeastern, and indigenous. Researchers in the Southern Plains should also be aware that locally made but stylistically foreign wares are very difficult to distinguish from their prototypes. Visual identification of plain wares may be inadequate.

Garza points are thought to be distributed over much of the southern Llano Estacado and Lower Plains (Runkles 1964:124). A Garza point was found in association with a hearth at the Garnsey Spring Campsite (Perry and Speth 1984:34) in southeastern New Mexico. This suggests that the Garza Complex is fairly widespread, but no detailed studies have been done. Lott points seem to have a more limited distribution and are less abundant than Garza points, but Lott is a newly defined type and has not been studied in detail. The Soto point of northern Chihuahua (Phelps 1964) is chronologically and morphologically similar to Garza points, but inferences on the relationship of the two types remain speculative. The distribution of Garza Complex sites is still in question. They seem to be centered in the Lower Plains along the upper tributaries of the Double Mountain Fork of the Brazos, but investigations in adjacent areas are lacking.

Various theories exist regarding the ethnic identity of the nomadic bison-hunting Garza Complex peoples. Apparent strong ties with the Southwest indicate a vigorous relationship between Garza and Puebloan peoples and provides much of the fuel for speculating on the cultural affinities of the Garza Complex. Beginning about A.D. 1450, a strong Southern Plains/Pueblo trade relationship is well documented (e.g., Thomas 1940). The most commonly proposed theory is that the nomadic Southern Plains bison hunters were Apachean peoples (Spielmann 1983:269). Certainly the arrival and history of Athapaskan-speaking peoples in the Southern Plains is subject to lively debate (Gunnerson 1979; Brugge 1983). Johnson et al. (1977) have proposed the Garza Complex as a likely candidate to archeologically represent Athapaskans in the Texas portion of the Southern Plains. This theory is supported by radiocarbon dates for the Garza Complex which agree with the current ideas of when Athapaskans first arrived in the Southern Plains, and the strong Southwestern ties agree with documented Apache/Puebloan trade relationships. Finally, the subsistence strategy represented in the Garza Complex conforms to interpretations of early Plains Apache lifestyles.

However, the Lott Site (Runkles and Dorchester 1987) and the Bull Hill Site (Shawn 1976) suggest that Garza sites (or sites with Garza components) in the Southern Plains may also be heavily influenced from the Caddoan area. Runkles and Dorchester (1987:112) think

TABLE 5

COMPARISON OF SELECTED DIAGNOSTIC CULTURAL MATERIALS FROM SITES WITH GARZA COMPLEX COMPONENTS*

	Bridwell	Floydada Country Club	Garza	Lott	Lubbock Lake	Montgomery	Pete Creek
PROJECTILE POINTS							
Garza	1	2	13	56	x	5	8
Harrell	48	18	15	6	x	26	22
Lott	1	2	-	49	x	-	1
Perdiz	3	-	-	58	-	6	-
Washita	13	-	-	-	-	2	26
Undefined triangular (includes Fresno)	58	-	27	52	-	18	-
LITHIC TOOLS							
Beveled knives	17	22	1	34	-	8	12
Snub-nosed end scrapers	43	65	21	81	x	30	27
EXOTICS							
Alibates agate	x	x	-	-	-	584	x
Obsidian	x	x	x	x	x	64	x
Turquoise beads	4	-	-	-	-	1	-
Olivella shell beads	-	14	-	-	-	2	-
Conis/Oliva tinkler	7	1	-	-	-	-	-
Dentalium	-	-	-	13	-	-	-
Wolf tooth pendant	-	-	2	-	-	-	-
Tubular bone beads	13	x	4	2	x	11	-

*Numbers derived from site reports, when they could be determined: Bridwell (Parker 1982); Floydada Country Club (Word 1963); Garza (Runkles 1964); Lott (Runkles and Dorchester 1987); Lubbock Lake (Johnson et al. 1977); Montgomery (Word 1965; Northern 1979); Pete Creek (Parsons 1967). An x indicates occurrence only in cases where numbers could not be derived from the reports.

Table 5, continued

	Bridwell	Floydada Country Club	Garza	Lott	Lubbock Lake	Montgomery	Pete Creek
SOUTHWESTERN CERAMICS							
Rio Grande Glaze (I-VI)	337	x	-	3	-	16	111
Micaceous utility ware (includes Perdida Plain)	76	-	-	-	x	170	190
SOUTHEASTERN CERAMICS							
Edwards/Little Deer (southwestern Oklahoma)	28	-	-	1	-	-	-
Unidentified East Texas	-	x	-	-	-	x	-
Bullard Brushed*	-	-	-	-	-	13	11
Henrietta Focus	-	-	-	-	-	-	6
LOCAL CERAMICS							
Bone/miscellaneous temper	-	-	-	600+	-	-	-

*These sherds are more likely Boothe Brushed, which is a Central Texas type of the Late Prehistoric Toyah Phase.

that one possible explanation for the locally made but stylistically Caddoan pottery at the Lott Site is that these people were intermarrying and bringing Caddoan women into the Southern Plains.

Other theories on the cultural affinities of the Garza Complex are of equal merit. The Garza phenomenon may be explained as seasonal hunting expeditions of Puebloan peoples. Puebloan bison-hunting ventures are known to have occurred (Whipple 1856; Spielmann 1983: 268), and the idea cannot be ruled out. Another plausible theory is that the Garza Complex represents Plains Village or Caddoan groups on seasonal bison-hunting and trading expeditions or a group which adopted a nomadic Plains lifestyle. Baugh (1986) interprets the Garza Complex as a western extension of the Wheeler Phase, representing a group (Caddoan) that increased its dependence upon nomadic bison hunting at the expense of dependence on sedentary horticulture. The Garza Complex is considered by some researchers to be a Proto-historic manifestation, but as yet no evidence of European contact has been found in these sites.

TIERRA BLANCA COMPLEX

The Late Prehistoric Tierra Blanca Complex has been postulated on the basis of distinctive sites clustered in the upper drainages of the Red River on the Llano Estacado. This complex, proposed by Jack Hughes, is briefly discussed by Spielmann (1983) and Habicht-Mauche (1987). The latter is the first to refer to a "complex." Like the Garza Complex, Tierra Blanca also dates to the European contact period, but evidence of such contact is lacking.

The Tierra Blanca Complex is similar in many ways to the Garza Complex. It represents nomadic bison hunters with strong Southwestern ties. Late Rio Grande Glaze/Polychrome ceramics, Southwestern-style striated utility ware, obsidian, turquoise, and Olivella shells are common trade items found in Tierra Blanca sites. Most data concerning Tierra Blanca are derived from four sites, all located on upper tributaries of the Red River. Spielmann (1983:259) investigated the Tierra Blanca and Blackburn sites, while Habicht-Mauche (1987:176) provided data from three Tierra Blanca Complex sites -- Tierra Blanca, Fifth Green, and Cita Mouth. Spielmann (1983:269) suggests that Tierra Blanca sites most likely were occupied by Apachean peoples. Locally made striated utility ware, Tierra Blanca Plain, is an indigenous Southern Plains pottery produced by Tierra Blanca peoples using well-established Southwestern ceramic techniques but local materials (Habicht-Mauche 1987:178). Tierra Blanca Plain is identical in stylistic and technological attributes to Rio Grande Faint Striated utility wares, and only the composition of the paste, naturally silty and tempered with medium to coarse particles of silica-rich crushed rock, is distinctive.

At the 1985 Southern Athapaskan Ceramic Conference in Boulder, Colorado, participants defined Tierra Blanca Plain as an indigenous ware produced by nonsedentary Southern Apaches (Baugh and Eddy 1987:797). They consider the type to be part of a larger group called "Llano Estacado Gray Wares." Although no other types besides Tierra Blanca Plain are recognized in this group, it is likely that additional types of locally made Apachean ceramics in the region will be defined.

The Tierra Blanca Complex is tentatively dated to A.D. 1400-1650. The geographic extent of the complex is not well known. It replaces the Antelope Creek Focus in the

northern Texas Panhandle sometime around A.D. 1400-1450 (Habicht-Mauche 1987:185). The rather abrupt end of the Antelope Creek culture correlates with the suspected arrival of Athapaskans in the Southern Plains and supports the hypothesis that Tierra Blanca peoples were Apaches. The Tierra Blanca and Garza complexes share many similarities with the Central Plains Dismal River Aspect defined by Gunnerson (1960, 1968). Dismal River almost certainly represents nomadic Apache groups. No detailed comparisons have been made between the Dismal River Aspect and the Southern Plains Tierra Blanca and Garza material cultures. Small tipi rings are associated with some Tierra Blanca sites (Jack Hughes, personal communication 1987), supporting the presumption that these people were the nomadic bison hunters living in skin tents seen by Coronado.

Other Texas Panhandle sites on tributaries to the Red River have been proposed as possible Apache sites and probably belong archeologically to the Tierra Blanca Complex. Hughes (1978b:45-47) identifies a number of these in the Palo Duro Canyon area, including the upper level at the Canyon Country Club Cave (A251) and sites A159, A152, A1373 and A288 (Panhandle Plains Historical Museum site numbers). Katz and Katz (1976:54-56) identify one site, 41BI83, as a probable Apache campsite in lower Tule Canyon. Gunnerson (1979:166) suggests that some sites (not considered to be Tierra Blanca Complex sites) in the Texas Panhandle are Apache based on their similarities to Apachean sites in New Mexico.

Protohistoric Period and Historic Plains Indians

When Coronado ventured onto the Southern Plains in 1541, he found nomadic pedestrian bison hunters living there. He called them Querechos and Teyas. At least one of these groups, the Querechos (later called the Farones by the Spanish), was most likely a band of Apachean peoples. The Garza and/or Tierra Blanca complexes may represent past occupations of these Apachean peoples, but no confirmed Apachean sites in the Southern Plains are known, and no definite evidence of European contact has been found in Garza or Tierra Blanca sites. Regardless of their archeological record, or lack thereof, Apachean groups did occupy the Southern Plains until the early eighteenth century, when other horse-mounted Plains Indians moved into the area (Newcomb 1961:85-101).

"To many Texans the word Comanche is synonymous with Indian," and the Comanches dominated the Southern Plains from the mid 1700s until 1875 (Newcomb 1961:155). In the seventeenth century, a group of Shoshonean-speaking peoples in the Colorado and Wyoming basin and range country adopted the nomadic Plains Indian horse culture and began moving south. By 1720 these people had moved into the Southern Plains, and by 1750 they thoroughly dominated the region (Wallace and Hoebel 1952; Newcomb 1961:156-158). There were many different bands, but collectively these people were referred to as Comanches. They literally drove their predecessors, the eastern Apaches, out of the Southern Plains during the early part of the eighteenth century (Newcomb 1961:107-109).

It is unfortunate that there is a tendency to attribute any eighteenth- or nineteenth-century site containing aboriginal cultural materials and European artifacts to the Comanche. The earliest evidence of European contact should appear at Apache sites in the region, and the Comanches were not the only horse nomads in the Southern Plains. The Comanche were at various times allied with other Plains Indian groups, most notably the southern Cheyenne, Arapahoe, and Kiowa; other Plains groups such as the Central Texas Tonkawa were enemies but ranged into the periphery of the Southern Plains. While the

majority of the Plains Indian sites in northern Texas are probably Comanche, other possibilities should not be dismissed. The differences between Comanche and Kiowa sites, for example, might be very subtle.

Two types of sites -- camp and graves -- are commonly associated with Comanches in Texas. No comprehensive synthesis of Comanche material culture has yet been attempted, but Word and Fox (1975) have compared the material culture of a number of probable Comanche burials. One campsite of probable Comanche affiliation (the Sand Pit Site) was found in Mackenzie Reservoir (Willey et al. 1978b). A mixed assemblage of aboriginal features and artifacts and late 1700s European trade items are strong evidence for this site being a Plains Indian campsite. The Sandstone Ledger Site (Willey and Hughes 1978c), also in Mackenzie Reservoir, contains metal arrow points and petroglyphs which may be of Comanche origin (Hughes 1978b). Many sites, such as the Floydada Country Club Site (Word 1963:60), the Bridwell Site (Parker 1982), and a site in Scurry County (Portis et al. 1968:62), have yielded European trade items.

Some historic sites in the Southern Plains associated with Comanches are nonaboriginal. Historic comanchero/Plains Indian trading is archeologically documented at the Merrill-Taylor Village Site (Guffee 1976) 121 km (75 miles) north of Justiceburg Reservoir. The "Mucho-Que" valley 24 km (15 miles) southwest of Justiceburg is a well-documented comanchero trade area. These nonaboriginal ventures are discussed in the historic section (see Chapter 4). Levine and Freeman (1982) review the archeological evidence of comanchero trade in the Texas Panhandle. This research is important to understanding the material culture of the historic Comanches, since much of their paraphernalia was obtained through the comanchero trade.

Grave sites are the most abundant type of historic Plains Indian site found in the Southern Plains. A few Plains Indian burials in the region have been excavated and reported. Many more have been discovered as they were being destroyed by modern activities or were reported after they were disturbed, and worse, others have been plundered and destroyed by thoughtless relic hunters.

Newcomb (1961:172-173) states that Comanches preferred "inaccessible crevices, washes, and similar spots" for graves. Comanche burials in the Southern Plains are typically found in just those types of inaccessible places. Where possible, burials were made in rock crevices or niches, but open interments and scaffold burials also occurred (Word and Fox 1975:50). Comanche graves typically contain abundant personal items (Newcomb 1961:173) depending on the individual's status in life. It is the inclusion of grave offerings which enables determination of cultural affiliation.

One of the most important historic Comanche burials in the region is the Cogdell burial from Floyd County, reported by Word and Fox (1975). The burial was excavated by amateurs, and the context was disturbed. They recognized the importance of the burial, however, and turned the materials over to a local museum. Word and Fox's analysis compared the Cogdell burial characteristics and materials with 12 other historic Indian burials in the area; their findings are discussed in terms of documented Comanche burial customs. Certain grave goods were present in most of the burials. Horse gear, brass bracelets, glass trade beads, manufactured fabric, and various European tools were the most common grave goods. Of the Historic burials considered in this study, only 6 of the 13 have been published (Word and Fox 1975:44). These are the Cogdell burial (Word and Fox 1975) in Floyd County, the Yellowhouse Canyon burial (Newcomb 1955) in Lubbock County, the White

Site burial (Suhm 1962) in Yoakum County, the W. H. Watson Site burial (Ray and Jelks 1964) in Fisher County, the Morgan Jones Site burial (Parsons 1967:80-93) in Crosby County, and the Dawson County burial (Bennett 1968). One of the unpublished historic Comanche burials, the Caprock Site, is located near Post in Garza County (Word and Fox 1975:44).

Other unpublished historic Indian burials in the region are probably Comanche. These include one uninvestigated site in Ochiltree County, one site in Floyd County which was destroyed by a relic hunter, and the Palmer Site burial in Martin County which was excavated in 1984. An historic Comanche burial was salvaged from Mackenzie Reservoir in 1978, as the lake level was rising rapidly due to heavy rains (Lubbock Avalanche Journal, June 18, 1978:24). Numerous historic burials undoubtedly have been destroyed by modern development and looters, leaving no record of their existence.

CHAPTER 4

REGIONAL HISTORICAL BACKGROUND

by Martha Doty Freeman

The territory drained by the Double Mountain Fork of the Brazos River embraces thousands of square miles of Caprock, High Plains, and deep canyons. Originating in Moor's Draw southeast of Tahoka in Lynn County, the river flows generally eastward down the Caprock through the Plains surrounding present-day Justiceburg in Garza County, and then creates a dramatic canyon before joining the North Fork of the Double Mountain Fork in western Kent County. For much of its length, the river carries fresh water, making it a logical connector between freshwater sources to the south and southeast and the historically dependable lakes of the High Plains in Lynn, Terry, and Gaines counties.

The freshness of the water carried in the Double Mountain Fork, together with the strategic location of Garza County relative to New Mexico to the west and points farther east and south, would have made the area a crossroads for Comanche populations traveling from the trading ground at Mucho-que (also appears as Moo-cha-ko-way, Mushaway, Muchoquay, Mucha Kowa, Muchaque, Mucha-que, and Mucha-kwa) in present-day Borden County to Yellowhouse Canyon northwest of present-day Lubbock, to Cañon del Rescate on the north, the White River to the northeast, and the fertile buffalo grounds in the vicinity of Double Mountains between present-day Jayton and Aspermont. The presence of Comanches in the area also would have made it a desirable trade site for Spanish, Mexican, and Pueblo Indian natives of New Mexico who ventured onto the Texas Plains after the Pecos Peace of 1786 to trade with Comanches and Kiowa Apaches. Later, the presence of both Indian and European trading groups would have made the area a likely target for U.S. military action as the government intervened to interrupt the large-scale theft of Central and West Texas cattle herds by Comanches who then met at sites in and near the Caprock to trade livestock for New Mexican goods.

The interruption of the comanchero trade, subduing of Comanche populations, and decimation of buffalo herds in the 1870s by professional hunters opened much of West Texas to use by cattlemen and to permanent settlement. In the vicinity of Garza County, exploitation of the water and grasses along the Double Mountain Fork was delayed until the early 1880s, but development was rapid following the establishment of regional trade centers such as Snyder in Scurry County which was settled in 1877.

Early Exploration and Trade -- European-Indian Relations on the High Plains

Earliest European exploration of the Texas Panhandle and Plains region began in the mid sixteenth century by Spaniards and continued until the Pueblo Rebellion of 1680 which drove the Spanish from New Mexico. Most of these exploratory efforts centered on the Red and Canadian rivers and included the expedition of Francisco Vázquez de Coronado in 1541, which is thought to have followed Tierra Blanca Creek into the Palo Duro Canyon area and to have traversed Garza and Lubbock counties by way of the North Fork of the Double Mountain Fork; the Francisco Leyva de Bonilla and Antonio Gutiérrez de Humaña expedition of 1595,

probably along the Canadian River; the 1599 expedition of Vincente de Saldivar Mendoca, which also is thought to have reached the Canadian; and the Juan de Oñate expedition which also followed the Canadian River in 1601 (Rathjen 1973:45-46, 57-59, 62-65; Brune 1981: maps, envelope supplement; Speer 1981:6-7).

Coincident with the reentry of the Spanish to the Southwest after 1698, the French initiated trade relations with the Plains Indians from what was later called Spanish Fort on the Red River. In 1739, Pierre and Paul Mallet crossed the Texas Panhandle on a trading expedition, and seven years later, signing of the Taovayas-Comanche Peace Treaty allowed the French to travel freely across Comancheria for trading purposes. In a very short time, French traders were crossing the plains from New Orleans and from San Antonio to Santa Fe (Speer 1981:8).

Equally free Spanish trade occurred after 1786 when Governor Juan Bautista de Anza negotiated a peace treaty at Pecos Pueblo in New Mexico. As a result of the treaty, the Spanish government in Santa Fe established trade regulations between New Mexican traders and Plains Indian populations, and a number of permanent Hispanic settlements were established along the Pecos River downstream from the Pueblo (Levine and Freeman 1982:2, 4).

Just as the 1786 treaty facilitated trade relations, so also it made exploration of formal trade routes more feasible. Pedro Vial, a Frenchman, was commissioned by Governor Domingo Cabello to open a trade route from San Antonio to Santa Fe in 1786; in 1787, Cabello commissioned Jose Mares to find another route, one which eventually led Mares along Tierra Blanca Creek to the vicinity of present-day Hereford. Later efforts by Vial occurred between 1788 and 1793 when he traveled from Santa Fe to Natchitoches, Louisiana, and from Santa Fe to St. Louis. Finally, 15 years later, Francisco Amangual embarked on yet another effort to open up trade between San Antonio and Santa Fe, choosing a route which is thought to have led him to the vicinity of the Caprock west of Quitaque, to the Canadian River, and thence into northeastern New Mexico (Speer 1981:9-10).

Although these formal efforts by the Spanish government to open trade routes and trade relations were important, they failed to have the impact or longevity of the less formal activities initiated by Spanish colonists along the Rio Grande and Pecos River. Much of the trade which occurred after 1786 was illicit, and Spanish authorities made numerous attempts to control it. However, their attempts were largely unsuccessful, and by the second decade of the nineteenth century, the New Mexican government simply urged trading parties to obtain passports to assure that they were sufficiently armed (Levine and Freeman 1982:6).

Generally speaking, comanchero trading parties used a number of trails from New Mexico to the Texas plains, one of which was in the general vicinity of Garza and Borden counties. The northernmost trail led from the Mora Valley and Las Vegas, New Mexico, east to the Canadian River where it forked. One fork led to Las Tecovas, a major trade site northwest of present-day Amarillo; the other fork led to the Pease River northwest of the Quitaque Peaks. A second major trail left the Pecos at Bosque Redondo, led to Laguna Salada and Yellowhouse Lake, then headed toward Punta del Agua and Cañon del Rescate near present-day Lubbock. Another major trail, documented later by Captain Randolph P. Marcy, left the Pecos and appears to have followed Sulphur Springs Draw southeast to the headwaters of the Colorado River and vicinity of Mucho-que, a flat-topped mesa located near present-day Gail in Borden County (Levine and Freeman 1982:8).

Documents from the Spanish Archives of New Mexico, Mexican Archives of New Mexico, United States military reports and maps, and recollections of West Texas pioneers make it clear that, while the vicinity of Justiceburg was not mentioned specifically, comanchero and Plains Indian activity occurred in every direction around it. A Spanish trade expedition is known to have been present at the rancharia of General Quegue at Mucho-que in about 1814 (Spanish Archives of New Mexico 1814), and considerable Comanche and Hispanic activity was recorded there until the 1870s by comancheros and ciboleros (buffalo hunters) such as Celedon Trujillo and military personnel such as Major Jonathan P. Hatch and Captain N. B. McLaughlin (Trujillo 1927:3; Wallace 1967:46, 66-67, 117-119). An informant for Major Hatch described trading activities in the area:

At Mucha-que Comanches (Quahadies) and Mescalero Apaches form a village of over one hundred lodges, perhaps two hundred. They have many horses. The Chief is called Pah-ween or Pa-cha-Cunee. As soon as our people arrived at Mucha-que, the Indians started a party of one hundred men to steal cattle. They left on the 19th March. A few Mexicans went with them. As soon as the cattle are brought to the village the Mexicans buy them and will return to New Mexico, but more will follow as it is a regular business. [Wallace 1967:46]

In Lynn County, which adjoins Garza County on the west, trade frequently occurred at Tahoka Lake, from which point one trail led to the Abilene-Sweetwater area by way of Deep Creek, Bull Creek, and Mooar's Draw. Another trail left Tahoka Lake and went generally southwest to Double Lakes, Rich Lake, Sulphur Draw, Indian Well, Ranger Lake, Four Lakes, Mescalero Springs, and the Pecos River (Lucas 1875; Hill 1936:36). In eastern Lynn County and western Garza County, numerous references were made to the trade and Comanche camps which occurred in Mooar's Draw, the headwaters of the Double Mountain Fork; one informant noted that as late as 1872, between 600 and 1000 Comanches wintered in Mooar's Draw, perhaps at the spring described by Frank Loyd where a squaw camp was located (Hill 1936:34; Loyd 1939:25-26).

Just as comanchero-Comanche trade is recorded south and west of Garza County, so trade also was common in adjoining counties to the north and east. In the autumn of 1832, for example, Albert Pike described a group of comancheros who had just returned from Cañon del Rescate where they had traded hard bread, blankets, punche (tobacco), beads, and other items for buffalo robes, bear skins, and horses (Pike 1967:40-42). In Kent County, the Double Mountains were known as landmarks to the Comanche and, probably, to the comancheros whose dugouts were reported on Duck Creek near present-day Jayton in 1871 (Carter 1935: 161). Approximately 80 miles to the north of the project area, comancheros may have camped on Quitaque Creek in present-day Floyd County where four habitations were excavated in 1974-1975 (Guffee 1976).

1821-1860: Anglo-American Exploration of West Texas

While comancheros and the Hispanic ciboleros who ventured into West Texas hunting buffalo represent the bulk of European activity and exploration in West Texas, the first tentative trade relations established between Santa Fe and St. Louis in 1792-1793 by Amanguel blossomed following Mexico's independence from Spain in 1821. In the same year, American traders William Becknell, Thomas James, and Hugh Glenn opened a route across the

Panhandle from Fort Smith, Arkansas, to Santa Fe, New Mexico, which became known as the Santa Fe Trail. By 1840, William Bent, who already owned a thriving trading post in southeastern Colorado, established a second post called Adobe Walls north of the Canadian River in present-day Hutchinson County. And one year later, the Republic of Texas sponsored a venture which became known as the Santa Fe Expedition. The group, which eventually was imprisoned by Mexican authorities, left Central Texas and entered the High Plains near Quitaque, then crossed the Panhandle via Tierra Blanca Creek near present-day Hereford and entered New Mexico (Speer 1981:12-13).

Texas statehood and the discovery of gold in California provided further impetus to exploration of the West Texas and Panhandle areas, and immigrants began to move westward, often accompanied by military escorts.* One such trip was made in 1849 by Captain Randolph B. Marcy who escorted gold rush emigrants from Fort Smith to Santa Fe. His return route ran from Doña Ana, New Mexico, in a generally northeasterly direction which led him across West Texas. By early October, the group had crossed the upper branches of the Colorado River and began to parallel the south bank of the Double Mountain Fork of the Brazos River. Approximately 10 miles to the north of the trail, which passed through groves of mesquite and a carpet of rich grama grass, Marcy could see the "two low bald mountains" which he believed to be on the head of the Double Mountain Fork (U.S. Congress 1850:211). Five years later, he revisited the area in the company of Major Robert S. Neighbors for the purpose of locating and surveying 18 square leagues of land for Indian reservations. This time, the party approached the Double Mountain area from the northeast, passing through the gypsum fields in the vicinity of the Salt Fork of the Brazos. Marcy saw a low mountain which he recognized as being the same one he had seen in 1849 from the point where the Doña Ana road struck the Double Mountain Fork. Due west, he could see the elevated mountains beyond the head of the Brazos, and he experienced a strong desire to extend his explorations. Unfortunately, Major Neighbors was suffering the aftereffects of having drunk too much gypsum water, and this early trip up the Double Mountain Fork had to be postponed (U.S. Congress 1856:14).

1861-1880: The Tide Turns

These first tentative forays into the vicinity of the upper Brazos by the U.S. military might have continued after the 1850s despite the presence of hostile Kiowa and Comanche bands, but following the outbreak of hostilities between Union and Confederate troops in 1861, the western frontier was left unprotected. Cattlemen who might otherwise have moved their herds onto the "rich grama grass" described by Marcy were held at bay, and the Southern High Plains were left to the Kiowa and Comanche who raided east into the Cross Timbers to steal livestock which they then delivered to New Mexican comancheros at their traditional trading grounds along the Caprock.

*The discovery of a petroglyphic date, June 6, 1849, at site 41GR333 during the current investigations suggests that an immigrant group or one of the mounted regiments assigned to protect them may have traversed the area. To date, no documentary evidence to explain or substantiate this date has been located.

Cessation of hostilities in 1865 and the establishment of important frontier posts such as Fort Concho ushered in yet another distinctive era in the history of West Texas. Free now to turn their attentions to the South Plains area, military troops provided protection to both cattlemen eager to move into the upper Brazos River area and to buffalo hunters who were attracted by the great Texas herds.

Of the two groups, the hunters probably had the greatest impact on the removal of Indians from West Texas. By 1870, groups of hunters had begun to move into Comanche-Kiowa country. The Cator brothers, for example, killed an estimated 16,000 buffalo between 1872 and 1874 from their camp on Upper Palo Duro Creek (Speer 1981:15-16), and many thousands more buffalo hides were processed at Rath City on the Double Mountain Fork in present-day Stonewall County.

Enraged by the slaughter of their most important food source, the Comanches and Kiowas also were persistent in their raids on Anglo settlements in Texas where they stole significant numbers of cattle and horses. In retaliation, the military resolved to eliminate both tribes from the plains. Under the leadership of General Philip H. Sheridan, troops began moving into the area (Speer 1981:16). Many of these troops were under the leadership of Colonel Ranald S. Mackenzie, who was ordered to establish a supply camp on the headwaters of the Colorado or the Freshwater Fork of the Brazos. From the camp which he established on the Freshwater Fork of the Brazos in Blanco Canyon, he was to scout in every appropriate direction and meet with troops from Fort Concho commanded by Captains John Lee and N. B. McLaughlin. Colonel William R. Shafter was ordered to bring three companies of the 24th Infantry and supporting wagons, mule teams, ambulances, and surgeons from Fort McKavett and meet Mackenzie on July 1, 1872, on the Freshwater Fork (Wallace 1964:64-65).

Reports of scouts by McLaughlin in July 1872 and a map prepared by Alex Lucas showing the country scouted by Mackenzie, Shafter, Captain R. P. Wilson, and others in 1874 and 1875 demonstrate that the military crisscrossed the territory surrounding the project area. Ernest Wallace has suggested that McLaughlin's 1872 scout actually passed near the future location of Justiceburg after he left Mackenzie's camp on the Freshwater Fork of the Brazos and marched southward, crossing Agua de Toro (the present South Fork of the Double Mountain Fork; Fig. 9) and arriving eventually at "Mucha Qua Valley" (Wallace 1964:67, 1967:116-118). Another major route lay in the vicinity of the confluence of Agua de Toro and the Double Mountain Fork (now known as the North Fork of the Double Mountain Fork of the Brazos River) near the Kent-Garza county line; as late as 1895, General Land Office surveyors laying out the section lines for Section 49, Block 5, in western Kent County noted that they crossed the Mackenzie trail before crossing the Double Mountain Fork of the Brazos.

Mackenzie's 1872 campaign discouraged but did not end Indian hostilities, and by 1874, bands of Comanches and Kiowas had left the reservation. Numerous raids occurred in the Texas Panhandle, the most notable being the Battle of Adobe Walls in June. The U.S. military retaliated immediately, and by 1875 the concerted efforts of numerous troops from frontier forts and posts such as Concho and Richardson in Texas, Dodge in Kansas, Sill in Oklahoma, and Union in New Mexico, resulted in the defeat of the Comanche and their removal to Oklahoma Territory. Ultimately, elimination of both Indians and buffalos from the plains had a profound effect on West Texas, for settlers could enter the area with relative impunity while the absence of buffalo freed up ranges for the use of cattle. By the late 1870s, the stage was set for the intensive utilization and development of the project area as stockmen from areas farther east and south trailed their herds toward the Double Mountain Fork of the Brazos River.

Figure 9. Map of parts of Texas, Mexico, and New Mexico scouted by Lieut. Col. W. R. Shafter, 24th Infantry, 1875-1876. This map shows landmarks in and around the project area during the period of greatest military activity. Mackenzie's Trail runs generally north on the west side of Mackenzie Mountain, through the vicinity of present-day Polar to the Supply Camp on the Fresh Fork of the Brazos. The trail is located just east of the confluence of the Double Mountain Fork and Agua de Toro, the source of which was Ojo Blanco. After the mid 1870s, Agua de Toro was renamed the Double Mountain Fork. Mucho-que, a Comanche and comanchero landmark, is located immediately south of the project area.

Map in the Crimmins Collection, courtesy of the Barker Texas History Center, The University of Texas at Austin.

1880-Present: Development of a Modern Landscape

J. Wright Mooar, a famous buffalo hunter in Kansas and the Southern Plains who also participated successfully in the ranching and commercial development of twentieth-century Texas, once observed that with the end of the buffalo and Indian, the entry of cattlemen to West Texas, and the construction of railroads, settlement and development of West Texas was inevitable (Mooar 1929:124-125). His home, Colorado City, grew up adjacent to the Texas and Pacific Railroad in the 1880s and became the "Mother City of West Texas," supplying goods and services throughout a wide region. Cattle companies headquartered there, and the success of its business enterprises made possible the growth of other, more-remote West Texas communities such as Snyder on Deep Creek in Scurry County. Soon, most sections of available land in the Southern Plains region had been purchased or leased by large-scale cattle companies which had received blocks of land from the State in the 1870s. By 1880, outfits herded cattle along all the major waterways of the Colorado, Brazos, Canadian, and Red river systems.

This early agricultural development reached its peak in the mid 1880s, after which a hard winter killed large numbers of cattle. In 1886, new land legislation effectively brought an end to the open range, and cattlemen were forced to purchase sections which they had previously leased from the State or railroad companies. Passage of the Four-Section Act in 1895, designed to make one homestead section and three agricultural sections available to prospective settlers, further restricted the activities of large-scale ranchers, who doubtless would have concurred with Mooar's assessment of the new settlers as being akin to "the locusts of Egypt" (Mooar 1929:125).

While State legislation was important in interesting homesteaders in the acquisition and development of West Texas lands, continued railroad construction was fundamental to making the area accessible. In certain more-remote parts of West Texas, railroad construction did not occur until after 1900, but by World War I, most of the area was served by major rail lines such as the Panhandle and Santa Fe which was completed through Post, the county seat of Garza County, in 1910 and eventually gridded the South Plains and Panhandle regions.

Development of the railroad and opening of rangeland to new settlers also encouraged the platting and promotion of new towns, only a few of which met with any success. Lack of dependable sources for fresh water and the relative fragility of rangeland continued to make the area a marginal one for major long-term population growth, and so it regularly lost residents during the War and during a drought in 1918. The successful discovery of oil reserves in the Southern Plains after World War I assisted in creating a greater degree of economic prosperity and stability, but population growth in general occurred slowly in a rural landscape owned by families who prefer to follow agriculturally related occupations.

CHAPTER 5

RESEARCH DESIGN

by Douglas K. Boyd and J. Michael Quigg

This chapter presents five general problem domains subsuming the major research questions that are important for the Justiceburg Reservoir area: environment, chronology, subsistence, site function and settlement patterns, and cultural affiliations and inter-relations. The identification of these problem domains is based on the results of previous regional research, as synthesized in Chapter 3. While survey-level data often cannot be used to address questions of such theoretical significance, it is important that problem domains be identified during the survey phase to guide the collection of data during subsequent phases of work so that the underlying research theme for the region, namely studying cultural adaptations and how and why they changed, can be addressed.

As presented in Chapter 12, the research questions offered here served as criteria in evaluating the sites studied during this project. Sites that yielded or have the potential to yield data to address one or more questions are considered potentially eligible for listing on the National Register. Sites that cannot address at least one research topic are considered not eligible for the National Register. In many instances, survey data alone do not permit precise judgments. At this stage, some sites that are not obviously significant or that may appear disturbed are judged to retain the potential to address important questions until otherwise demonstrated. These potentially eligible sites require further investigations to clarify their contribution to the resource base.

Environmental Domain

Environmental setting is critical to an understanding of cultural history. Paleo-environmental studies are sparse in the Southern Plains (Wulfkuhle 1986:30), although data from the Llano Estacado and surrounding areas provide a useful framework. Varying interpretations of the paleoenvironmental data from the Southern Plains, however, are still subject to much debate. What plant and animal resources were present during Paleoindian times in this region, and how do they compare to those in surrounding regions? Will paleoenvironmental data from Justiceburg Reservoir support an Altithermal as proposed by Antevs (1955) and indicated by the data from the Lubbock Lake Site (Johnson and Holliday 1986:46-67) and Yellowhouse Draw (Stafford 1981:563)? Can expansion in the range of the local oak population be documented at any time in the past? What local environmental characteristics can be shown to influence site selection or patterning observed in the reservoir area? Do late Pleistocene to early Holocene deposits exist in the project area? If so, are they deeply buried and are they extensive? Can changes in vegetation and/or environment be shown to have had a direct effect on the regional human populations?

Chronological Domain

On the basis of past research in the Southern Plains, the Justiceburg project area is postulated to have been occupied almost continuously for the past 10,000 years. During

this period, humans have utilized the region with varying technologies and strategies (see Chapter 3). It is necessary to establish whether the same sequence of events and time frames established at the Lubbock Lake Site can be documented for the area east of the Caprock Escarpment in the Southern Plains. If any or all of the Paleoindian sequence recorded at Lubbock Lake is documented here, what are the similarities and differences between the two regions? What are the temporal and spatial relationships of those Paleoindian groups discovered? Given that a major drying period is thought to have started near the end of the Paleoindian period, can a gap in the cultural sequence associated with this event be documented?

Projectile points are the key diagnostic artifacts from the Southern Plains. Few Archaic points recovered in the Panhandle have come from dated or stratigraphically controlled contexts, and thus no region-specific projectile point chronology has been established. Extrapolating point types from Central Texas chronology, Etchieson et al. (1978: 86) proposed a sequence of Archaic projectile point types for the Rolling Plains. This sequence may prove useful as a general framework at Justiceburg, but it should be used cautiously. Six thousand or more years of prehistory, from ca. 8000 to 2000 B.P., can be divided into only three periods -- early, middle, and late. It has been proposed that the early Archaic is more sparsely represented than the middle and late Archaic in the Southern Plains (Etchieson et al. 1978, 1979; Thurmond et al. 1981) and on the Llano Estacado (Hughes 1976). However, this generalization does not apply to the upper Clear Fork basin, as evidenced by numerous local artifact collections (Wulfkuhle 1986). Is the upper Clear Fork basin atypical, or are previous archeological investigations biased due to extensive surface collecting and/or the depth of burial of cultural materials? What Archaic cultures are present in the Justiceburg area, and to what times can they be attributed?

The last 2,000 years of human occupation in the Southern Plains is better documented than the preceding 6,000-year-long Archaic Stage. Distinctive artifact assemblages which include ceramics, beveled knives, and arrow points define several Late Prehistoric culture complexes in adjacent regions. The earliest two, the Plains Woodland and Palo Duro cultures, are dated from transitional late Archaic into Late Prehistoric. Plains Woodland seems to extend south to the Canadian River in Texas and Oklahoma, and Palo Duro occurs in the Lower Plains south of the Canadian River. Are either of these two cultural groups represented in the project area, and if so, at what time do they appear? What technological and/or stylistic characteristics separate these late assemblages? Can the north-south movement of the Austin and Toyah phases at roughly A.D. 600-800 as Prewitt (1985:201, 225-228) postulates for Central Texas be supported at Justiceburg?

The Historic Period in the Southern Plains begins with Coronado's entrada in 1541. What is the earliest datable evidence of historic European activity and/or contact in the region and in the project area? What is the evidence for historic Plains Indian occupation in the project area, and when is the last evidence of their presence? When and how was the project area utilized by buffalo hunters, Mexican sheepherders, and/or Euro-American cattlemen?

Subsistence Domain

Current data indicate that the study area has undergone climatic fluctuations over the last 10,000 years. It is expected that changes in the faunal and floral resources provide

differing constraints for successful human adaptation. Understanding specific subsistence strategies within each of the cultural-historical periods will provide crucial data on adaptation and land use.

Did Paleoindian groups emphasize the use of big game resources as is stereotyped in the literature, or did gathering play a much greater role in Paleoindian subsistence, as suggested by Johnson (1977:65)? During the Archaic period, were burned rock middens, which are common to Central Texas, utilized in the project area for acorn processing as is postulated farther to the south? Live oak trees, of which there are remnant stands in the Grape Creek drainage, could have provided the necessary resource base (acorns). Are changes in subsistence strategies abrupt or gradual? Etchieson et al. (1979:355) have proposed that a foraging subsistence based on wild plant foods was dominant in the first half of the Archaic period, with hunting becoming increasingly more important in the second half. If this is the case, then what is the role of grinding implements during the middle and late Archaic? Variations in bison population and changes in range noted by Gunnerson (1972), Dillehay (1974), and Lynott (1979) may also have influenced density, movements, and diets of early human populations in the Southern Plains. To what extent did local peoples utilize this food resource when available, and/or what other animal protein food resources were used when bison were unavailable?

Within each phase assemblage, what were the technological elements of subsistence procurement? At what periods or seasons, if any, were local resources supplemented by imported food obtained through trade? Is the frequency of the small lithic scatters identified in the region proportional to the size of resource procurement groups? Are changes in tool assemblages related to changes in subsistence practices, and if so, were these changes abrupt?

Site Function/Settlement Patterns

Interrelated with subsistence strategies is the question of settlement pattern. Investigations must first address those factors that affect site location, and second, what influences affect internal site structure. This is expected to vary within each identified cultural-historical unit.

Can intrasite spatial patterns be identified at individual sites, and are these patterns functionally related? Can regional intersite settlement patterns be identified? How are these patterns related to cultural adaptation to the environment? Can seasonal use of individual sites be identified, and if so, what were the dominant factors responsible for site selection and use? To what extent did the distribution of important resources -- specifically lithics and water -- control settlement patterns? Do settlement patterns change through time, and if so, what environmental/cultural variables might account for these changes?

What factors controlled Paleoindian settlement patterns in the Southern Plains? Can Paleoindian occupations be linked to particular geographic landforms such as river terraces or uplands? Is it possible to demonstrate that Paleoindian sites are clustered along the margins of the Caprock Escarpment where springs were most abundant and a greater diversity of plant and animal resources were accessible? In regard to the Adair-Steadman Folsom site, Tunnell (1975:28) states:

It appears that the people who lived there were making a specific tool kit for specific purposes and were rarely inclined to improvise by utilizing fortuitous implements or lithic by-products. They were not frugal with the lithic resources at this site, in contrast to what has been observed elsewhere. . . . Perhaps the difference was the ready availability of high-quality lithic raw material in large quantity.

Archaic period sites discovered on tributaries of the Salt Fork of the Double Mountain Fork of the Brazos River in Kent, King, and Stonewall counties northeast of Justiceburg (Thurmond et al. 1981) indicate strong similarities between that area, the northern portion of the Lower Plains, and the Llano Estacado. In contrast, the upper Clear Fork basin, in the southern part of the Lower Plains southeast of Justiceburg, appears to have stronger similarities with Central Texas (Wulfkuhle 1986:441), and the entire Archaic period is more evenly represented. Is there a cultural boundary to the southeast that divides Central Texas from the Lower Plains during the Archaic? If so, is the Justiceburg area culturally tied to either of those areas? Does this cultural affiliation remain constant, or does it change to other regions at certain times?

Most sites in the Lower Plains are comprised of burned rock scatters and/or middens that contain few or no diagnostics. Some burned rock features are identified as slab-lined hearths, while others are thought to be discarded boiling stones (Thurmond et al. 1981:74; Etchieson et al. 1979:344). Slab-lined hearths and boiling stone dumps represent very different activities; further, other activities may be represented by types of features not yet recognized. The fact remains that the functions of and activities represented by the large quantities of chronologically undiagnostic burned rocks in the Lower Plains are poorly understood. Are the two major types of burned rock features evenly distributed throughout the project area? If not, are they associated with specific functions, settings, or time periods?

Ray (1937:193) was convinced that stone-slab cist graves, which he found distributed for 60 miles north to south and 175 miles east to west along branches of the Colorado River and both the Clear and Salt forks of the Brazos River, held the remains of very ancient man (Wulfkuhle 1986:82). Can these slab-lined cist and cairn burials (and combination cist/cairn and variations thereof) be associated with a particular group? What can be said about their locations in the environment?

Can the expression of life through rock art be attributed to religious activities, vision quests, or other individual actions? Is the aboriginal rock art separated into historic and prehistoric events? Are these sites away from or associated with general camps? Are Euro-American depictions similar to the aboriginal works, and if not, why not?

Does the low frequency of the poorly understood gouge indicate a lack of a specific function in this area? If gouges are discovered in the project area, can they be related to a particular site type or function?

Can sites of the Late Prehistoric be associated with specific landforms or environmental settings? If bison were more abundant during the last 2,000 years, what effect does this have on the selection of Late Prehistoric camps and kill sites?

What caused the selection of Euro-American settlements, and what were typical architectural and material culture configurations? Is it possible to identify locations of

semipermanent occupation (i.e., dugouts, sheep or cow camps) in the survey area? How do these locations compare with documented sites of equivalent age in nearby areas? Can any of the historic sites be associated with the so-called "taming of the west," such as military battles with Indians, early wagon trains, trails along which settlers moved into or through the area, or other such activities? What accounted for the establishment of the town of Justiceburg, and what impact did it have on the surrounding area? What impact did the railroad have? Is there a change in the material culture at historic sites in the project area after the town was established and the railroad constructed? Where were the locations of schools?

Cultural Affiliations/Interrelations

Archeologists depend upon diagnostic artifacts and artifact complexes such as projectile points and pottery types to derive cultural identities, intercultural relationships, regional exchange patterns, social networks, and evidence of conflict. Is there evidence for intra- and interregional exchange, and if so, what commodities were exchanged?

The Paleoindian cultures in the Southern Plains are defined, but no evidence of their presence in the project area has yet been found. Is there evidence of Paleoindian activities at Justiceburg? What contributions can Justiceburg make to the recognition of Archaic cultural groups and the establishment of an Archaic cultural sequence?

Several previously untyped arrow point styles and possibly a number of graver forms recognized in the inventory of the upper Clear Fork basin reconnaissance are thought to represent a region-specific Late Prehistoric culture complex (Wulfkuhle 1986:432-434). Do these artifact types indicate movements of populations into the region or the development of new styles from within?

Do the Late Prehistoric cultures recognized in the project area represent the Garza, Tierra Blanca, or other complexes not yet defined? Can these groups be linked to Athapaskan (Apachean) peoples who moved into the area (Spielmann 1983; Habicht-Mauche 1987)? Garza Complex sites could also represent a western extension of the Wheeler Phase out of Oklahoma (Baugh 1986) or seasonal hunting expeditions of Puebloan peoples from New Mexico. If the Garza Complex sites are not Apache sites, then where are the Apache sites in the Lower Plains? Are Tierra Blanca sites Apache but Garza sites are not? What is the nature of the interregional exchange evidenced by the relatively large amounts of Southwestern ceramics, obsidian, and occasional turquoise and shell beads found in the Southern Plains?

Prewitt (1983:201, 225-228) has proposed north to south movements of people and/or material goods during the Austin and Toyah phases based on Central Texas radiocarbon dates. If documented here, what caused the initial southward movement of the Austin Phase, and how does the Texas Lower Plains fit into the picture?

The last Indian groups in the Southern Plains were the Plains Indians. The Comanches, "Lords of the South Plains" (Wallace and Hoebel 1952), pushed the Apaches out of the region and dominated it until Anglo-Americans arrived in force. A few other Plains Indian groups also roamed the Southern Plains. Many historic Plains Indian sites are known in the Lower Plains. Can those which may be recognized at Justiceburg be attributed to any one particular group?

PHASE I INVESTIGATIONS, JUSTICEBURG RESERVOIR

Much of the Plains Indian material culture was derived from trade (or raid) with European groups. Is there evidence of European/Plains Indian trade in the region? Mucho Que Valley southwest of the project area is a known trade location between Mexican and New Mexican comancheros and the Southern Plains Indians. Is there evidence of this activity in the project area? What impact did such contact have on the native peoples?

The Comanche reign of the Southern Plains ended abruptly in 1874 with their subjugation by the U.S. Army. The few years preceding this were marred by intense and violent exchanges between Euro-Americans and Native Americans. Is there any evidence of nineteenth-century military activity in or near the project area?

During the historic period, what relationships, if any, did the area have to larger population centers such as Post, Snyder, and Lubbock? What impact did the development of the oil industry have on the area in terms of economy and material cultural? Did any specialized industrial communities develop, and if they did, how did they impact older residential communities?

CHAPTER 6

OBJECTIVES AND METHODS

by Douglas K. Boyd

This chapter presents the objectives for Phase I of this project. Following the objectives, the methods utilized to achieve the stated tasks are presented.

Objectives

The objectives of this phase were to: (1) conduct an intensive 100% pedestrian survey of approximately 8,600 acres to locate and record cultural resources within a specified area; (2) conduct a thorough literature and archival search for the definition and recognition of natural environmental zones and specific key environmental variables which may influence the cultural resources; (3) conduct subsurface exploration of sediments where there is high potential for buried cultural resources; and (4) develop a plan for future treatment of significant or potentially significant resources to be impacted by the proposed reservoir development.

Methods

Prefield Investigations

The prefield investigations were designed to do several things: (1) begin the literature and records search; (2) determine the nature and extent of all previous archeological, historical, and geoarcheological work in the region and in the project area; (3) identify all recorded archeological and historical sites in the project area; (4) provide data to familiarize all field personnel with the region and the project area; and (5) plan and organize an efficient field program to integrate the archeological, historical, and geomorphological fieldwork.

Prefield archeological work concentrated on gathering data on previous archeological surveys and excavations in the region and reviewing all pertinent literature on regional chronologies, paleoenvironmental studies, prehistoric settlement patterns, etc. One of the primary tasks was to synthesize the regional data into an up-to-date cultural chronology for the Texas portion of the Southern Plains (see Chapter 3). This step was basic to understanding the cultural resources in the project area.

The second prefield archeological task was to develop an understanding of the types of cultural resources (i.e., site types, artifact types) that could be expected to be encountered in the project area. Prehistoric cultural data were gathered from both primary and secondary sources. Primary sources included site and collection documentation in the county and reservoir files of the Texas Archeological Research Laboratory of The University of Texas at Austin and the Texas Historical Commission. Contacts with area professionals

were made to arrange field visits, and local avocational archeologists and collectors were contacted to arrange to review their collections and site data, most specifically sites and collections from the project area or immediate vicinity. One of the last prefield tasks was to gather and prepare orientation materials (orientation handbooks, lithic material samples, artifact samples) for presentation to field crewmembers.

Prefield geomorphological tasks included: (1) beginning the literature and records search for previous geological, geomorphological, and paleoenvironmental studies in the region and in the project area; (2) identifying the character of the project area and the types of landforms which could be expected there; and (3) reviewing maps and aerial photographs to determine the general character of fluvial and eolian deposits.

Prefield historical tasks included: (1) beginning the literature and records search; (2) identifying Spanish, Mexican, Euro-American, and Historic aboriginal populations within the region and the nature of their interactions; (3) identifying the historic settlement and development sequence of the project area; and (4) gathering pertinent historic site type and locational data to alert archeological field crews to potential historic sites and high-probability areas. Emphasis was placed on the interaction among the various historic groups involved and on the development and major shifts of economic pursuits.

The prefield historical investigations utilized both primary and secondary sources available in the Austin area, including the Texas State Library/Archives, Barker Texas History Center, Texas Historical Commission, and the General Land Office. Prefield historical tasks also included planning field investigations, contacting local informants and arranging interviews, contacting knowledgeable professionals with regional expertise, and preparing orientation materials on historic resources for the field crews.

One of the most important prefield activities was the setting of a project boundary in order to assess all of the cultural resources which could be affected by various activities related to reservoir construction and development. The project survey boundary agreed upon followed the 2245-ft mean sea level (spillway elevation plus 5 ft) contour, but it was adapted to include at least 300 linear feet (flowage easement) from the 2220-ft mean sea level contour (conservation pool elevation). This meant that in cases where the valley was very steep and narrow and the 2245-ft mean sea level contour fell on the valley slope, the survey boundary would in most cases extend onto the upland and include the edge of the canyon rim. Several tracts of land which would serve other functions (e.g., a potential borrow area, a public access area, a construction equipment area, and the spillway area) were then added to delineate the final project survey boundary. The area encompassed approximately 8,600 acres; a route for a proposed access road to the dam area and a portion of a water pipeline route were also included.

Archeological Field Investigations

The main archeological field task was a 100% intensive pedestrian survey of the approximately 8,600-acre project area. Archeological survey crews were responsible for recording prehistoric and historic resources. The objective of the pedestrian survey was to locate and define all cultural resources and record site data adequate enough to allow each resource to be evaluated and assessed according to National Register criteria. The archeological reconnaissance was conducted from March 9-May 27, 1987, involving

approximately 360 person days of survey work. The Project Archeologist and one Crew Chief spent an additional week in the field after the survey was completed (June 3-6, 1987). This week was spent recording additional site data and doing more-intensive shovel testing of selected floodplain areas.

SURVEY PROCEDURES

Two three-person crews (each composed of a crew chief and two crewmembers) were in the field at all times. All crewmembers were experienced in archeological survey and site recording. Each crew was responsible for locating and recording sites within each day's survey area. The Project Archeologist was also in the field during the entire survey period. The Project Archeologist spent the majority of the time alternating between crews, overseeing fieldwork, and assisting in survey and site recording. As needed, the Project Archeologist was free to talk to local landowners, run errands, arrange and schedule survey activities, and take care of other administrative details. The Principal Investigator was present during approximately 30% of the fieldwork; he also alternated between survey crews, overseeing, and assisting. He also was available as needed to take care of administrative duties.

Most of the project area is rugged canyon country with steep valley walls, sheer cliffs or talus slopes, and narrow alluvial channels. Standard systematically spaced survey transects were inappropriate in this type of terrain. Some larger tracts on the uplands or in the wide portions of the Double Mountain Fork floodplain were amenable to this type of survey. In these areas, parallel transects, approximately 30 m apart, were walked by the surveyors. The majority of the reservoir, however, could not be surveyed in this manner. A survey technique which was more appropriate for the rugged terrain (as described and illustrated in the topography section of Chapter 2) was devised. The most appropriate survey technique, which in retrospect seems to have worked very well, was to survey topographic transects parallel to and on one side of the Double Mountain Fork channel or its main tributary channels. Each three-man crew was assigned a starting place on one side of the drainage being surveyed. One person was assigned to the uplands, from the edge of the canyon rim back to the edge of the project survey boundary (usually a distance of 50 to 100 m). One person was assigned to the bluffs and was responsible for the area below the canyon rim down to the footslope of the valley, including the vertical bluff faces and the upper talus slope. This transect varied in width from as much as 100 m to as little as 20 m, depending upon the steepness of the valley. The third surveyor was assigned to the floodplains, including the lower part of the valley talus slope. This transect varied from as much as 100 m in width to areas where no floodplain existed.

The survey crews began at designated starting points and surveyed parallel to the drainage channel, with each person responsible for his respective topographic transect. Each person zigzagged back and forth over the transect making sure that all areas were adequately covered. When a fourth person was on the crew, that person assisted with large or difficult transects. If necessary, surveyors left their transects to assist other members but then returned to the point where they left. For safety reasons, all surveyors periodically communicated with each other, and the surveyor on the uplands was usually responsible for keeping track of the others. The most efficient method turned out to be one in which the crew surveyed all morning, then met at lunch and discussed the sites found and how they should be recorded. Usually, the crew spent the afternoon recording sites that had been found during the morning. Occasionally, when fewer or less significant sites

were found, the crew spent the afternoon surveying. Shovel testing was an integral part of the survey.

RECORDING PROCEDURES

The maintenance of careful field records was an important concern; State of Texas Archeological Site Data Forms were used to record all cultural resources. Each recorded site was assigned a temporary field number. Each survey crew assigned a separate sequential field number to each site that was recorded. Sites were later assigned a unique trinomial number designation by the Texas Archeological Research Laboratory (TARL). All site locations were plotted in the field on copies of USGS 7.5' topographic maps. Site locations were transferred to a base map each evening, and site locations were later added to the TARL files. Brunton-compass-paced maps were made of each site showing important landmarks, exposed cultural features or surface collected artifacts, topographic layout, and location of the on-site shovel test(s). A color slide and a black-and-white photograph were taken of each site, except in a few cases where sites were insignificant or photographs would be of no value. Also documented by photographs were defined environmental features, the condition of the project area, and field procedures and methods. A detailed photographic log was kept, recording the date, location, vantage point, and general description of each photograph taken.

At the end of each day, each crew chief turned in a Daily Journal Survey Form which included the names of the crewmembers; described the location, general character, and acreage of the area surveyed that day; summarized the days activities; and noted any special problems. A daily journal summarizing all project activities and field management concerns was maintained by the Project Archeologist.

SHOVEL TESTING PROCEDURES

Shovel testing was an important standard procedure during the investigations and was utilized in two ways. First, shovel tests were used as an aid in locating buried site remains, and secondly, shovel tests were used to define the nature of the cultural deposits at sites. The following guidelines were followed: (1) shovel tests were placed in all high site probability areas (natural rises, rockshelters, dune areas, etc.) where no cultural materials were noted during surface reconnaissance; and (2) shovel tests were placed at intervals not exceeding 25 m in all areas where the ground surface was totally obscured.

Shovel tests were excavated on-site as needed to define the depth of the cultural deposits and the extent of the site. Shovel tests were dug at all previously known and newly recorded sites in the project area, with some obvious exceptions. No shovel tests were dug at rock art sites, totally deflated sites with no depth, large sparsely utilized lithic source areas, or other sites where shovel testing was neither useful nor practical.

The number of shovel tests within a specific survey area or site was not standardized. Some floodplain areas were dissected by deep gullies, while others were covered with vegetation. A single shovel test at some sites was adequate to determine the nature and extent of the deposits, while at others three or four tests were needed. These were judgmental field decisions based on the circumstances of each individual case and on previous experiences.

Shovel tests were approximately 25-cm-diameter probes which were taken down to a maximum of 100-120 cm or to bedrock. These tests were excavated in arbitrary 20-cm levels, and all matrix was screened through 6-mm (1/4-inch-mesh) hardware cloth, except in a few cases where clayey soils were encountered. In those instances, the matrix was troweled carefully. All shovel tests were plotted on the field copies of the topographic maps. For all sites which yielded cultural materials or negative shovel tests on a site, a Testing Data Form was filled out and the materials were bagged by level and retained for analysis. A noncorrosive aluminum disk was placed at the bottom of each on-site shovel test to mark its location.

COLLECTION PROCEDURES

Surface collections from sites were limited to potentially diagnostic (temporally or functionally) cultural materials, items of a fragile nature which would be likely to be lost, materials from sites which are endangered by natural or manmade threats, and materials from severely disturbed sites. All cultural materials found in shovel tests were collected.

Geoarcheological Field Investigations

Phase I geoarcheological investigations were intended to provide a preliminary study to assess the potential for buried archeological remains and to make recommendations for more-detailed investigations. On the basis of the preliminary investigation results, recommendations for a comprehensive program of subsurface reconnaissance (i.e., mechanical testing) for archeological sites in areas of high potential may be made.

The Project Geoarcheologists conducted a pedestrian reconnaissance in order to assess the project area and plan limited mechanical testing of selected areas. The geoarcheologists were able, on the basis of this inspection, to provide the archeologists with some basic interpretations of the alluvial and eolian sediments in the reservoir area. They later conducted subsurface backhoe testing in several portions of the project area. An archeologist was present during all subsurface mechanical testing to inspect for and record all archeological remains. Details of the geoarcheological investigations and the analysis of the data are provided in Chapter 7.

Historical Field Investigations

The Project Historian made several field trips to the project area and completed many tasks. Primary historical source materials were inspected at locations near the project area. County records, such as deed, probate, and plat records, were reviewed at the Kent and Garza county courthouses, and an abstract was prepared for each section of land lying within or contiguous to the project area. Miscellaneous source materials were inspected at the Garza County Museum, the Southwest Collection at Texas Tech University, and in private collections in Post and Polar. The Project Historian contacted and interviewed many knowledgeable local informants and on several occasions was able to provide the archeological crews with detailed information on sites in and near the survey area. The Project

Historian also made on-site inspections of all significant historical sites found in the reservoir area. Details of the historical investigations and analysis are provided in Chapter 9.

Analysis of the Archeological Data

Laboratory analysis, interpretation, and report preparation were conducted from June to December 1987. Laboratory analysis of cultural materials collected involved the following procedures: each bag was logged in and given a lot number; materials were then washed, labeled, inventoried, and catalogued; materials were then analyzed and described. Lithic materials were examined for tool morphology, method of manufacture, and type of material. Tools were categorized and defined by standard recognized types, and diagnostic attributes (indicating function and/or age) were noted. Ceramic artifacts were examined for vessel form and design characteristics, method of construction, paste, temper, surface treatment, and decoration. Exotic ceramics were sent to regional ceramic specialists for identification. Faunal materials were sent to zooarcheological consultants for basic analysis (such as identification of taxon and species, sex determination, pathology, seasonality of death, and cultural modification). Historic artifacts were analyzed and treated in a similar manner to prehistoric artifacts. A special effort to identify chronological and functional attributes, as well as manufacturing and other characteristics, of historic materials was made.

Site data were analyzed on an IBM computer using the Minark Archaeological Database System (Johnson 1985). Different site characteristics, such as environmental setting, site type or function, temporal and cultural affiliation, and presence or absence of diagnostic traits, were compared. Interpretations of cultural phenomena (such as settlement and land-use patterns, subsistence strategies, and resource utilization) were then derived from these data and other studies in the region.

The synthesized artifact and site data and interpretations were the basis for evaluating the cultural resources. Sites were evaluated individually based upon available evidence for significance according to the criteria established for nomination to the National Register of Historic Places (36 CFR 60). Recommendations for all of the Justiceburg Reservoir cultural resources were then made based on site assessments. The process of assessing the sites and formulating recommendations is discussed in more detail in Chapters 12 and 13.

CHAPTER 7

GEOARCHEOLOGICAL INVESTIGATIONS

by Michael D. Blum

As specified in the technical proposal, geoarcheological investigations during Phase 1 activities at Justiceburg Reservoir were designed to evaluate the potential for recovery of buried archeological resources in sediments believed to be of culturally relevant age. In this chapter, the theoretical and methodological bases for geoarcheological investigations are outlined in general terms, the need for this type of research strategy at Justiceburg Reservoir is demonstrated from a review of the literature on surrounding areas, and an examination of the limited geological and soils data from the area is presented. This is followed by an outline of methodology, documentation of results, and preliminary interpretations. Suggestions for future subsurface archeological reconnaissance are made in Chapter 13.

Background to Geoarcheological Research

There has been a long-standing, demonstrable relationship between prehistoric cultural materials and geologic deposits (Renfrew 1976; Cooke 1983). In the early days of archeological research, this relationship fostered symbiotic cooperation between geologists and archeologists, as the scientific community attempted to gain a fuller appreciation of human antiquity in both the New and Old worlds (Renfrew 1976; Gifford and Rapp 1985a, 1985b). In more recent years, geoscientists have maintained an active interest in archeological problems and have established a subdiscipline of earth science research performed in an archeological context (e.g., Gifford and Rapp 1985a, 1985b). Several authors (e.g., Renfrew 1976; Gifford and Rapp 1985a, 1985b; Stein and Farrand 1985) have traced the historical development of this interdisciplinary cooperation, and have identified three temporally overlapping traditions. The first, characteristic of many projects undertaken during the nineteenth and early twentieth centuries, consisted of archeologists and geologists working at the same site but publishing results in separate forums with little attempt at integration. The second, more common in the past three decades, involved on-site interdisciplinary cooperation and the regular integration of geologists into the archeological field staff (e.g., Rapp 1975). Unfortunately, the results of geological investigations were, and in many cases still are, incorporated into site reports as an appendix and commonly consist of an assessment of the site's environmental context and trajectory. This second trend has been referred to as "archeological geology" since investigations were still primarily geological in terms of their goals (Gifford and Rapp 1985a, 1985b; Stein and Farrand 1985).

The strategy incorporated into initial archeological investigations at Justiceburg has been termed "geoarcheology" and is defined as the investigation of past human ecosystems using techniques of the earth sciences (Renfrew 1976; Butzer 1982; Gifford and Rapp 1985a, 1985b; Stein and Farrand 1985); hence, the goals of geoarcheological investigations are framed in archeological terms. This can differ both in spirit and practice from traditional archeo-geological investigations that are done during the excavation phase alone and are principally concerned with site stratigraphy and geochronology. To be sure, these issues remain as primary concerns to the geoarcheologist; however, when integrated into a

research design from the beginning, earth science techniques can be complementary to the survey and interpretation phases of the program as well (Butzer 1982; Davidson 1985; Hassan 1985). It is noteworthy that increasing adoption of this perspective has resulted in initiation in 1986 of a new journal -- Geoarchaeology -- and is reflected in the Journal of Archaeological Science where geoarcheological articles are becoming increasingly frequent.

Geoarcheological investigations are strongly based on the cultural-ecological approach to human prehistory, and the perspective is one that views sites not in isolation but as part of a larger, interactive cultural-environmental system. Butzer (1982:7-8) offers a comprehensive theoretical framework for the ecological analysis of prehistoric groups, suggesting that five interacting themes should emerge as central concerns: (1) the spatial and/or temporal scale that characterize natural and cultural processes; (2) the spatial distribution of biotic and abiotic resources and the human groups that used them; (3) the complexity or heterogeneity of the biophysical environment; (4) the level of interaction between human groups and their biophysical environment; and (5) the equilibrium state that characterized prehistoric groups under investigation. Together, these five themes provide a systemic context for cultural residues and a framework for the analysis of synchronic cultural adaptation and diachronic change.

Geoarcheological techniques are central to implementation of this approach since they provide the critical empirical framework upon which cultural-ecological interpretations must be based. The range of information produced may include: (1) geomorphic settings that produce surface and/or subsurface sites (e.g., Drew 1979; Stafford 1981; Davidson 1985; Helgren 1986); (2) sources of lithic raw materials (e.g., Holliday and Welty 1981; Rapp 1975); (3) multiscale site landscape and stratigraphic context (e.g., Butzer 1978; Gladfelter 1977, 1981; Holliday 1985a, 1985b; Hassan 1985; Stein and Farrand 1985; Meltzer and Collins 1987); (4) geomorphic processes that affect site formation, modification, and destruction (Schiffer 1983, 1987; Hassan 1985; Stein 1985; Ferring 1986; Nash and Petraglia 187); and (5) human impact on the environmental system (e.g., Butzer 1974, 1978; Eidt 1985).

At a more detailed level, with specific reference to the initial survey phase of a cultural resources management program, geoarcheological techniques can be used to assist pedestrian surface reconnaissance and/or to provide a logical basis for subsurface archeological testing in deposits believed to be of culturally relevant age (Butzer 1982). The primary goal of such an integrated strategy is to maximize the identification of cultural residues from all time periods of concern. Secondly, geoarcheological survey techniques provide an empirical basis for identifying environments and time periods that are not preserved in the geomorphic record and may be underrepresented in the corresponding archeological inventory. As a result, geoarcheological survey techniques contribute directly to the analysis of the temporal and spatial scales of natural and cultural processes and their spatial distribution (Butzer 1982).

The range of geoarcheological techniques incorporated into the archeological research design depends in part on the local environmental setting and in part on the strategy chosen for surface survey. If pedestrian surface survey is intended to be less than full coverage and the area is dominated by younger sedimentary deposits, preliminary geomorphic mapping is the most significant contribution that geoarcheologists can make (Davidson 1985). Such an approach can be used to direct surface reconnaissance toward the types of environments where sites are known to occur based on previous investigations in neighboring areas (Butzer 1982). An excellent local example of this potential is provided by Stafford (1981) concerning sites on the Llano Estacado of Texas.

In areas where pedestrian surface survey will be comprehensive, characterization of the genetic stratigraphy and chronological aspects of sedimentary deposits is necessary to determine whether subsurface archeological testing is desirable and to identify those areas where it may prove to be the most efficient procedure for data recovery. This strategy revolves around the identification and evaluation of unconformities between sedimentary units that demarcate some change in the paleogeomorphic environment (Helgren 1986). Unconformities marked by a buried soil or some other evidence of subaerial exposure constitute former land surfaces and are the most logical place to search for buried sites (Stafford 1981; Helgren 1986). Indeed, lateral tracing and extensive testing of former land surfaces may constitute the only realistic methodology for documenting a significant sample of cultural remains from time periods that are not widely exposed at the surface. Additionally, a well-dated geomorphic and stratigraphic framework provides investigators with the opportunity to target specific time periods and/or local problems of interest. Drew (1979) suggests that the search for pre-Clovis occupation could be enhanced by this approach, but the concept can be applied to other time periods as well.

In summary, an integrated geoarcheological strategy can contribute to all phases of an archeological research program. During the initial survey phase, more-traditional pedestrian reconnaissance can be enhanced by geomorphic mapping and the development of a chronologically controlled stratigraphic framework for those deposits of culturally relevant age. In addition to providing some potential assistance to surface survey, this data base also forms a logical, empirically derived framework for future subsurface archeological testing. Incorporation of geoarcheological techniques into the survey phase of an archeological research design should lead to an overall increase in the number of identified sites, and the archeological inventory should be more representative in both spatial and temporal terms. Moreover, a geomorphic and stratigraphic framework provides an initial, noncultural explanation for the underrepresentation of cultural remains from certain time periods and/or specific environments.

The Role of Geoarcheological Research at Justiceburg

The Double Mountain Fork of the Brazos River, within the Justiceburg project area, drains the eastern margins of the Llano Estacado and adjacent western Rolling Plains in Garza and Kent counties, Texas. As outlined more fully in Chapter 2, the Llano Estacado is an isolated constructional surface of Tertiary and Quaternary age that is separated from the dissected erosional topography of the Rolling Plains by the prominent Caprock Escarpment. Bedrock exposed at the surface on the Rolling Plains, and in the reservoir area, consists of indurated sandstones and red mudstones of the Triassic Dockum Group and red shales and mudstones of the Permian Quartermaster Formation (Barnes 1967). The regional unconformity between the Permian and Triassic sections is expressed topographically as an irregular north-south-trending escarpment downstream from the Justiceburg dam site.

Within the reservoir area, resistant Dockum sandstones dominate the uppermost reaches, and the Double Mountain Fork has carved out a relatively broad valley. A short distance downstream, the stream channel becomes canyon confined within the underlying less-resistant Dockum and Quartermaster mudstones and shales, with Dockum sandstones forming the caps to canyon walls. Lateral channel migration and canyon widening is hindered by large blocks of sandstone that are undercut, move downslope, and then come to rest protecting the less resistant lithologies from further erosion. At a greater distance downstream, near the dam

site itself, the canyon widens considerably, as rocks of the Dockum Group have been almost completely removed by erosion. Also near the dam site, Grape Creek, a major tributary that enters the Double Mountain Fork from the south, has carved out a relatively broad alluvial valley.

Given this overall geologic setting, fluvial and/or colluvial sediments are not widely recognized in the reservoir area, with the exceptions being those areas farthest upstream near the limits of the inundated area and farthest downstream, in and around the confluence of Grape Creek with the Double Mountain Fork (Barnes 1967). Examination of county soil surveys suggests that eolian sediments are widespread in the uplands as well, in particular near the confluence of Grape Creek with the Double Mountain Fork, an area that includes the proposed dam spillway (Richardson et al. 1965; Richardson and Girdner 1973). Late Quaternary deposits that have been mapped in and around the project area remain undifferentiated, and stratigraphic and geochronologic data that address the geomorphic history of the Double Mountain Fork and its tributary network do not exist. However, information from nearby areas on the Llano Estacado and the Rolling Plains records a geologically recent past that is both complex and varies on an area-by-area basis.

In an archeologically inspired study on the Llano Estacado, Stafford (1981) provides an overview of the geologic setting, genetic stratigraphy, and geochronology of several draws, including areas upstream from the Lubbock Lake Site on Yellowhouse Draw in Lubbock, Running Water Draw near Plainview where the Plainview type site is located, and on Blackwater Draw at the Clovis type site near Clovis, New Mexico. On the basis of distinct lithological characteristics, he differentiates the late Pleistocene and early to middle Holocene Yellowhouse Draw Formation (ca. 13,000 to 4900 years B.P.) from the late Holocene Lubbock Formation (ca. 4900 years B.P. to present). Stafford (1981) notes that this overall stratigraphy remains consistent over a broad area but that geometric relationships between depositional units vary considerably as a function of local geologic controls. His investigations also point out clear associations between archeological remains and certain types of depositional environments, and in doing so he has provided an empirically based model for future geoarcheological survey on the Llano Estacado.

The Lubbock Lake Site has been investigated by interdisciplinary research teams for over 50 years (Holden 1974) and is one of the best examples of a well-documented stratified site in North America. Holliday et al. (1983, 1985) summarize 117 radiocarbon dates that provide a solid framework for interpretation of cultural adaptation to changing late Pleistocene and Holocene environments. The latest Pleistocene and early Holocene was characterized by fluvial, lacustrine, and marsh deposition (ca. 11,100 to 8000 years B.P.) and contained both Paleoindian and earliest Archaic cultural remains. A regionally identified period of middle Holocene eolian activity (ca. 6500 to 4500 years B.P.) contained early and middle Archaic remains, whereas late Holocene mixed fluvial, marsh, and eolian environs (ca. 4500 years B.P. to present) were occupied by middle Archaic, late Archaic, and Late Prehistoric peoples (Holliday 1985a). Reports from other sites on the Llano Estacado, including Mustang Springs in Martin County (Meltzer and Collin 1987) and the Clovis and Plainview type sites (Holliday 1985b), demonstrate similar cultural-ecological and geological trajectories.

Geoarcheological techniques have proven useful in other parts of the Southern Plains, notably in the "Caddo Canyons" of Caddo County in southern Oklahoma. The archeological importance of this area and the need for coordinated interdisciplinary research efforts have been recognized since the discovery of the deeply buried Domebo Paleoindian site and

associated mammoth remains over 20 years ago (Leonhardy 1966). In 1977, the Oklahoma Conservation Commission provided initial funding to investigate the potential for buried cultural materials in Delaware Canyon where reservoir construction was about to begin (Ferring and Hall 1977). A substantial body of accumulated geoarcheological data from this and follow-up studies in Delaware Canyon, and renewed work in Domebo and nearby Carnegie canyons, are summarized in Ferring and Hall (1987), Hall (1987), and Hall and Ferring (1987). To summarize, stratigraphic and geochronologic investigations have recognized sequential periods of rapid alluviation, slow alluviation and contemporaneous soil formation, and rapid canyon incision that appear to be temporally synchronous throughout the region. Of critical importance to the archeological record are two regionally identified buried soils, the Caddo paleosol that formed from 1945 to 990 years B.P. and yields Plains Woodland occupations, and the Delaware Creek paleosol that dates from 585 to 385 years B.P. and contains Plains Village remains. Older periods of landscape stability and soil formation that are known to date from culturally relevant time periods due to stratigraphic constraints are evident in canyon exposures and remain the targets of ongoing geoarcheological research.

Geologic investigations in the Rolling Plains of Texas, done under the auspices of high-level nuclear waste site characterization, document an equally complex and informative late Quaternary record. Data presented in Baumgardner and Caran (1986a, 1986b), Caran and Baumgardner (1986a, 1986b), and Gustavson (1986) show that previously unrecognized late Quaternary deposits of fluvial, lacustrine, and eolian origin blanket an estimated 1660 km² in Floyd, Hall, Briscoe, and Motley counties, Texas, to the north of Justiceburg Reservoir. The extensive nature and unusual thickness of the deposits represent rapid wastage and retreat of the Caprock Escarpment in response to localized subsidence caused by dissolution of subsurface Permian evaporites. However, within the overall stratigraphic framework, the authors also recognize periods of Holocene fluvial and eolian geomorphic activity that are unrelated to salt dissolution and may be more representative of regionally significant environmental change.

In a related study, the alluvial stratigraphy of the Little Red River in Briscoe County, Texas, illustrates the complexities of the geomorphic history of a small drainage in the Rolling Plains (Baumgardner 1986). Prior to 2140 years B.P., the deeply incised Little Red River migrated laterally to form the present valley configuration. Sediments deposited during this time underwent soil development, then were buried by over 6 m of fine-grained alluvium between 2140 and ca. 840 years B.P., when the channel was again deeply incised. Although archeological investigations were not a part of this or other studies associated with nuclear waste isolation, the record left behind by the Little Red River and surrounding areas in the Rolling Plains provides some valuable guidelines for future geoarcheological survey in the area. As an example, fluvial paleoenvironments that predate 2140 years B.P. are unexposed at the surface and only seen two-dimensionally low in the fill profile where channel cutting is currently active. Consequently, traditional pedestrian survey techniques may find middle to late Archaic riverine sites underrepresented in the prehistoric record unless accompanied by subsurface survey using geoarcheological techniques designed to incorporate and refine this stratigraphic framework.

Although the geomorphic development of the Double Mountain Fork is poorly understood, the research cited above serves to illustrate that geomorphic processes have been quite active in areas surrounding the site of the proposed Justiceburg Reservoir during time periods that have demonstrated archeological potential. Of particular importance is the recognition of widespread periods of alluviation in this area during the late Holocene, a

critical time period that corresponds to late Archaic and Late Prehistoric occupations. Hall (1988) contends that such alluviation characterized streams from northeastern Oklahoma to central Texas, and ended around 1000 yrs B.P. when widespread channel entrenchment ensued. Moreover, he points out that although the sequence of events is remarkably similar on a regional basis, the geometric relationships between periods of deposition and erosion vary between valleys due to local geologic controls. Knox (1983) has observed that other environmental factors such as vegetation also contribute to the variations seen between neighboring valleys. Canyon-confined streams perhaps analogous to the Double Mountain Fork, such as those of the Caddo Canyons in Oklahoma (Ferring and Hall 1987; Hall 1987; Hall and Ferring 1987) and the Little Red River in Texas (Baumgardner 1986), often tend to aggrade and bury, or completely erode, evidence of prior geomorphic activity, leaving little trace of certain time periods exposed at the surface.

At Justiceburg Reservoir, initial recommendations in the technical proposal for subsurface testing were based on reconnaissance of the literature outlined above and examination of available geologic and topographic maps as well as county soil surveys. Of the late Quaternary fluvial deposits mapped in and along the channel of the Double Mountain Fork and its major tributaries (Barnes 1967), most show little or no evidence of substantial soil development (Richardson et al. 1965; Richardson and Girdner 1973). Since the development of certain soil properties, such as horizon differentiation, color changes, or leaching of carbonate minerals, is believed to be correlative with age (Birkeland 1984), the weakly developed nature of fluvially related surface soils in the reservoir area suggests that their parent materials were recently deposited. The youthful nature of soils exposed at the surface, in conjunction with stratigraphic and geochronologic data from surrounding areas, also suggests that buried soils and older sediments may be present in the subsurface. As a result, preliminary mechanical subsurface testing for buried cultural resources in these fluvial deposits is justified on scientific grounds and may demonstrate that future subsurface reconnaissance is required to establish a representative archeological inventory.

The other major late Quaternary depositional environment in the project area, eolian sediments in the uplands, was not widely recognized in previous geologic mapping (Barnes 1967); however, eolian sediments were designated as the parent materials for many upland soils (Richardson et al. 1965; Richardson and Girdner 1973). Stratigraphic constraints and cultural remains associated with eolian deposits on the Llano Estacado and the Rolling Plains demonstrate that eolian processes have been active during both the middle Holocene and the last millenia (Holliday 1985a, 1985b; Baumgardner and Caran 1986a, 1986b; Caran and Baumgardner 1986a, 1986b; Meltzer and Collins 1987). At Justiceburg, in contrast to the youthful nature of surface soils in fluvial deposits of the Double Mountain Fork and tributaries, soils formed in upland eolian materials within the project area suggest some degree of maturity, since they show both horizon differentiation and rubification, and leaching and reprecipitation of carbonate minerals (Richardson et al. 1965; Richardson and Girdner 1973). Holliday (1985a) reports a similar degree of soil development in eolian sediments from the Lubbock Lake Site that were deposited from ca. 6500 to 4500 years B.P. Yet, because of the considerable variability in rates of soil development, the potential for recovery of buried sites in the eolian uplands should be evaluated by first establishing that the deposits result from geomorphic activity during time periods with demonstrated archeological potential rather than by actual mechanical subsurface examination.

Methodology

The approach involved four principal tasks: (1) prefield assembly and examination of topographic sheets, aerial photos, available geologic maps, and county soil surveys; (2) field orientation and surface reconnaissance in order to derive a working familiarity with depositional processes and the range of geomorphic settings present in the project area; (3) preliminary mechanical subsurface examinations and descriptions in representative geomorphic settings within the riverine environment in order to make recommendations on the potential for the recovery of buried archeological remains; and (4) examination and preliminary description of upland eolian sediments to determine whether the deposits are of culturally relevant age and warrant future subsurface archeological reconnaissance. The discussion below is organized around the latter three of these tasks.

Radiocarbon Dating

Subsequent sections of this chapter reference a series of 12 radiocarbon date assays obtained from archeological and geomorphological contexts in the project area. These dates are essential to interpretation of the geomorphological history and to providing a basis from which to predict the locations of archeological sites of differing ages. The assay results are summarized in Table 6.

All radiocarbon assays were made by the Radiocarbon Dating Laboratory, The University of Texas at Austin, under the supervision of S. Valastro, Jr. Date calculations are based on a 5568-year half-life. Assay results are provided by S. Valastro, Jr. (personal communication, 1987) and are not yet published in the UT-Austin Radiocarbon Dates series.

Spatial Distribution of Depositional Environments

Examination of aerial photography, available geologic and soils literature, and initial surface reconnaissance in the project area suggested that a range of depositional processes have been active during culturally relevant times. Important present and past geomorphic settings include: (1) the channel, floodplains, and terraces of the Double Mountain Fork of the Brazos River; (2) channel and floodplain marginal eolian deposits; (3) small colluvial wedges or fans that are shed from short steep slopes within canyon-confined portions of the reservoir; (4) the channel, floodplain, and terraces of Grape Creek near its confluence with the Double Mountain Fork; (5) the larger and more extensive colluvial/alluvial fans in the Grape Creek area; and (6) upland eolian sand sheets. Although depositional landforms associated with tributaries other than Grape Creek are present locally, they were not investigated in any detail. In addition, older, highly dissected, stratified gravels and sands also occur in the uplands and probably originated as fan sediments shed off of the retreating Caprock Escarpment. Their geomorphic position in the landscape and their deeply weathered and strongly cemented appearance imply that they predate human occupation of the region. However, they remain important because of their probable function as a sediment source for upland eolian sand sheets and are discussed in that context.

TABLE 6
RADIOCARBON DATES*

UT Radiocarbon Lab Number	Provenience			Uncalibrated	
	Location**	Site	Depth	Date B.P.	Calendar Date
Tx-5758	Hearth	41GR484	0.25 m	260 $\pm$ 70	A.D. 1690 $\pm$ 70
Tx-5759	BHT 5	-	0.5 m	1750 $\pm$ 60	A.D. 200 $\pm$ 60
Tx-5760	BHT 8	41GR323	1.4 m	810 $\pm$ 50	A.D. 1140 $\pm$ 50
Tx-5761	BHT 9	-	1.4 m	4780 $\pm$ 60	2830 $\pm$ 60 B.C.
Tx-5762	BHT 12	-	0.5 m	520 $\pm$ 50	A.D. 1430 $\pm$ 50
Tx-5763	BHT 12	-	1.3 m	860 $\pm$ 70	A.D. 1090 $\pm$ 70
Tx-5764	BHT 13	41GR568	1.8 m	1910 $\pm$ 60	A.D. 40 $\pm$ 60
Tx-5765	BHT 14	41GR484	1.0 m	1160 $\pm$ 60	A.D. 790 $\pm$ 60
Tx-5766	BHT 14	41GR484	1.5 m	1830 $\pm$ 70	A.D. 120 $\pm$ 70
Tx-5767	BHT 17	-	0.5 m	740 $\pm$ 50	A.D. 1210 $\pm$ 50
Tx-5796	GM 2	-	5.0 m	13500 $\pm$ 280	11550 $\pm$ 280 B.C.
Tx-5798	GM 1	-	0.9 m	4730 $\pm$ 70	2780 $\pm$ 70 B.C.

*All dates were derived from soil samples, with the exception of Tx-5758 from 41GR484 which was obtained from a charcoal sample taken from a hearth. All dates were calculated using a 5568-year half-life.

**BHT = backhoe trench; GM = geomorphic locality.

The Double Mountain Fork of the Brazos River is a braided ephemeral stream with a sediment supply dominated by sand-sized materials. Minor amounts of both coarse siliceous gravels and fine reddish muds occur in and proximal to the channel as well. Principal depositional environments of the Double Mountain Fork can be subdivided into the channel and floodplain subenvironments. Within the channel, geomorphic features include the multiple low-water thalwegs that define the braided stream pattern and are floored with coarser gravels and sands, and the higher discharge, bankfull channel that consists of sandy, low-relief, vertical accretion style bedforms at several distinct elevations up to 1 m above the low water level. Shallow trenches and natural exposures in the channel indicate that stratified sediments from the sandy bedforms and gravelly channel thalwegs inter-finger in vertical section. By contrast, geomorphic features on the floodplain consist of partially vegetated, low-relief sand flats at elevations of 2-3 m above the low water level. In profile, floodplain sediments commonly are massive, bioturbated fine sands, and muddy sands, with occasional pebble stringers. Examination of older fluvial deposits suggests that floodplain sediments are more often preserved in the stratigraphic record,

whereas those of the channel itself are cannibalized by the rapid lateral shifting characteristic of many sandy braided streams (see Miall 1977).

Linear eolian sand dunes, up to 5 m in height and over 50 m in length, are found proximal to the channel of the Double Mountain Fork at several locations within the reservoir area. Backhoe trench exposures reveal that dunal deposits are primarily massive, well-sorted fine sands, with occasional ripple laminations. Sediment supply is the stream-bed itself, as strong winds erode loose dry sand from sandy bedforms in the channel, transport it as saltation and/or traction load, with deposition taking place on top of partially vegetated floodplain sand flats. The presence of eolian dunes implies a wind regime with velocities above the threshold of entrainment for sand-sized material and a suitable area for deposition (Greeley and Iverson 1985). As a result, dunes are not ubiquitous in the reservoir area and occur only when the geomorphic setting is such that channel sands exist upwind from a relatively flat, featureless, and open area. These conditions are locally satisfied in both the far upstream and far downstream portions of the reservoir, and the general east-west orientation of the dunes implies that relatively strong winds with westerly, and perhaps southerly, components are responsible. Although data for the immediate area are not available, westerly winds of sufficient magnitude occur at least 5% of the time in the Lubbock area during the winter and spring months, whereas during the summer and fall, southerly winds capable of sand transport occur more than 10% of the time (Larkin and Bomar 1983). At present, the relationship between dune form and process and the local wind regime remains poorly understood. However, transport of sand by strong winds within the confining walls of the canyon were observed on several days during the fieldwork.

Within the canyon-confined portion of the study area, numerous small, steep (3-10°) colluvial fans grade into the floodplains and terraces of the Double Mountain Fork. Texturally, these deposits consist of crudely bedded to massive muddy sands, with frequent stringers of rounded siliceous pebbles and occasional angular clasts of locally derived sandstone. Typically, the colluvial wedge fines in the down-dip direction until interfingering with the sandy deposits of the trunk stream. Most colluvial deposits examined in the field have multiple, deeply entrenched channels that reveal complex cut-and-fill relationships as well as the underlying unconformity with the Triassic or Permian bedrock. Because of the preliminary nature of the fieldwork reported here, the limited areal extent of the colluvial wedges, and their equally limited archeological potential, they were not intensively investigated and remain poorly understood.

Grape Creek, the largest tributary to the Double Mountain Fork within the project area, has a unique set of depositional environments that differ from those of the main stream due to local geologic controls. The Ogallala Formation, a major source of coarse sands and siliceous gravels for the Double Mountain Fork, does not crop out in the Grape Creek drainage. Accordingly, sediment supply is different and consists of relatively fine sands and muds in combination with coarse subangular gravels composed of Triassic Dockum sandstone. Because of this different sediment supply, Grape Creek is a meandering stream that aggrades its channel by lateral rather than vertical accretion. Principal depositional environments on the modern stream consist of coarse gravelly and sandy point bars and the +3-m floodplain composed of muddy sands and sandy muds. As Grape Creek approaches its base level, defined by the present elevation of the Double Mountain Fork, its gradient flattens out considerably, and during periods of low flow, the channel is occupied by standing water and marshlike vegetation.

The relatively broad valley carved out by Grape Creek, in combination with the substantial local relief provided by the remaining Triassic sandstone caprock, has led to the development of several larger alluvial/colluvial fans that interfinger with and grade into floodplains and terraces of Grape Creek itself. In comparison with smaller, steep colluvial wedges common in the canyon-confined reaches of the Double Mountain Fork, fans along Grape Creek are less steeply dipping (3-5°) and are an order of magnitude larger in terms of area. Natural exposures and several backhoe trenches reveal that fan deposits consist of interbedded gravels and sands or massive muddy sands that show a considerable degree of variation along-strike and fine considerably in the downslope direction. The stratified nature of exposed sections testifies to the importance of competent channelized flow on the fan surface in the past. In fact, many fans now maintain entrenched channels in their upper reaches that merge with the present geomorphic surface down-dip. Observed fan deposits range in thickness from less than 1 m to over 6 m.

Much of the uplands surrounding the valley of Grape Creek, including the proposed dam spillway, are veneered by relatively fine grained eolian sands and silts that lack three-dimensional expression. Kocurek and Nielson (1986) have termed similar deposits "sand sheets" and specified a range of controls that act to prevent the formation of dunes in an environment that is otherwise dominated by eolian processes. In the Justiceburg area, the most significant of these controls is the presence of vegetation that acts to baffle wind currents near the ground where sand-sized sediments are eroded, transported, and deposited. This makes it difficult to transport sediments in saltation, a process considered essential for the initiation and propagation of three-dimensional eolian bedforms (Greeley and Iverson 1985). Instead, fine sands move along the surface as traction load, or silts are picked up and transported as suspended load, with both passively coming to rest on pre-existing landforms. In the Justiceburg area, the source for much of the sand sheet deposits seems to be the older alluvial fan sediments that were shed from the retreating Caprock Escarpment sometime during the Pleistocene and now occur sporadically throughout the uplands. An additional source for eolian materials may be Dockum siltstones or sandstones that cap much of the upland area, but the extent of their contribution is not clear at the present time.

In summary, the range of depositional environments and geomorphic settings considered important to geoarcheological investigations during Phase I activities at Justiceburg have been identified and briefly described. With the exception of channels, floodplains, and younger terraces of the Double Mountain Fork that extend through the project area, each environment has a characteristic spatial distribution that depends on the larger-scale geologic setting. In the upper part of the reservoir, principal geomorphic features include: (1) eolian dunes located proximal to the channel and floodplain source areas; and (2) older terraces of the Double Mountain Fork. By contrast, in the canyon-confined portion of the project area, depositional landforms are the small, steep colluvial fans that are episodically shed from canyon walls; because of the constrictions imposed by canyon morphology, eolian dunes and older terraces are rarely present, having been cannibalized through time by the rapid lateral shifting of the main channel. In the lower part of the reservoir, prominent landforms in the valley bottoms include: (1) eolian dunes located proximal to the Double Mountain Fork; (2) the channel, floodplains, and terraces of Grape Creek; and (3) the larger alluvial/colluvial fans in the Grape Creek valley. In addition, eolian sand sheets are widespread in the uplands around the Grape Creek valley, in particular in and around the area designated as the proposed dam spillway. Figure 10 summarizes in block diagram form the spatial distribution of depositional environments within the Justiceburg Reservoir area.

Figure 10. Depositional environments. (a) upper part of reservoir; (b) canyon-confined central part of reservoir; (c) lower part of reservoir and Grape Creek valley.

Temporal Characteristics of Fluvial, Alluvial/Colluvial
Fan, and Stream-proximal Eolian Dune Deposits

Preliminary identification of the spatial distribution of geomorphic settings in the reservoir area provided the logical basis for the sampling of different depositional environments in the subsurface using mechanical excavation. Where possible, this was supplemented by examination of natural exposures in stream cutbanks, gully walls, and borrow pits. In addition to basic description of sediments and soils (after Folk 1980; Soil Survey Staff 1975), a major component of this strategy was the collection and processing of samples suitable for radiocarbon dating. Three areas and their associated geomorphic settings were chosen for examination: (1) the valley of Grape Creek near its confluence with the Double Mountain Fork, including both fluvial and colluvial/alluvial fan depositional environments; (2) the canyon-confined central part of the reservoir, 2 km downstream from the mouth of Rocky Creek, where younger terraces of the Double Mountain Fork were examined; and (3) the upper part of the reservoir, where both large eolian sand dunes and older terrace deposits were described. In sum, this approach provides a preliminary spatial-temporal framework necessary for an evaluation of the need for future subsurface archeological testing.

The Grape Creek Valley

Within the valley of Grape Creek, near its confluence with the Double Mountain Fork, a total of 14 backhoe trenches (BHTs) were excavated, 2 natural exposures were described (GMs), and 10 internally consistent radiocarbon dates were obtained. Archeological and/or paleontological materials were encountered in four of the trenches and are described in Appendix A (sites 41GR483, 41GR484, 41GR485, and 41GR568). Locations of sampling localities and a simplified geomorphic map of the area is presented in Figure 11. Rather than a trench-by-trench description, the following discussion is oriented around a synthesis of the temporal aspects of different map units that have been identified, and description proceeds according to standard stratigraphic practice of oldest to youngest. Actual trench descriptions are included in Appendix D.

Exposed along a cutbank of Grape Creek, in the location designated as GM-2, is an alluvial deposit and paleosol of the ancestral drainage that is unconformably bounded at its base by the Permian Quartermaster Formation at an elevation of +2 m and at its top by younger fan sediments at an elevation of +4 m, both measured with respect to the modern Grape Creek channel. This older alluvium consists of a fining upwards sequence of cross-stratified sandy gravels and sands, overlain by fossiliferous (gastropod fauna), reddish brown (5YR 5/3) sandy muds. The unit has been severely altered by postdepositional pedogenic and diagenetic processes, as evidenced by its partially gleyed and mottled appearance, strong coarse prismatic structure, and the presence of numerous medium pedogenic carbonate nodules (up to 2 cm in diameter). No distinct horizonation was detected in the field, suggesting that soil development took place under hydromorphic conditions resulting in a vertisol-like profile. A radiocarbon date of $13,500 \pm 280$ years B.P. (Tx-5796) was obtained from this buried soil, 0.5 m below the erosional unconformity with the overlying fan sediments, and indicates that deposition of and soil development on this unit preceded the demonstrated human occupation of this region.

Figure 11. Geomorphologic map of Grape Creek valley.

Fan sediments that unconformably overlie late Pleistocene alluvium and Permian bedrock at location GM-2 were encountered in BHTs 8, 9, and 10. Fan sediments here consist of interbedded sands and gravels or fine muddy sands with occasional dispersed pebbles or pebble stringers. Matrix muddy sands are reddish brown (5YR 4/4) to yellowish red (5YR 4/6) and may contain few fine pedogenic carbonate nodules at depths of less than 2 m. A radiocarbon date of 4780 ± 60 years B.P. (Tx-5761), obtained at a depth of 1.5 m in BHT 9, in combination with the late Pleistocene age of $13,500 \pm 280$ years B.P. from the underlying soil at location GM-2, suggests that considerable fan deposition, perhaps as much as 6 m locally, occurred during culturally relevant times. Figure 12 illustrates geometric and stratigraphic relationships between late Pleistocene alluvium and Holocene fan sediments at location GM-2.

Along the western flank of the Grape Creek valley, alluvial/colluvial fans coalesce with the younger terraces of Grape Creek itself. Eleven backhoe trenches were excavated and described within these geomorphic units. Proximal fan sediments, encountered in BHTs 1, 2, and 11, range from reddish brown (5YR 4/4), crudely sorted pebbly to gravelly sands to dark reddish brown (5YR 3/4), poorly sorted sands to muddy sands with occasional dispersed pebbles or pebble stringers. Distal fan sediments, present in BHTs 3, 8, and 12, interfinger and overlie deposits of Grape Creek itself and usually consist of reddish brown (5YR 4/4) to dark reddish brown (5YR 3/4) sandy muds to muddy sands, with occasional dispersed pebbles. Terrace deposits of Grape Creek were present in BHTs 4, 5, 6, 7, 12, and 13 and generally are massive to very coarse blocky, reddish brown (5YR 4/4) to dark brown (7.5YR 4/4) sandy muds and muddy sands. Soil development in the upper 0.5 m of all trenches excavated in the Grape Creek valley has been obscured by root plowing during historic times and usually consists of an Ap horizon of intensely mixed, dark yellowish brown (10YR 4/4) loamy sands to sandy loams. All alluvial fan and fluvial deposits are calcareous, and mixed-texture sediments that have not been disturbed tend to have weakly developed, coarse blocky structures, with filaments of calcium carbonate coating many ped faces.

Five radiocarbon dates have been obtained from fluvial deposits of Grape Creek and the interfingering and overlapping sediments derived from the complex of alluvial/colluvial fans. Fluvial sediments in BHT 13, at a depth of 1.5 m below the surface and associated with disarticulated bones from a small ungulate (see Appendix C, site 41GR568), yielded an assay of 1910 ± 60 years B.P. (Tx-5764), whereas similar sediments at 1.0 m below the surface in BHT 5 were assayed at 1750 ± 60 years B.P. (Tx-5759). Overlying fan sediments in BHT 12 yielded ages of 860 ± 70 years B.P. (Tx-5763) at 1.3 m below the surface, and 520 ± 50 years B.P. (Tx-5762) at a depth of 0.5 m. Similar sediments from BHT 8, at a depth of 1.4 m, were assayed at 810 ± 50 years B.P. (Tx-5760). Older, proximal fan sediments that unconformably underlie surficial deposits display fine nodules of calcium carbonate similar to those present in BHT 9 that yielded a radiocarbon age of 4780 ± 60 years B.P. (Tx-5761) and may imply similar ages for deposition of these sediments. Figure 13 presents a schematic cross section of the Grape Creek valley that summarizes known stratigraphic relationships between older fluvial deposits, older fan sediments, younger fluvial deposits, and the younger fan sediments.

Terrace deposits of the Double Mountain Fork were exposed in BHT 14 and consist of interbedded yellowish red (5YR 4/6) massive sands and reddish brown sandy muds with medium, subangular blocky structures. The terrace surface, at +3.5 m above the modern channel, is covered by a thin wedge of fan sediments visible in exposures along the Grape Creek cutbank. Like similar deposits farther up the Grape Creek valley, fan sediments here are

a

b

Figure 12. Geometric and stratigraphic relationships at GM-2. (a) view of exposures illustrating stratigraphic relationships between Permian bedrock, late Pleistocene alluvium of ancestral Grape Creek, and Holocene alluvial fan sediments; (b) close-up of area shown in (a); arrow indicates location of radiocarbon sample.

Figure 13. Schematic cross section of Grape Creek valley, near its mouth.

predominantly massive to laminated, reddish brown (5YR 4/4) to yellowish red (5YR 4/6) muddy sands, with occasional stringers of rounded siliceous pebbles or locally derived angular clasts of sandstone. Three radiocarbon assays provide chronological control on both terrace deposits of the Double Mountain Fork and the more recent fan sediments. Samples collected from depths of 1 and 1.5 m below the surface in BHT 14 yielded ages of 1160 ± 60 years B.P. (Tx-5765) and 1830 ± 70 years B.P. (Tx-5766), respectively, whereas charcoal collected from a small hearth (41GR484) in the overlying fan sediments yielded an age of 260 ± 70 years B.P. (Tx-5758). Figure 14 presents a schematic cross section through terrace alluvium of the Double Mountain Fork, overlying fan sediments, and the underlying Permian bedrock that illustrates the known stratigraphic relationships.

In sum, a series of 14 backhoe trenches, several descriptions of natural exposures, and 10 radiocarbon dates provide a temporal framework for preserved sediments of the Grape Creek valley. Late Pleistocene fluvial deposits of the ancestral Grape Creek are preserved locally on the east wall of the valley. Although deposition of the sediment predates demonstrated human occupation in the area, the terrace surface itself may have been exposed for a considerable length of time before burial by locally derived fan sediments and may represent the only preserved environment within the valley that dates to critical late Pleistocene and early Holocene time periods. Overlying fan sediments exposed at the same locality and at depth in several backhoe trenches suggest some antiquity since they commonly have pedogenic carbonate horizons. A single radiocarbon date of 4780 ± 60 years B.P. (Tx-5798) provides some absolute chronological control on one such deposit and argues that older fan sediments were deposited during the early to middle Holocene. Late Holocene fluvial sediments, deposited prior to ca. 1000 B.P., are ubiquitous along the Grape Creek axis and are preserved locally adjacent to the Double Mountain Fork. Fan sediments

Figure 14. Schematic cross section of Double Mountain Fork.

deposited during the last millenium cover previously existing geomorphic surfaces, including older fan deposits, fluvial deposits of Grape Creek and the Double Mountain Fork, and Permian bedrock. In archeological terms, this framework implies that many preserved environments available for human occupation during much of the Holocene are unexposed at the surface. Accordingly, records of human use of these same environments in the Grape Creek valley may be preserved at depth and recovered by subsurface archeological testing.

The Canyon-confined Central Part of the Reservoir

Three backhoe trenches were excavated in the central part of the reservoir, on the south bank of the Double Mountain Fork some 2 km downstream from the mouth of Rocky Creek. The depositional environment sampled comprised a younger terrace of the main stream at +4 m above the modern low water level and +2 m above the modern floodplain. Figure 15 is a simplified geomorphic map of the area showing the locations of BHTs 15, 16, and 17 and the lateral extent of the geomorphic surface they represent.

The majority of sediments preserved in younger terraces of the Double Mountain Fork were deposited in the floodplain environment during a period of activity that predates the modern hydrologic regime. Relatively fine grained overbank sediments consist of strong brown (7.5YR 4/6) to dark brown (10YR 3/3), massive muddy sands and sandy muds, with occasional dispersed pebbles or pebble stringers. By contrast, cross-stratified channel gravels and sands were present at a depth of 2 m below the surface in BHT 17 and are exposed at depth in a nearby gully. Regardless of texture, a very weak soil, characterized by an A-Cu profile, is present on the terrace surface, or there may be a thin (less than 20

Figure 15. Geomorphic map of canyon-confined central part of reservoir.

cm) veneer of recently deposited eolian sand. A radiocarbon age of 740 ± 50 years B.P. (TX-5767) was obtained at a depth of 50 cm in overbank sediments of BHT 17 and implies that incision and abandonment of this geomorphic surface and development of the present channel and floodplain have occurred since that time. Sediments with a similar texture and color, but showing a very slight degree of oxidation and cementation, were present at a depth of 1.7 m in BHT 15. A small hearth, constructed from locally available sandstone slabs (41GR485), was uncovered at the erosional unconformity separating the two depositional units, but its age and cultural associations cannot be determined since the age of the underlying sediments is unknown and no diagnostic materials were recovered. Sediments described from the +4-m terrace in this area are typical of others in the canyon-confined

portion of the reservoir and suggest that the majority of older deposits, perhaps predating late Archaic times, have been cannibalized by rapid lateral migration of the Double Mountain Fork.

Older Terraces and Eolian Dunes in the Upper Part of the Reservoir

Principal depositional environments present in the upper part of the reservoir include older fluvial deposits and younger, channel-proximal eolian dunes (Fig. 16). Older fluvial deposits of the Double Mountain Fork are exposed in a borrow pit to the south of the main channel and to the east of Ft. Justice (GM-3). Terrace sediments rest unconformably on Dockum sandstones at +3.5 m above the modern channel and attain a total thickness of 4.5 m. Basal facies consist of cross-stratified channel gravels and sands that fine upwards into finer grained overbank deposits. There is considerable lateral facies variation in the upper half of the sequence, with overbank facies including reddish brown (5YR 5/4) muddy sands deposited in floodplain sand flats and dark reddish brown (5YR 3/4) muds that were deposited in floodplain swales. Soil development at the surface in these older fluvial deposits is obscured by deep root plowing, but subsurface horizons are characterized by a Bw-Ck profile, with strong medium blocky to prismatic structures and fine pedogenic carbonate nodules. Because older terrace deposits in the upper part of the reservoir are outside of the project area proper, chronometric age determinations are not available. However, when compared with younger fluvial deposits in other parts of the reservoir that have weakly developed soils, the degree of soil development in these terraces clearly suggests some antiquity. A conservative estimate would place deposition of this set of fluvial deposits sometime during the early to middle Holocene.

Eolian dunes occur in the upper reaches of the reservoir area in several locations where the geomorphic setting meets requirements outlined in the previous discussion of depositional environments. Three backhoe trenches were excavated into a large dune on the north side of the river (see Fig. 16). In BHTs 18 and 19, eolian sediments consisted of massive to ripple laminated fine sands that were more than 3 m thick and rested on the modern floodplain, whereas at BHT 20, eolian deposits were interbedded with modern floodplain muddy sands of the Double Mountain Fork. No soil development was observed in either exposure, which, in conjunction with stratigraphic and geomorphic relationships with the modern floodplain, suggests that dunes may have originated during the past several centuries or, more conservatively, during the past millenium. Unfortunately, samples suitable for radiocarbon dating were not encountered, nor were any diagnostic cultural materials, and more-precise age estimations for channel-proximal eolian dunes would be premature.

Temporal Characteristics of Upland Eolian Sand Sheets

Eolian sand sheets in the uplands around Grape Creek were examined in natural exposures and shallow trenches (see Fig. 11, GM-1). Preliminary estimation of the antiquity of sand sheet deposits depends in part on the identification of the degree and type of soil development, often considered to be an indicator of sedimentary processes and relative age (Birkeland 1984). Soils developed in upland eolian sand sheets show a considerable degree of maturity, most commonly displaying an Ap-Bt-Ck profile. In the profile shown in Figure

Figure 16. Geomorphic map of upper part of reservoir.

17 (location GM-1), the Ap horizon is represented by 40-50 cm of dark brown (7.5YR 3/4) fine sandy loam and tends to be cumulic in nature, suggesting that soil development proceeded while sedimentation was an active, albeit slow, process. The underlying, moderately well developed Bt horizon consists of over 50 cm of reddish brown (5YR 3/4) sandy loam to sandy clay loam with a strong, coarse blocky structure. Translocation of clays into the B horizon from above has been an active process, and carbonate minerals have been leached to a depth of over 90 cm. Transition from the Ap horizon to the underlying Bt is gradual and reflects deep root plowing during historical times rather than pedogenic processes per se. Although the described profile did not extend to depths greater than 90 cm, surrounding partially eroded slopes expose an underlying Ck horizon characterized by small nodules and

Figure 17. Shallow trench profile (GM-1) in upland eolian sand sheets that shows relatively advanced degree of soil development. A radiocarbon date of 4730 ± 70 years B.P. was obtained from the base of the exposure at a depth of 90 cm.

soft masses of calcium carbonate that appear to have been leached from above and reprecipitated at depth.

Under normal conditions, the degree of development displayed by soils in the upland eolian sediments, with the presence of a textural Bt horizon and a Ck horizon characterized by carbonate nodules, generally takes at least 10,000 years to form (Birkeland 1984). However, Holliday (1985a) confirms that similar soils have developed in eolian sediments at Lubbock Lake in less than 6,000 years due to rapid mechanical infiltration of clays and leaching of carbonate minerals by the high intensity rainfalls characteristic of this area. To provide a more reliable estimation of the age of these sediments, organic residues in a sample obtained from the Bt horizon (GM-1), at a depth of 90 cm below the surface, were processed by the radiocarbon method and yielded an age of 4730 ± 70 years B.P. (TX-5798). This does not represent the actual time of deposition since the organic material contained in the sedimentary matrix is to a large extent postdepositional and pedogenically derived. However, it does imply a minimum age and demonstrates that soil development in this portion of the upland eolian sand sheet has been active since that time. Moreover, this radiocarbon date, in combination with published estimates of the time required for development of similar soil profiles from nearby Lubbock Lake (Holliday 1985a), suggests that considerable deposition of eolian sand sheets in the uplands around the proposed dam spillway took place during culturally relevant times.

Recommendations for Future Subsurface Testing

Initial geoarcheological investigations provide a spatial-temporal framework for preserved sedimentary deposits in the Justiceburg Reservoir project area and can be used to evaluate the need for future subsurface reconnaissance. This becomes especially critical at Justiceburg since the results of pedestrian survey document that surface archeological materials are unevenly distributed in time. Most importantly, of the 288 prehistoric/protohistoric archeological sites noted in or near the project area, the Paleoindian and early Archaic periods are unrepresented, whereas only 4 sites have been recorded that may date to middle Archaic times. By contrast, late Archaic and Late Prehistoric sites are widespread and occur in all environments and in all parts of the reservoir area. Comparison of these results with the geologic setting of Justiceburg Reservoir provides an initial explanation for this skewed temporal distribution since much of the area is an erosional landscape and the majority of sedimentary deposits exposed at the surface are of very recent derivation. The results of geoarcheological investigations provide a logical basis for testing in the subsurface that may assist in the recovery of a more representative archeological record since sediments from all culturally relevant time periods have been identified. The following recommendations are organized around the temporal aspects of cultural remains and where certain time periods may be recovered in the sedimentary record.

Sediments emplaced prior to the Paleoindian period have been identified in the Grape Creek valley and consist of alluvial deposits from the ancestral Grape Creek drainage. Although the sediments themselves predate demonstrated human occupation of the area, soils that developed in situ indicate a period of relative landscape stability that may have extended into culturally relevant times. Although this paleoland surface is not areally widespread, it appears to be intact and may constitute the only realistic place to search for cultural remains in the riverine environment from earlier time periods. Accordingly, this paleoland surface should be examined in detail. Because of the higher energy levels associated with alluvial fan sediments that eventually covered this surface, recovered sites may be in either semiprimary or secondary sealed context.

Three sets of deposits, from different paleoenvironmental settings, have been identified that may contain records of the Paleoindian and early to middle Archaic periods. Within the Grape Creek valley, alluvial fan sediments that unconformably overlie late Pleistocene alluvium apparently were deposited through the early and middle Holocene. These deposits should be examined in detail in conjunction with the underlying paleoland surface upon which they rest. Other older alluvial fan sediments are present at depth on the west side of the Grape Creek valley and should be tested at the same level of intensity. Once again, energy levels associated with alluvial fan deposition suggest that recovered sites may be in either semiprimary or secondary sealed context.

Older eolian sediments, deposited as sand sheets in the uplands around the proposed dam spillway, have yielded a minimum radiocarbon age of 4730 ± 70 years B.P. (Tx-5798) from the lower part of the soil profile and demonstrate that soil development was under way by that time. Accordingly, these deposits merit extensive subsurface testing and represent the best opportunity for recovery of materials from Paleoindian and early to middle Archaic groups that were utilizing upland environments. If cultural materials are present, because of the passive depositional processes associated with eolian sand sheets, recovered sites should be in primary sealed context.

Older terraces of the Double Mountain Fork that were examined and described near Ft. Justice are outside of the reservoir proper but would provide an additional environment where earlier sites may be located. Unfortunately, there are no chronometric controls on these deposits, but the degree of postdepositional soil development present suggests perhaps an early to middle Holocene age. Subsurface examination to the extent possible may provide a unique opportunity for recovery of cultural remains in the riverine environment from earlier time periods above the canyon-confined portion of the Double Mountain Fork. Because of the relatively low energy levels indicated through much of the exposed section in these older terraces, recovered sites may be in primary or semiprimary sealed context.

Younger fluvial and alluvial fan deposits are widespread in the Grape Creek valley and have produced radiocarbon ages that correspond to late Archaic and Late Prehistoric times. Although pedestrian surface survey recorded a large number of sites from these time periods, there is a distinct advantage to searching for additional buried cultural materials since they have not been subjected to disturbance by local artifact collectors. A moderate level of reconnaissance in these deposits is recommended for this reason and may recover semiprimary sealed late Archaic sites in fluvial deposits or semiprimary sealed Late Prehistoric sites within younger sediments from the alluvial fans.

Canyon-confined reaches of the reservoir contain fluvial deposits of the Double Mountain Fork that correspond in age to late Archaic and Late Prehistoric times. Older deposits may be present as well but were not positively identified. Arguments for subsurface reconnaissance are much the same as for younger fluvial and alluvial fan deposits in the Grape Creek valley; such reconnaissance may produce sites from more-recent time periods in semiprimary sealed context that have not been disturbed by local collectors. However, the canyon-confined nature of the reservoir in this area presents logistical problems for mechanical excavation since many terrace surfaces are not easily accessible. As a result, limited mechanical testing in areas with reasonable access is recommended and should be supplemented in other areas by limited, deep, hand-dug tests.

Channel-proximal eolian dunes occur on and interbedded with the modern floodplain of the Double Mountain Fork in both the far upstream and far downstream portions of the reservoir area. Although chronometric controls are unavailable, geomorphic relationships with the modern floodplain imply that these deposits originated during the past millenium. Channel-proximal eolian dunes offer a relatively unique opportunity for human use of the riverine environment since they are close to the channel itself but are high enough in elevation to provide some protection from flood hazards normally associated with the floodplain environment. Although mechanical examinations during geoarcheological investigations did not recover any archeological materials, shallow shovel tests into nearby dunes during pedestrian survey were positive (sites 41GR467, 41GR471, and 41GR485) and suggest that limited subsurface reconnaissance may be appropriate in this environment as well. Archeological materials found in eolian bedforms can be expected to have undergone some surface disturbance prior to burial and may be in semiprimary to secondary sealed context. Eolian dunes may also obscure primary-context cultural remains buried in the underlying terraces.

To conclude, Table 7 summarizes the range of depositional environments preserved in the sedimentary record, the level of subsurface reconnaissance recommended, and the types of sites that may be expected. The geoarcheological investigations suggest that all cultural time periods are represented to some degree in preserved sediments within Justiceburg Reservoir. However, like the cultural inventory produced during the pedestrian surface survey, the preserved sedimentary record is heavily skewed toward more-recent time

TABLE 7

SUMMARY OF SPATIAL/TEMPORAL DISTRIBUTION OF DEPOSITIONAL ENVIRONMENTS, LEVEL OF
SUBSURFACE RECONNAISSANCE RECOMMENDED, AND TYPES OF SITES THAT MAY BE EXPECTED

Environment	Location	Age	Amount of Preservation	Intensity of Subsurface Reconnaissance	Probable Finds	
					Age	Context
eolian dunes	UR, LR	last 1000 yrs	minimum	moderate to minimum	Late Prehistoric	SP, S
younger fan sediments	LR/GC	last 1000 yrs	maximum	moderate to minimum	Late Prehistoric	SP, S
younger fluvial terrace deposits	MR	late Holocene to last 1000 yrs	moderate	moderate, if possible	late Archaic, Late Prehistoric	SP, S
younger fluvial terrace deposits	LR/GC, MR, UR	late Holocene	maximum	minimum to moderate	middle Archaic, late Archaic	P, SP, S
older fluvial terrace deposits at surface	UR	early to middle Holocene	moderate	moderate, if possible	Paleoindian(?), early Archaic, middle Archaic	SP, S
older fan sediments (buried)	LR/GC	early to middle Holocene	moderate		Paleoindian(?), early Archaic, middle Archaic(?)	SP, S
eolian sand sheets	Up	late Pleistocene to early Holocene	moderate	moderate to maximum	Paleoindian, early Archaic	P, SP
older fluvial deposits (buried)	GC	late Pleistocene	minimum	maximum	Paleoindian	SP, S

Table 7, continued

Key:

Location: UR = upper part of reservoir; MR = canyon-confined middle part of reservoir; LR = lower part of reservoir; GC = Grape Creek; Up = uplands (spillway area only).

Amount of Preservation: means relative degree of preservation of that environment within indicated location, with minimum meaning localized and maximum meaning ubiquitous and moderate somewhere in between.

Intensity of Subsurface Reconnaissance: means relative degree of examination per unit volume of preserved sediments. Deposits should be examined at a level of intensity inversely proportional to their preservation in the landscape.

Context: Degree of disturbance to original site setting: P = primary, meaning very little dispersal or disturbance with significant association preserved; SP = semiprimary, some dispersal or disturbance but some associations preserved; S = secondary, significant disturbance and dispersal with few significant associations preserved.

periods. As a result, in order to achieve a more representative archeological record, sediments that are preserved should be examined at a level of intensity that is inversely proportional to their occurrence in the landscape. Figure 18 presents a generalized model of the relationship between preserved sediments, the recorded archeological inventory, and the level of subsurface reconnaissance intensity required for each time period. In general, intensive subsurface reconnaissance is recommended for all deposits that correspond to earlier time periods with demonstrated archeological potential. Preserved sediments deposited during time periods that have produced an abundant archeological record should also be examined since sites that have not been disturbed by human activity during historic times may be discovered.

Figure 18. Conceptual model of the relationship between preserved sedimentary deposits and the recorded archeological inventory.

CHAPTER 8

PREHISTORIC RESOURCES IN JUSTICEBURG RESERVOIR

by Douglas K. Boyd

Of the 375 recorded sites in the proposed Justiceburg Reservoir project area, 288 have at least one prehistoric or protohistoric aboriginal archeological component which are discussed in this chapter. Archeological sites are viewed as evidence of human activity through time and space; thus, survey-level study provides limited data for site assessment. The dimension of space is more easily defined. Recognizing sites or components of a specific cultural group, a specific time period, or a particular activity is much more difficult. Most of the 288 prehistoric sites can be assigned only to gross functional categories such as lithic procurement areas or open campsites. Because of the scarcity of diagnostic cultural materials, 84% of the sites cannot be assigned temporal affiliation, and of those which can be linked to a given time period, most can be defined only in broad categories of Archaic or Late Prehistoric. None of the 288 sites can be conclusively assigned to any of the regionally recognized cultural complexes, but several sites contain evidence which makes them probable candidates for specific cultural affiliation.

Sites

Forty-five of the 288 prehistoric sites in the project area are isolated finds, i.e., sites which consist solely of isolated artifacts or debris not associated with other cultural materials, or cultural debris that is so widely scattered that it lacks associational context. This site type category is defined as any single surface artifact with no associated materials or context, or surface sites with a density of cultural materials less than one item in 20 m². It was often difficult to rigorously enforce this definition, particularly at sparse lithic procurement sites. The determination was left to the discretion of the field investigators in such cases. Isolated finds, in all cases, are considered to have little interpretive potential beyond the survey level and have no potential for providing additional data. The remainder of this chapter focuses on the 243 prehistoric archeological sites, excluding the isolated finds.

At 243 sites in approximately 8,600 acres, site density for Justiceburg Reservoir is 1 site every 35 acres, or 18 sites per square mile. If the isolated finds are included, the site density (288 sites) increases to 1 site every 30 acres, or 21.4 sites per square mile. Adding the 30 isolated aboriginal rock art sites, the total aboriginal site density (318 sites) increases to 1 site every 27 acres, or 23.6 sites per square mile.

The most important spatial consideration for the prehistoric sites within the project area is topographic setting. Prehistoric archeological sites occur in most of the various topographic settings in the project area (Table 8) as defined in Chapter 2. The distribution of sites is roughly proportional to the areal extent of landforms in the project area.

Functional classification of sites was made on the basis of the exposed cultural materials or cultural materials found in the subsurface. In some cases, there is abundant evidence for assigning a site type; in other cases, the evidence is sparse. The following site type definitions apply to the project area:

TABLE 8
PREHISTORIC SITES BY TOPOGRAPHIC SETTING

Topographic Setting	Number of Sites*	Percent of Sites
Upland	109	44.9
Bluff edge	5	2.1
Talus slope	1	0.4
Lower alluvial terrace	37	15.2
Upper alluvial terrace	19	7.8
Eolian dunes on alluvial terraces	3	1.2
Erosional remnant	45	18.5
Isolated mesa	4	1.6
Bedrock terrace	20	8.2
Total:	243	99.9

*Excludes 45 isolated finds

Lithic procurement areas are natural outcrops of Quaternary gravels which exhibit evidence of use as a lithic source area. Almost all lithic outcrops in the study area contain evidence of at least sparse utilization. Lithic procurement areas in the project area contain natural gravel nodules (see description of the geology in Chapter 2), tested nodules, cores, primary flakes, and core choppers and hammerstones. Finished artifacts are rare, and most cultural materials are obviously related to testing of source materials and early stages of lithic reduction. Lithic procurement areas differ from quarries in that the gravels are exposed on the surface and quarrying is not required. Fifty-six (23%) of the prehistoric sites are lithic procurement areas.

Open campsites are distinguished mainly by the presence of burned (or fire-cracked) rocks, evidence of later stages of lithic reduction (thinning flakes, etc.), and occasional finished stone tools. No distinction is made between temporary and base camps. Classification as a campsite assumes that food preparation (i.e., cooking) is represented by the burned rocks and that these activities took place mainly at habitation sites. One hundred and five sites (43.2%) are open campsites.

Lithic procurement/open campsites are utilized gravel outcrops which also have characteristics of open campsites. Sixty-two sites (25.5%) are combination lithic procurement/open campsites.

Rockshelters are overhangs in or beneath the upper canyon-rim-forming bluff. Rockshelters occur throughout the project area, but most have shallow to no soil accumulations. Only five rockshelters (2.1%) with cultural deposits were found. These are of special importance because of the enhanced potential for the preservation of cultural remains.

Faunal localities are locations containing large mammal bones but no definite cultural materials. The bones are articulated or semiarticulated and represent at least one animal. These sites are considered archeological because of their potential to represent isolated kills, portions of kill sites, or association with other cultural evidence. Nine faunal localities (3.7%) were located; eight probably are bison, one is deer (see Appendix C).

Lithic scatters are similar to campsites, but they contain only sparse evidence of the later stages of lithic reduction and occasional finished artifacts and manufacturing failures; fire-cracked rocks and burned rock features are sparse or absent. These sites are not situated in gravel outcrop areas. Six sites (2.5%) are lithic scatters.

Correlations between site function and location have been recognized in the rugged canyon breaks along the Caprock Escarpment. Word (1977) describes functional site types by topographic setting for five counties (Briscoe, Hall, Floyd, Motley, and Dickens) just north of the project area. Other studies (Etchieson et al. 1978, 1979; Thurmond et al. 1981) have recognized specific site types in similar topographic settings. Similar settings are represented in Justiceburg Reservoir, with one addition, eolian dunes, not noted in the previous studies. These dunes are well developed on some alluvial terraces in the upper and lower portions of the reservoir.

Table 9 shows the correlation between site type and topographic setting in the project area, and a few patterns are apparent. Open campsites are found in all topographic settings except the talus slope and bluff edges. The talus slope is a constantly and rapidly changing setting, and any cultural materials there are almost certainly redeposited by colluvial action. Rockshelters are confined to bluff overhangs along the bluff edge or along secondary ledges. Habitation occurs in all topographic settings except active talus slopes. The relative number of campsites/shelters in the different topographic settings is probably related to the abundance and relative extent of the different landforms and topographic settings within the project area.

The faunal localities are confined to the floodplain terraces. This is probably due to the fact that the natural cutbanks in the floodplain provide the best exposures for locating these types of remains. Further, bone preservation is undoubtedly better in deeply buried alluvium than in any other locations.

Lithic procurement sites (and campsites with lithic procurement) are obviously confined to natural Quaternary gravel outcrops. These outcrop areas are almost exclusively found in the uplands and on erosional remnants; only occasionally are outcrops found on isolated mesas, talus slopes, bedrock benches, or upper alluvial terraces.

Temporal affiliation is the next important site variable that must be considered. Justiceburg Reservoir is similar to many Southern Plains archeological projects in that of all the recognizable prehistoric components, the majority cannot be assigned a temporal affiliation on the basis of the survey data alone. Compared with other survey areas (Tables 10 and 11), Justiceburg presents a temporal distribution of sites most similar to the survey on the Salt Fork of the Brazos. These archeological survey areas are within 160 km (100 miles) of the Justiceburg project area. The survey on the Upper Clear Fork of the Brazos and two surveys on tributaries of the Washita River northeast of the Justiceburg area had somewhat different results. The latter two studies are heavily biased toward Archaic sites because a large number of sites were categorized under the assumption that gouges (i.e., Clear Fork tools) are diagnostic Archaic artifacts.

TABLE 9
COMPARISON OF PREHISTORIC SITES BY TOPOGRAPHIC SETTING AND SITE TYPE

Topographic Setting	Lithic Procurement Area	Open Campsite	Lithic Procurement Area and Open Campsite	Rock-shelter	Faunal Locality	Lithic Scatter	Totals
Upland	33	35	37	-	-	4	109
Bluff edge	-	-	-	5	-	-	5
Talus slope	1	-	-	-	-	-	1
Lower alluvial terrace	-	28	2	-	6	1	37
Upper alluvial terrace	3	7	5	-	3	1	19
Eolian dunes on alluvial terraces	-	3	-	-	-	-	3
Erosional remnant	14	22	9	-	-	-	45
Isolated mesa	-	2	2	-	-	-	4
Bedrock terrace	5	8	7	-	-	-	20
Totals:	56	105	62	5	9	6	243

A few general conclusions can be drawn from comparing these archeological surveys in the Lower Plains region. Temporally diagnostic artifacts are not abundant, and surface collecting probably accounts for much of the scarcity of artifacts. For example, parts of Justiceburg Reservoir are known to be frequently (and extensively) collected. Sites which can be defined temporally are dominantly late Archaic and Late Prehistoric.

Only 39 sites could be assigned a temporal affiliation (Table 12). Paleoindian sites in the Lower Plains are very rare, probably due in part to the fact that large, active river systems tend to have relatively recent terraces and most of the late Pleistocene/early Holocene deposits have been removed. Of the six recognized Paleoindian components (see Table 11) in the five survey areas, the three at Crowell Reservoir (Etchieson et al. 1979:170, 123) are all located in the upper third terrace, and of the three in the Upper Clear Fork (Wulfkuhle 1986:412, 417), two were located in the uplands and one was from a disturbed context in the floodplain. The geoarcheological research described in Chapter 6 helps to understand the lack of Paleoindian remains in the Justiceburg project area. Most of the geomorphic landforms simply are not old enough to contain late Pleistocene-age sites. Most likely, sediments of this age are deeply buried in the uplands or are small terrace remnants of late Pleistocene alluvium such as the one near the mouth of Grape Creek. Only one site, 41GR566, at Justiceburg yielded a possible Paleoindian artifact, but the site is classified as undefined due to the dubious affiliation of the artifact.

TABLE 10
TEMPORAL AFFILIATION OF PREHISTORIC COMPONENTS
AT JUSTICEBURG AND OTHER NEARBY SURVEY AREAS*

Age	Justiceburg	Crowell	Truscott	Brazos Salt Pollution	Upper Clear Fork
Paleoindian	-	3	-	-	3
Early Archaic	-	1	2	2	-
Middle Archaic	4	3	3	2	-
Late Archaic	10	25	21	4	-
Undefined Archaic	10	37	23	9	13
Late Prehistoric	24	5	6	4	9
Protohistoric	-	-	-	1	-
Undefined	<u>204</u>	<u>108</u>	<u>31</u>	<u>100</u>	<u>18</u>
Total # of Components:	252	182	86	122	43
Total # of Sites:	243	173	70	122	33

*Justiceburg -- total number of sites excludes isolated finds.

Crowell Reservoir, Cottle, Foard, King, and Knox counties (Etchieson et al. 1979:101-105)

Truscott Reservoir, King and Knox counties (Etchieson et al. 1978:Table 2)

Brazos Salt Pollution Control Project, Kent, King, and Stonewall counties (Thurmond et al. (1981:Table 21)

Upper Clear Fork of the Brazos, Fisher and Jones counties (Wulfschle 1986:115, 179)

Archaic sites with chronologically distinctive projectile point types tend to be dominantly late Archaic. Early and middle Archaic site also are rare in the Lower Plains, possibly because of the lack of early Holocene sediments (Hall 1988:211-212) or an inability to locate sediments of the appropriate age. It has also been suggested (e.g., Etchieson et al. 1979:355) that early and middle Archaic subsistence was based more on plant foods than on animals and that less hunting was done, hence less projectile points were made. No early Archaic sites were identified during the current investigations. Only four sites in the project area are classified as middle Archaic, and these classifications are tentative, based solely on the surface finds of single stemmed dart points which are not well defined in the region.

None of the Late Prehistoric components of Justiceburg sites can definitely be attributed to specific regional cultural complexes. Six sites, however, yielded materials which suggest that they may belong to recognized complexes. Late Prehistoric components at three sites (41GR256, 41GR325, and 41GR438) yielded distinctive Deadman's points that are associated with the Palo Duro culture as defined at Mackenzie Reservoir (Willey and Hughes 1978b). The Palo Duro type site in Swisher County and the Kent Creek Site in Hall County (Brett Cruse, personal communication 1987) have yielded Deadman's points in association

TABLE 11
PERCENTAGE OF PREHISTORIC COMPONENTS AT
JUSTICEBURG AND OTHER NEARBY SURVEY AREAS*

Age	Justiceburg	Crowell	Truscott	Brazos Salt Pollution	Upper Clear Fork
Paleoindian	-	2	-	-	7
Archaic	9.5	36	57	14	30
Late Prehistoric	9.5	3	7	3	21
Protohistoric	-	-	-	1	-
Undefined	81.0	59	36	82	42
Totals:	100%	100%	100%	100%	100%

*Justiceburg -- excludes isolated finds.

Crowell Reservoir, Cottle, Foard, King, and Knox counties (Etchieson et al. 1979:101-105)

Truscott Reservoir, King and Knox counties (Etchieson et al. 1978:Table 2)

Brazos Salt Pollution Control Project, Kent, King, and Stonewall counties (Thurmond et al. (1981:Table 21)

Upper Clear Fork of the Brazos, Fisher and Jones counties (Wulfkuhle 1986:115, 179)

with Jornada Brownware pottery and radiocarbon dates ranging from A.D. 200-800. South-western ceramics from two sites (41KT47 and 41KT53) are identified as Glaze Polychrome V and Faint Striated ware made at Pecos Pueblo between A.D. 1600-1700. Late Rio Grande utility wares and glaze polychrome wares are commonly found at Garza Complex sites (see Table 5). The occurrence of Pecos Glaze V wares at two sites strongly suggests that they are related to the Garza Complex. Artifacts found in the midden exposed at 41KT79 suggest that it may also be a Garza Complex site.

Features

A number of features were encountered at sites in the project area. The most abundant are burned rock features; others include bedrock mortar holes, trash middens, cairns, and unburned sandstone concentrations.

Burned Rock Features

At Justiceburg Reservoir, open campsites are distinguished from other types of sites by the presence of burned rocks and burned rock features. This correlation is supported by

previous research at nearby Truscott and Crowell reservoirs (Etchieson et al. 1978:331, 1979:344, 354). The burned rocks found in large quantities at sites in the Rolling Plains can be attributed mainly to two types of features, hearths and boiling stone dumps. Both activities are considered to be predominantly related to food preparation at campsites. On the basis of research at Truscott and Crowell reservoirs (Etchieson et al. 1978, 1979), the following interpretations have been suggested:

(1) Fire-cracked rocks are associated mainly with campsites, both Archaic and Late Prehistoric.

(2) Fire-cracked rocks in the region are dominantly quartzites and cherts (including Potter chert) and are thought to have been used as boiling stones.

(3) Definable hearths tend to be constructed from sandstone (or limestone/dolomite), but quartzites and other materials also were used.

(4) Boiling stone dumps (concentrations of fire-cracked quartzites and cherts) are found dominantly at Archaic sites, possibly because stone boiling was a popular cooking method for nonceramic peoples.

(5) Hearths are less common than boiling stone dumps but are found in both Archaic and Late Prehistoric sites.

These hypotheses have yet to be conclusively verified but seem to be plausible explanations accounting for the distribution and nature of fire-cracked rock features in the region. The data from Justiceburg Reservoir tend to support some of these hypotheses. Potter chert is the dominant material found in the Quaternary gravels and is much more abundant than other quartzites throughout the reservoir area. It is also the dominant fire-cracked material found on sites in the project area. At Crowell Reservoir (Etchieson et al. 1979:339), fire-cracked Potter chert is dominant (62%), but quartzites comprise a large portion (36%) of the fire-cracked rocks. Truscott Reservoir (Etchieson et al. 1978:328) is similar in that Potter chert accounts for 66% of the fire-cracked rocks and quartzites are somewhat less abundant (30%). No detailed data are available for Justiceburg Reservoir, but exposed surface materials suggest that the Potter chert is very dominant and that other quartzites constitute less than 15-20% of the fire-cracked rocks. Undoubtedly, these differences are due to the availability of materials in the local gravels. Similar types of burned rock features, especially the Potter chert concentrations, were found at Caprock Canyons State Park (Bagot and Hughes 1979:88-93).

Limestone is also found in small quantities in Quaternary gravels in the project area, and some fire-cracked limestone does occur on sites. Burned limestone makes up only a small percentage of the fire-cracked rocks in the study area.

Following Potter chert, the next most abundant thermally altered rock in the Justiceburg area is sandstone. Burned sandstone in the project area is not fire-cracked, however. It is most commonly found in large complete slabs, and it is difficult to determine the presence of burning solely from their exterior appearance. Intensively burned pieces may exhibit reddened or blackened exteriors, but in many cases the only way to determine if sandstone has been burned is by breaking off a small section and viewing the interior for discoloration.

TABLE 12
TEMPORAL AFFILIATIONS OF JUSTICEBURG PREHISTORIC SITES

Temporal Affiliation	Site Number	Site Type
<u>SINGLE COMPONENT</u>		
Middle Archaic	41GR264	Open campsite
	41GR359	Lithic procurement/open campsite
	41GR429	Open campsite
	41GR442	Open campsite
Late Archaic	41GR274	Lithic procurement/open campsite
	41GR340	Lithic procurement/open campsite
	41GR425	Open campsite
	41GR451	Open campsite
	41GR504	Lithic procurement/open campsite
Undefined Archaic	41GR204	Lithic procurement/open campsite
	41GR207	Open campsite
	41GR376	Lithic procurement/open campsite
	41GR393	Open campsite
	41GR541	Lithic procurement/open campsite
	41KT49	Lithic procurement/open campsite
Late Prehistoric	41GR54	Rockshelter
	41GR271	Lithic procurement/open campsite
	41GR383	Open campsite
	41GR390	Open campsite
	41GR407	Lithic procurement/open campsite
	41GR432	Open campsite
	41GR444	Open campsite
	41GR474	Open campsite
	41GR515	Lithic procurement/open campsite
	41GR563	Lithic procurement/open campsite
(Palo Duro?)	41GR325	Open campsite
	41GR438	Open campsite
(Garza?)	41KT47	Open campsite
	41KT53	Open campsite
	41KT79	Open campsite

TABLE 12
TEMPORAL AFFILIATIONS OF JUSTICEBURG PREHISTORIC SITES

Temporal Affiliation	Site Number	Site Type
<u>SINGLE COMPONENT</u>		
Middle Archaic	41GR264	Open campsite
	41GR359	Lithic procurement/open campsite
	41GR429	Open campsite
	41GR442	Open campsite
Late Archaic	41GR274	Lithic procurement/open campsite
	41GR340	Lithic procurement/open campsite
	41GR425	Open campsite
	41GR451	Open campsite
	41GR504	Lithic procurement/open campsite
Undefined Archaic	41GR204	Lithic procurement/open campsite
	41GR207	Open campsite
	41GR376	Lithic procurement/open campsite
	41GR393	Open campsite
	41GR541	Lithic procurement/open campsite
	41KT49	Lithic procurement/open campsite
Late Prehistoric	41GR54	Rockshelter
	41GR271	Lithic procurement/open campsite
	41GR383	Open campsite
	41GR390	Open campsite
	41GR407	Lithic procurement/open campsite
	41GR432	Open campsite
	41GR444	Open campsite
	41GR474	Open campsite
	41GR515	Lithic procurement/open campsite
	41GR563	Lithic procurement/open campsite
(Palo Duro?)	41GR325	Open campsite
	41GR438	Open campsite
(Garza?)	41KT47	Open campsite
	41KT53	Open campsite
	41KT79	Open campsite

Table 12, continued

Temporal Affiliation	Site Number	Site Type
<u>MULTICOMPONENT</u>		
Archaic/Late Prehistoric	41GR33	Lithic procurement/open campsite
	41GR203	Open campsite
	41GR388	Lithic procurement/open campsite
	41GR396	Lithic procurement/open campsite
Late Archaic/Late Prehistoric	41GR13	Lithic procurement/open campsite
	41GR206	Lithic procurement/open campsite
	41GR263	Lithic procurement/open campsite
	41KT42	Open campsite
Late Archaic/Late Prehistoric (Palo Duro?)	41GR256	Open campsite

Preliminary experiments in heating Potter chert and sandstone were conducted during the survey. While the experiments were not rigorously controlled, they did suggest the following generalizations:

(1) The local sandstone, usually a light greenish tint on its interior, becomes progressively more discolored with additional heatings, but one intensive heating of short duration (about one hour) produces a noticeable darkening or reddening of the interior. Additional heatings continue to darken or redden the interior, while the exterior appearance is relatively unchanged. Sandstone does not fracture during heating, a characteristic which makes it preferable to Potter chert for constructing hearths.

(2) Intensive heating of Potter chert produces very distinctive characteristics. The cortex of small nodules may be slightly reddened, and the interior may be darkened to a dark gray. Most obvious, however, is the angular cracking which occurs. Impacts to heated fragments produce similar angular fragments, and the material can no longer be flaked.

(3) Potter chert is very efficient for stone boiling, as has been demonstrated for quartzites (Etchieson et al. 1978:331). Potter chert used for stone boiling cracks very rapidly during the boiling, but the cracked fragments are not visually distinguishable from angular Potter chert fragments which were intensively heated but not used for stone boiling. This suggests that it may be difficult to distinguish true boiling stone dumps from other burned Potter chert features.

(4) The differences in thermal properties (e.g., heat retention and fracturability) between sandstone and Potter chert suggest that the materials were preferentially selected for different functions. This may help explain why burned rock features vary considerably in materials.

Many open campsites at Justiceburg Reservoir contain distinctive burned rock features which are exposed by sheet erosion, cutbanks, roadways, etc. These features are of four main types -- small burned sandstone features (hearths), large burned sandstone features, burned Potter chert features, and mixed features with burned sandstone and burned Potter chert. Small burned sandstone features (Fig. 19a) are either obviously slab-lined hearths or they appear to be hearths disturbed to various degrees. These could serve many functions but are generally assumed to have been used for cooking.

Large burned sandstone features (Fig. 19b) were noted at six sites (41GR264, 41GR383, 41GR396, 41GR422, 41GR432, and 41GR441). One such feature was noted at an Archaic campsite, 41GR264. Sites 41GR383 and 41GR396 are Late Prehistoric campsites on the upland margin on opposite sides of Gobbler Creek. The features exposed by roadcuts at these two sites are very similar. Both are thick lenses of burned sandstone exposed in vertical roadcuts, and both are about 2 m in length and 30-40 cm thick. Mussel shell fragments, tertiary thinning flakes, and other lithic debris were noted at these features. At 41GR396, a sandstone mano was found in association with the feature. The feature at 41GR441 is similar but is exposed horizontally on the surface of a lower alluvial terrace. It consists of an oval burned sandstone mound about 2x3 m in diameter and about 40 cm thick. Mussel shell fragments and chipped lithic debris and tools were found in association, but the site is temporally undefined.

All of these large burned sandstone features appear to be analogous to Central Texas burned rock middens and may be diminutive forms of this type of feature. Two burned rock midden features were noted at Crowell Reservoir (Etchieson et al. 1979:91-93, 100), and Thurmond et al. (1981:66) noted that some features in the Brazos Natural Salt Pollution Control project area resembled "small burned rock middens in a few instances." The burned rock middens at Justiceburg, if that is what they are, are some of the northernmost middens known in Texas. Their function in this region is still not known, but they are presumed to have been used for processing plant foods.

Burned and fire-cracked Potter chert is found at most of the open campsites in the project area. In most cases, only loosely defined clusters or scatters of burned Potter chert were found, but a few features were more obvious. Small tight clusters, less than 1 m in diameter, composed only of small angular fragments of burned Potter chert and occasional quartzite fragments (e.g., Feature 2 at 41GR302) are probably boiling stone dumps (Fig. 20a). They are similar to the boiling stone dumps described at Crowell Reservoir (Etchieson et al. 1979:354) except that the features at Crowell are dominantly quartzite with small amounts of Potter chert. These probable boiling stone features were noted at both Archaic and Late Prehistoric sites at Justiceburg. Based on surface data only, this neither supports nor contradicts the previously mentioned hypothesis that boiling stone dumps are dominantly Archaic features.

The last type of burned rock feature at Justiceburg is a combination of burned sandstone and fire-cracked Potter chert in small clusters (Fig. 20b). These are probably hearths. One of these mixed burned rock features at site 41GR263 is partially exposed by sheet erosion. It consists of burned sandstone slabs in a tight cluster surrounding and partially covering Potter chert and limestone nodules. It appears to have been intentionally constructed to create a box-like oven into which heated Potter chert and limestone was placed.

a

b

Figure 19. Burned rock features. (a) small burned sandstone feature (hearth) at 41GR446; (b) large burned sandstone feature (burned rock midden?) at 41GR383.

a

b

Figure 20. Burned rock features. (a) fire-cracked Potter chert feature (boiling stone dump?) at 41GR379; (b) mixed burned rock feature (sandstone and Potter chert) at 41GR263.

The four types of burned rock features encountered at Justiceburg illustrate the range of variability of these features (see Figs. 19 and 20). As noted above, Truscott and Crowell reservoirs contained a variety of different burned rock features. On the Salt Fork of the Brazos, Thurmond et al. (1981:54-55) noted several types of burned rock features consisting of quartzite, sandstone, and dolomite in various combinations. Wulfkuhle (1986: 377-407) described an excavated Late Prehistoric hearth in Fisher County associated with a large number of probable "boiling stones." The Late Prehistoric Garza and Lott sites (Runkles 1964; Runkles and Dorchester 1987) are west of the project area and closer to Cretaceous limestone formations, and limestone is commonly used, along with sandstone, in the slab-lined hearths at these sites. No boiling stones were found at these two sites. All of these sites illustrate the wide range of variability in burned rock features in the Southern Plains. The variability in materials is due in large part to the availability of local materials and probably in part to the intended function. The variability in morphology is probably due to functional and/or cultural differences.

Bedrock Mortars

Bedrock mortars are known from many areas in the Southern Plains but are relatively scarce. They are presumed to have been used in the preparation of food, but conclusive evidence is lacking. They occasionally preserve organic materials and can serve as pollen traps after abandonment. Pollen extraction must be done with great caution because bedrock mortars frequently are thoroughly cleaned upon discovery.

Bedrock mortars vary considerably in size and shape. They are usually round or oval in shape and are found in all stages of use. Some are very shallow and probably were abandoned in early stages of use, while others were probably abandoned subsequent to being worn beyond a usable depth. The shape of mortar holes may reflect functional differences resulting from the techniques of grinding. While pestles are rarely found, it is likely that wooden pestles were used in the deeper mortar holes.

A distinctive regional variety of pointed-oval bedrock mortar is dominant. This type of mortar was first recognized in the Abilene Region by Ray (1930), who termed them "boat-shaped" mortar holes. Sayles (1930) reported two boat-shaped mortars from Coke County at about the same time. The distribution of pointed-oval mortars is not known, but one is reported in Scurry County (Portis et al. 1968:63), Shawn (1971) reports 25 of them in Mitchell County, and Jackson (1938:134, 137) reports that several were found near rock art sites in Loving and Ward counties.

Kirkpatrick (1978:31) describes 57 pointed-oval mortars at 13 sites in Garza County and mentions two possible sandstone pestles (the latter are not described). Three of the 13 sites (site GA11 = 41GR31, site GA249 = 41GR390, and site GA197 = 41GR205) are in the Justiceburg Reservoir project area. The average size of the pointed-oval mortar holes is 33 cm long, 14 cm wide, and 18 cm deep; they range in length from ca. 20-55 cm, in width from ca. 10-20 cm, and in depth from 5-30 cm (Kirkpatrick 1978:33). Figure 21 shows shape and cross sections of a typical pointed-oval bedrock mortar.

With few exceptions, bedrock mortars found in the Justiceburg project area are of the pointed-oval type. All of these fall within the range described by Kirkpatrick (1978). The primary variable is the shape of the bottom, which can be rounded or somewhat pointed.

Figure 21. Typical shape and cross sections of a pointed-oval bedrock mortar. These drawings represent the average dimensions given by Kirkpatrick (1978:33). A-A' = 33 cm.

Less-distinctive shallow oval basin mortar holes also occur. These are sometimes of dubious origin. Some appear to be cultural, representing early stages of mortars, but others are possibly natural. Eleven sites in the project area (including the three mentioned by Kirkpatrick) contain bedrock mortars (Table 13). Eight of these sites contain definite pointed-oval mortar holes (Fig. 22); two of the eight also contain smaller shallow-basin features. Three sites (one is an isolated find) exhibit only shallow-basin features of dubious origin.

Site 41GR391 recorded by Alexander (1982) consists solely of three shallow round bedrock mortar holes. This site is reported to be within the project area, but the current investigations failed to locate it. The description of the site suggests that these features are of dubious origin.

Of the bedrock mortars in the project area, Kirkpatrick (1978:35) states that all of the mortars investigated (which include those at sites 41GR31, 41GR205, and 41GR390) were cleaned out completely for photographing. There is still a potential for obtaining pollen or organic residue samples from bedrock mortars at sites 41GR37, 41GR258, 41GR264, 41GR169, and 41GR388. In addition, there potentially are buried bedrock mortars at 41GR264 and 41GR388.

Trash Midden

One feature exposed in a cutbank is a Late Prehistoric trash midden layer at 41KT79. It consists of a band of gray, ashy soil about 30 cm thick which varies from 30 to 60 cm below the surface. A profile of the cutbank was troweled and the residue screened revealing a variety of cultural materials. These include the distal tip of an arrow point, a

Figure 22. Bedrock mortars at 41GR31.

two-beveled knife of Alibates agate, chipped lithic debris, a deer tooth and scapula, and other unidentifiable bone fragments. Beveled knives in this region usually are associated with Garza Complex sites.

Cairns

Cairns are piles of rocks which are cultural in origin. There are probably countless reasons why people made rock piles in the past, but only one function of prehistoric cairns has been recognized in the region. They were typically used to cover and mark or protect human interments. Several cairn burials in the region have been investigated, including one in Kent County (Holden 1929:31-33), one in Garza County (Shedd 1968), a double burial in Donley County (Witte 1955), a multiple burial in Garza County (Cockrum 1963), and a slab-lined, cairn-covered interment from Dickens County (Parsons et al. 1979). The first three burials are Late Prehistoric in age; the latter two are probably late Archaic.

In the Justiceburg Reservoir project area, no definite cairn burials were found. A number of isolated rock piles were observed; these were determined to be either natural in origin or fortuitous piles of rocks. A possible cairn at 41GR264 was shovel tested; the rock pile was found to rest almost directly on bedrock and yielded no evidence of human burials. Another possible cairn at this site was not tested. Several possible cairns were noted at 41GR271; a shovel test of one feature again revealed no cultural materials. The cairns within site locations are very likely cultural in origin. It is known that the tested features are not burial cairns, but their function is still unknown.

TABLE 13
BEDROCK MORTARS IN THE JUSTICEBURG RESERVOIR PROJECT AREA

Site No.	Site Type	No. of Mortar Holes	Type	Comments
41GR31	Undefined open campsite	15	pointed-oval	Mentioned by Kirkpatrick (1978) as site GA11. Mapped and recorded by Alexander (1982:20).
41GR33	Archaic/Late Prehistoric lithic procurement/open campsite	2	pointed-oval	
41GR54	Late Prehistoric rockshelter (Reed Shelter)	?	shallow basin	Riggs (1966:56) noted five shallow-basin mortar holes near Reed Shelter. When the site was revisited, no definite mortars were noted.
41GR205	Undefined open campsite	3	2 pointed-oval, 1 shallow oval basin	Kirkpatrick (1978) mentions two pointed-oval mortar holes at GA197. The current investigations recorded these two and a smaller shallow-basin mortar hole.
41GR258	Undefined open campsite	1	pointed-oval	
41GR264	Middle Archaic open campsite	2	pointed-oval	
41GR269	Undefined lithic procurement/open campsite	1	pointed-oval	
41GR388	Archaic/Late Prehistoric lithic procurement/open campsite	3	2 pointed-oval, 1 shallow basin	

Table 13, continued

Site No.	Site Type	No. of Mortar Holes	Type	Comments
41GR390	Late Prehistoric open campsite	4	pointed-oval	Riggs (1966:56) reported 10 bedrock mortars across the creek from Reed Shelter. This is probably Kirkpatrick's (1978) site GA249, listed with only two pointed-oval mortars. When the site was revisited, four pointed-oval mortars were noted, but the shallow basins are probably natural. Four bedrock mortars were also noted by Alexander (1982).
41GR425	Undefined open campsite	1	shallow basin	Possible natural feature.
41KT74	Isolated find	1	shallow basin	Isolated find, single bedrock mortar; possible natural feature.

Alexander (1982) recorded 41GR397 as an isolated cairn suspected of containing a burial. It is near the project boundary, and a special search was made of a large area around the reported location. The feature could not be relocated.

Unburned Sandstone Features

Two clusters of unmodified sandstone found in an alluvial terrace at site 41GR405 are potentially cultural features. One is exposed in a roadcut and the other in an erosional gully. Scattered lithic debris at the site are not directly associated with the features, and several shovel tests revealed no other cultural materials. If these features possibly are cultural, their function is unknown. They may be natural features (i.e., colluvial slope debris from nearby bluffs).

Artifacts

The artifacts collected during this survey (see Appendix A) do not constitute an unbiased sample of the artifacts in the Justiceburg Reservoir project area. Certain

classes of artifacts, i.e., projectile points, ceramics, unifaces, bifaces, and gouges, were systematically collected. All other classes of artifacts were selectively collected to obtain a representative sample or were selectively collected if they were thought to have some special interpretive value. The collected artifacts, then, are considered representative of the kinds of materials present but not the relative quantities of materials.

Table 14 shows the relative abundance of different types of artifacts at the 243 prehistoric sites in the project area. The data includes collected artifacts, artifacts which were noted but not collected, and artifacts noted or collected by previous researchers. These combined data are more representative of the total artifact assemblage.

TABLE 14
PRESENCE OF ARTIFACT TYPES AT THE PREHISTORIC SITES*

Artifact Type	Number of Sites with Artifact Type Present	% of Sites
Manos	59	24
Metates	10	4
Dart points	24	10
Arrow points	20	8
Unifacial tools	73	30
Bifacial tools	81	33
Triangular gouges	26	11
Ceramics	7	3
Chipped lithic debris	222	91
Mussel shells	18	7
Bones	22	9

*Total sites = 243, excludes isolated finds.

The ground stone manos at Justiceburg are made exclusively of local sandstones or quartzites, and metates are made exclusively from sandstones. This seems to be generally true for most of the Lower Plains, although in areas of Cretaceous outcrops limestone is often used, and in areas of Permian outcrops dolomite is used for ground stone tools. At Justiceburg, grinding stones are found at both Archaic and Late Prehistoric sites in roughly equal frequencies. There is no notable difference in occurrence between sandstone and quartzite manos, and they occur together at sites. There may be a functional difference between them, but this cannot be adequately demonstrated. All of the manos have either flat or beveled grinding surfaces. This may reflect either functional differences or simply preferences in grinding techniques.

Chipped stone tools are the most common artifacts found at the prehistoric sites in the region. Only a few of these are temporally diagnostic. Dart points and arrow points are the basis on which most temporal assignments are made. Dart points which can be

assigned to types include a Castroville (41GR504), two Ensors (41GR461 and 41KT42), a Mahomet (41GR256), and two Nolans (41GR442 and 41KT59), although one Nolan and one Ensor are isolated finds. Castroville is an established point type in the Rolling Plains (Etchieson et al. 1978:86) and is documented in association with late Archaic bison kills (D. Hughes 1977). The late Archaic Ensor type is common in Central Texas (Prewitt 1981) but is also documented in the Rolling Plains (Etchieson et al. 1978: 86). The late Archaic Mahomet type recognized in Central Texas (Prewitt 1981) is not specifically known in the Rolling Plains; it is a variation of the former Darl type which is reported in the Rolling Plains (Etchieson et al. 1978: 86). The middle Archaic Nolan type is well established in Central Texas (Prewitt 1981) but is not well documented in the Rolling Plains (Etchieson et al. 1978:86). Untyped dart points include stemmed varieties which may be middle to late Archaic and corner-notched points which are thought to be late Archaic.

Recognized arrow point types in the Justiceburg project area include four Deadman's (one from 41GR256 and 41GR325 and two from 41GR438), three Fresnos (41GR396, 41GR432, and 41KT42), one Harrell (41GR515), one Harrell or Washita (41GR325), and one possible Livermore (41GR33). Deadman's is an early type associated with the Palo Duro culture (Willey and Hughes 1978b). The Fresno, Harrell, and Washita types are common throughout the Texas Panhandle and Lower Plains region. These are associated with several different cultural phases and complexes, including the locally recognized Garza Complex. The possible Livermore point from 41GR33 is a somewhat more unusual occurrence in the Lower Plains. This type is attributed to the Livermore Focus, and less certainly the Jornada Mogollon, in the Trans-Pecos area (Suhm and Jelks 1962:279-280). Shedd's collection from the same site (41GR33; Shedd site 25) contains a Perdiz point, a Washita point, and a serrated Deadman's point.

Other chipped stone tools found at Justiceburg are also temporally diagnostic. Seven artifacts are classed as alternately beveled bifaces. Of these, four (from 41GR33, 41GR339, 41GR444, and 41KT79) are Late Prehistoric beveled knives characteristic of bison-hunting tool kits and associated with the Garza Complex in the Lower Plains. Two are made of Alibates agate, and three were found at sites with arrow points. Snub-nosed unifacial end scrapers also are considered to be diagnostic Late Prehistoric bison-skinning tools, and four specimens were collected (from 41GR368, 41KT53, 41KT75, and 41KT83). Only one is from a known Late Prehistoric site (41KT53) which yielded Southwestern ceramics and may be a Garza Complex site.

Triangular unifacial gouges of the Clear Fork type are sometimes considered to be Archaic in age and diagnostic of the early and middle Archaic (Etchieson et al. 1978:348, 1979:353; Hughes 1978b:39). Of the 26 Justiceburg sites at which gouges have been found or recorded, only one contains solely Late Prehistoric artifacts, while five contain Archaic components. Other rectangular-shaped gouge tools, like planar tools found in the area, may be similar in function to the Clear Fork gouges.

Ceramics were collected from four sites in the project area and were noted by previous investigators at three other sites. A sherd of El Paso Polychrome was found at 41GR396, and an unidentified brownware sherd is an isolated find at 41GR482. Pecos Glaze Polychrome V and associated Pecos Faint Striated ware were found at 41KT53, along with an unidentified brownware sherd. The decorated polychrome sherds were found in an animal burrow backdirt pile, and the plainwares were found in a shovel test. A sherd of Pecos Glaze Polychrome V was also found at disturbed upland site 41KT47. Shedd noted ceramics at 41GR13 (Shedd site 24) when he originally recorded the site. His collection from 41GR33 (Shedd site 25)

contains ceramic sherds identified as Bullard Brushed, which is an East Texas type. Shedd's collection from site 41GR563 (Shedd site 24c) contains sherds of micaceous "Apache pottery" which have not been identified.

Bones were found at a number of sites in the Justiceburg project area, but only in a few cases are the bones definitely culturally related. At many of the sites, the bones may have been deposited through either natural or cultural processes. Bones from definite cultural contexts include the deer bones and other bone fragments from the trash midden at 41KT79 and the buried bone fragments from a shovel test in rockshelter site 41GR559.

Mussel shells were also found at a number of Justiceburg sites. Mussel shells were recovered from a shovel test in rockshelter 41KT57 and were noted at other sites in association with burned rock midden(?) features. The midden features and the mussel shells suggest a subsistence activity not previously documented in the region.

Lithic Resource Utilization

Many lithic materials were available for the prehistoric inhabitants of the Southern Plains to use in fashioning chipped and ground stone tools. In the immediate vicinity of the proposed Justiceburg Reservoir, the most abundant rock is sandstone. The upper sandstone ledge forming the bluff edge in most of the reservoir area is a Triassic sandstone which is fine grained and very compact. The weathered surface is stained red or dark gray to black. The unweathered sandstone, however, is usually a greenish gray color. This sandstone is the same bluff-forming Trujillo sandstone found in Palo Duro Canyon (Matthews 1969:23) and in Mackenzie Reservoir (Hughes 1978a:21), and there are several other Triassic sandstone layers of varying grain size, color, and density below the canyon rim. These Triassic sandstones, found throughout the reservoir area, commonly were used to manufacture manos, metates, and other ground stone tools (e.g., abraders, shaft smoothers). The sandstone outcrops often were used for bedrock mortars, and aboriginal rock art frequently is etched into or painted onto sandstone faces. Sandstone slabs are the preferred material for constructing cooking hearths, and burned sandstone debitage is very common. Elsewhere in the Texas Panhandle, sandstone was used by prehistoric peoples in constructing houses, but at Justiceburg this use can only be associated with historic occupations. The Triassic sandstone outcrops in Mackenzie Reservoir (Hughes 1978a:23) were utilized in very similar ways to those in the Justiceburg Reservoir project area.

Lithic procurement areas are abundant throughout the project area (Fig. 23). These are natural Quaternary gravel deposits found on the uplands, canyon rims, and erosional remnants. In some cases, these gravels have been redeposited onto talus slopes and bedrock terraces.

These gravels are composed of siliceous stream-worn rocks which range in size from small pebbles to large cobbles. The smaller stream pebbles are of a wide variety of different silicate minerals and are probably derived from the Triassic conglomerates. Most of these are too small to have been utilized as a lithic source, but small pebbles of a milky, pure-white quartzite, which seem to be from Triassic conglomerates, are frequently tested and occasional artifacts are fashioned from them (Jack T. Hughes, personal communication 1987).

Figure 23. Distribution of Quaternary gravel lithic procurement areas.

The larger gravels are of two types -- Potter chert and quartzites -- both of which are derived from the Ogallala Formation (see Chapter 2). Potter chert nodules in the Justiceburg area are relatively large and vary from fist sized to bowling-ball sized and larger. Jack Hughes (personal communication 1987) notes that in the Justiceburg area outcrops, the Potter chert cobbles are larger and are more concentrated than most outcrop areas along the eastern Escarpment.

The quartzites found in the Quaternary gravels of Justiceburg are stream-worn quartzites and metaquartzites which vary considerably in grain size, color, and size of the nodules. The coarser grained materials were commonly used for making manos and are often battered and worn, indicating use as hammerstones. The finer grained quartzites, generally resulting from a higher degree of metamorphism (Hood 1978:380), were a preferred material for chipped stone tools, especially gouges, scrapers, and flake tools. One variety of quartzite is very distinguishable and relatively abundant. It is a maroon, red, or purple, medium-grained, sugar-textured quartzite and was utilized frequently. This material becomes less abundant in the Quaternary gravels farther away from the Caprock. Jack Hughes (personal communication 1987) notes that it is very common along the Canadian River but much less abundant in the Justiceburg area. Hood (1978:380) notes that it is rare in the Seymour Gravels.

The Quaternary gravels at Justiceburg also were used extensively, presumably in the processing of food resources, resulting in large quantities of burned debitage. It is not known exactly how these materials were being used, but different types of burned rock features suggest that varying functions are represented.

Other materials which originate in the Ogallala Formation and are found in the Quaternary gravels are silicified wood and undefined types of jasper and chert. These materials also were used for chipped stone tools in the Justiceburg area, but they are relatively rare. As would be expected with gravel deposits, there is considerable variation in the composition of individual outcrops, not only along the Caprock Escarpment but also within the reservoir area itself. Opalized caliche also originates in the Ogallala Formation and is found in several locations on the Llano Estacado (Holliday and Welty 1981:209). It is rare in the project area, and only two artifacts, an Archaic Nolan point from 41KT59 and a scraper from 41GR456, are probably made of opalized caliche.

The collected lithic debitage is not described or analyzed in detail because the collections are not comparable on a site-to-site basis. Most of the debitage was collected from shovel tests, and its primary use is in providing information on site depth and extent. Lithic debitage was not collected from the surface of sites unless exotic or unusual materials were present. Samples of burned lithic debris from shovel tests were collected.

Of the lithic debitage collected, 246 specimens (71%) are chipped lithic debris and 102 specimens (29%) are burned lithic debris. Potter chert and sandstone comprise 74% of the burned rock debris, and observations of the burned rock features, as previously discussed, indicates that sandstone and Potter chert were the preferred materials. One hundred and ninety-six chipped stone tools were collected. These materials, along with the debitage, are not a random sample of the lithic materials utilized but are considered to be fairly representative of the materials and their relative frequency. Table 15 compares the lithic material types represented at Justiceburg with other study areas in the Lower Plains. All of the survey areas for which data are presented are within a 160-km (100

TABLE 15
LITHIC RESOURCE UTILIZATION IN THE LOWER PLAINS REGION*

Material	Justiceburg				Crowell		Upper Clear Fork	Brazos Salt Pollution	Truscott	Mackenzie
	Chipped Stone				Chipped Stone		All Chipped Stone	Chipped Stone	All Lithic Materials	All Lithic Materials
	#	%	#	%	%	%	%	Tools %	%	%
Edwards chert	95	48.5	62	25.3	4.30	0.61	99.6	-	6.80	2.9
Potter chert	38	19.4	46	18.8	48.74	64.63	x	11.1	46.60	24.2
Maroon Ogallala quartzite	11	5.6	12	4.9	1.04	0.54	-	-	11.80	-
Other Ogallala chert/quartzite	10	5.1	-	-	-	-	-	63.5	-	2.0
Silicified wood	2	1.0	3	1.2	12.80	7.22	x	9.4	8.20	5.0
Alibates agate	5	2.6	1	0.4	0.67	0.28	x	1.6	0.33	6.4
Tecovas jasper	3	1.5	6	2.4	11.98	9.96	x	3.2	0.45	56.4
Obsidian	1	0.5	1	0.4	-	0.02	-	-	0.03	-
Other and/or unidentified materials	<u>31</u>	<u>15.8</u>	<u>114</u>	<u>46.5</u>	<u>20.48</u>	<u>16.73</u>	<u>x</u>	<u>11.2</u>	<u>25.80</u>	<u>3.1</u>
Totals:	196	100.0	245	99.9	100.01	99.99	99.6	100.0	100.01	100.0

*Crowell -- Etchieson et al., 1,352 lithic tools (1979:Table 25, 279), 9,288 unworked flakes (1979:Table 25, 337).

Upper Clear Fork -- Wulfkuhle (1986:423), approximately 8,000 lithic specimens; x indicates materials present but no numbers were specified.

Brazos Salt Pollution -- Thurmond et al. (1981:Table 20), 63 lithic tools.

Truscott -- Etchieson et al. (1978:Table 24), 6,543 lithic specimens.

Mackenzie -- Hughes and Willey (1978:272), 1,038 lithic specimens.

mile) segment of the Lower Plains region. The considerable variation seems to be correlated directly to the proximity of each survey area to major lithic outcrops and to local variations in the composition of Quaternary gravels. Some differences are due to individual biases in the identification of materials. For example, some studies recognize maroon or purple Ogallala chert as a distinctive lithic type, while others do not. For the most part, however, the data are roughly comparable.

Edwards chert was used almost exclusively in the Upper Clear Fork. Primary outcrops of the Cretaceous Edwards Formation are found immediately south of there, and Edwards chert and limestone are common in the redeposited gravels in the project area (Wulfkuhle 1986:18). Justiceburg is also only a short distance from Cretaceous outcrops, and Edwards chert is found redeposited in the local gravels in the project area. Edwards chert is not abundant in the gravels, but it was evidently a favorite material selectively chosen for many types of tools, and undoubtedly some of the Edwards chert was transported into the area. Farther north and east of Justiceburg (and away from the northernmost Cretaceous outcrops), Edwards chert is not found in the local gravels and becomes rare in archeological sites. The Double Mountain Fork of the Brazos cuts through Cretaceous outcrop areas, but the Salt Fork of the Brazos does not. It is interesting to note that only 80 km (50 miles) north-east of Justiceburg, no Edwards chert was collected from the Brazos Salt Pollution Control study on the Salt Fork.

Evidently Edwards chert was a valuable resource in the Southern Plains. A cache of over 800 Edwards chert blades and an associated Perdiz point was found on the Salt Fork in Kent County (Tunnell 1978:44). The Weaver-Ramage cache was found in a single pit near the river and is thought to be a cache of Perdiz preform blades. Other caches of Edwards chert are known from King, Motley, and Haskell counties (Tunnell 1978:45), and 11 caches of Edwards unifaces and bifaces are reported from Lynn, Dawson, Gaines, Martin, and Howard counties (Hart 1983).

Potter chert and quartzites derived from the local Quaternary gravels in the Lower Plains seem to vary somewhat from area to area but still make up a considerable amount of the utilized lithic materials in most areas. Ogallala materials are abundant in the local gravels and were the dominantly utilized materials in the Crowell, Truscott, and Brazos Salt Pollution survey areas. In these areas, the Quaternary gravels are the only lithic source, which explains the obvious preference for the material. In the Upper Clear Fork study area, Ogallala materials are present in the gravels (Wulfkuhle 1986:18) but were virtually ignored in favor of Edwards chert. At Mackenzie Reservoir, Ogallala materials were utilized frequently, but the dominantly preferred material was Tecovas jasper which outcrops very near the survey area.

Obsidian is rare in the Lower Plains and is an obvious import. The nearest known source areas are in New Mexico, and most of the obsidian found in the Southern Plains seems to have been obtained from the Jemez area in New Mexico during Late Prehistoric or Proto-historic times via trade through the Picuris and Pecos pueblos (Baugh and Terrell 1982). Two specimens of obsidian were collected from Justiceburg at a site with a Late Prehistoric component (41GR13). These were identified as being from the Jemez Mountains area of northern New Mexico (see Appendix A).

Alibates agate is another imported material in the Justiceburg area. It is derived from a fairly localized source area in the northern Texas Panhandle, about 290 km (180 miles) north of Justiceburg. While visual identification of Alibates should only be done

with caution, certain varieties of the material are clearly recognizable. At Justiceburg, only specimens which are obviously Alibates are so designated. Only a handful of specimens of Alibates were collected, and it is interesting to note that of the five artifacts collected, three are Late Prehistoric. One is a Fresno arrow point from 41KT42, and two are alternately beveled bifaces from 41GR444 and 41KT79. Extensive distribution of large quantities of Alibates agate did not begin until Late Prehistoric times (Lintz 1982b). It is also noteworthy that of all the survey areas compared in Table 15, Mackenzie Reservoir has the highest percentage of Alibates; it is also closest to the source area. Wulfkuhle (1986:440-441) reported flakes of Alibates agate in association with a hearth which was radiocarbon-dated to ca. A.D. 1300-1600, and a dart point midsection and uniface of Alibates agate from surface collections. Morrow (1936) reported a dart point and knife of Alibates agate from a late Archaic cremation burial in Taylor County. The sparsity of this material from known Archaic contexts supports the contention (Lintz 1982b) of less-widespread use of Alibates agate prior to the Late Prehistoric.

CHAPTER 9

HISTORIC RESOURCES IN JUSTICEBURG RESERVOIR

by Martha Doty Freeman

Introduction

The historic period in the Southern Plains is characterized by the development of Plains-New Mexico trade relations, tentative exploration of the area by scientific and military groups, confrontations between Native Americans and the military, the eventual decimation of both Indians and buffalo, and rapid and cataclysmic change as cattlemen and railroads extended westward rapidly.

Within the project area, some limited evidence exists in petroglyphic records (41GR333 and 41GR445) to suggest that military personnel may have followed the South Fork of the Double Mountain Fork to the vicinity of present-day Justiceburg as early as 1849. Firm evidence of an Anglo-American presence, however, does not occur until 1878. In that year, an individual named A. W. McCormick, who may have been attached to a buffalo-hunter's campsite nearby (41GR528), was buried in a solitary grave on Sand Creek just south of the river.

The decades preceding 1880 saw only limited and sporadic use of southeastern Garza County by non-Indian populations. In contrast, the closing decades of the century were characterized by intensive utilization of the area by cattlemen whose frontier was described by Jones and Richardson (1943) as moving westward "by seven-league strides." The Comanche and buffalo were gone, for the most part, and grass "covered every prairie, draw, and valley."

The Colorado, Concho, the Clear Fork, and the Double Mountain Fork of the Brazos and their tributaries afforded water. Their brakes and adjacent buttes gave shelter from the northers. Hackberry, mesquite, and scrub oak supplied fuel and poles for corrals and dugouts. It is not an over statement to call this land a cattleman's paradise. [Jones and Richardson 1943:36-37]

In 1987, 28 historic structures and archeological sites were recorded in the proposed Justiceburg Reservoir project area, exclusive of historic rock art sites. Of those structures and sites, 10 are dumps which cannot be associated with a specific event or habitation site in or near the project area; 1 is a dump which is associated with an historic site in the project area; 14 are locations of dugouts or other habitations; 1 site is a cemetery; 1 is a campsite in association with a grave; 1 is an industrial complex related to railroad development in the area; and 2 are chronologically and functionally unidentifiable.

Evidence of historic activities such as European-Indian trade, Anglo-American military exploration, and Hispanic trade and ranching was either missing from the archeological and architectural record in the project area or was present in sites whose identity was conjectural, at best. However, the structures and sites which were recorded are representative

of many of the later significant historic activities, periods, and/or events which occurred in southeastern Garza County and western Kent County after 1875. Among these activities were the killing of the last great buffalo herds in the late 1870s by hunters, the immigration of homesteaders in the late nineteenth and early twentieth centuries, and the development of towns such as Burnham and Justiceburg after construction of the Santa Fe Railroad in 1910.

1875-1899: Buffalo-hunting and Ranching,
Early Economic Activity in the Project Area

Historical Overview

Utilization of the resources within the project area occurred immediately after the removal of Plains Indians and took the form of buffalo-hunting by professional outfits from Kansas and North Texas along the Canadian River. One of the best-known of these outfits was that of Josiah Wright and John Wesley Mooar, who began hunting in 1870 along Pawnee Creek, the Smoky Hill River, and the Arkansas River, and then became involved in supplying hides to W. C. Lobenstein, a Leavenworth, Kansas, hide dealer (Gard 1959:83-88, 95-97).

By 1873 hunting had been so intensive along the Cimarron River that the herds had thinned significantly, and so J. Wright Mooar and John Webb entered the Texas Panhandle and crossed the Canadian River. They returned to Kansas only to find buffalo so scarce that they decided to move permanently to Texas. In 1875 Mooar traveled south to Denison then up the Brazos River valley northwest of Fort Griffin. There he joined up with W. H. (Pete) Snyder, a freighter (Gard 1959:129-130, 134, 197-200).

In 1876 Mooar traveled to the vicinity of present-day Snyder, just south of the project area, and made camp on Deep Creek where Pete Snyder had purchased a supply store from H. T. Cornelius. Other outfits in the area included that of Raymond and Matt Rumph, who had arrived in present-day Garza County from Missouri in October 1876, and that of J. W. and A. B. Woody. The Rumphs made camp about 6 miles south of present-day Post, staying in a dugout with a rock chimney (Gard 1959:226-229; Anderson 1984:53). Their group, Mooar's, or some other outfit may have been responsible for a camp on Sand Creek (site 41GR528) where the existence of .44- and .45-70-caliber cartridges and primers and lead sprue from casting of bullets, similar to those found at Adobe Walls (Baker and Harrison 1986: 194-197), clearly points to buffalo or some other hunting activity of major proportions.

The Mooars continued to hunt from their camp on Deep Creek during the winter of 1877-1878, but it was clear to them that the buffalo had been so severely decimated that the business of shooting and skinning was almost at an end. They began to buy a few cattle which they put on the open range in Fisher County and, like many other buffalo hunters, soon came to view ranching as a more stable and profitable business (Gard 1959:251-254).

With the disappearance of the first natural resource which had attracted entrepreneurs to the upper Brazos River, the stage was set for capitalization on the second natural resource, grass. Utilization of rangeland which began slowly in the late 1870s and accelerated rapidly in the following decade was facilitated, in turn, by two factors relating to

railroad construction in Texas. First, the Texas and Pacific Railroad extended westward from Fort Worth to El Paso, making possible the shipment of supplies into the region and the shipment of cattle out (Mooar 1929:124). Second, the State of Texas had granted hundreds of sections of West Texas land to railroad companies to encourage the construction of rail lines throughout the State. In western Kent and eastern Garza counties, along the South Fork of the Double Mountain Fork of the Brazos River, the State granted two blocks of land (5 and 6), each of which was comprised of numerous sections of approximately 640 acres each (Fig. 24), to the Houston and Great Northern Railroad, a line which eventually merged with the International and Great Northern. These sections, which were separated from each other by State-owned sections, were surveyed in 1873 and subsequently patented to the Railroad.

In the early 1870s, the Garza and Kent county sections were of little value to the Houston and Great Northern. With the explosive expansion of cattle herds in the period 1875-1880, however, the value of the property became clear as cattlemen sought to lease grasslands from both the railroads and the State. Such leases were common in and near the project area by 1880, and a study of deeds, General Land Office records, and ranch histories at that date demonstrates that virtually every part of the Garza-Kent county territory was utilized. In southwestern Kent County, for example, Clay Mann, with his famous "80" brand, ranged along the Double Mountain Fork, as did his father-in-law, George Kindred (Kin) Elkins. Partners with Mann in a 137-section Kent-Garza county lease at one time were Jim Jackson and Cal Sloan (Jones and Richardson 1943:38, 38n; [McKinney] 1981:176). Ranches or ranchers mentioned by cowboy Rollie Burns, who inscribed his name at site 41GR51 in 1883 and "reped" for the "22's" at the fall roundup on the Double Mountain, were the OS of Frank and Andy Long; the Two Circle Bar, whose range was in northeastern Scurry and northwestern Fisher counties; Charley Dalton in the east-central part of Garza County; Dan Kyle northwest of Dalton; the Curry Comb (≡) range of Young and Galbraith in the northwestern quadrant of Garza County; John B. Slaughter's range between the Yellowhouse Fork and McDonald Creek; and Will Slaughter's range north of John B. Slaughter (Holden 1932:76-77). Finally, the 1880 Garza County census lists three cattlemen along the Double Mountain Fork of the Brazos (probably a reference to the North Fork): Dan F. Cole from Mississippi, and Henry B. Beal and John W. Snead from Texas.

Because the range was still unfenced, livestock from most of the Garza-Kent county ranches ran together regardless of the location of actual leases. However, in 1882 an early attempt to actually purchase sections in the project area instead of merely leasing them occurred on January 1 when J. Wright Mooar, the famous buffalo hunter and cattleman from Scurry County and later Colorado City, made a payment on School Section 58, Block 5, Garza and Kent counties, on Grape Creek. Mooar made the payment to the State Treasurer's Office on behalf of his apparent partner, H. T. "Tuck" Cornelius, the first merchant to locate a trading post near Deep Creek and the old Mackenzie Trail in present-day Scurry County (Anderson 1984:53). This purchase was followed by a second purchase of Section 56, on which site 41KT42 is located, and a third purchase of Section 60, on which site 41KT84 is located (Fig. 25), on June 19, 1882 (Texas. General Land Office 1900a, 1900b, 1900c).

The alternating sections selected and purchased by Mooar for Cornelius were prime grazing lands which lay in a north-south-running line along Grape Creek, one of the most reliable sources of fresh water in the project area. The three sections also lay in the approximate middle of a 137-section lease which J. W. Mooar Brothers, Cornelius Brothers, and C. Sloan, comprising the firm of J. W. Mooar Bros. Cornelius and Sloan of Colorado [City], Mitchell County, negotiated on June 14, 1882, a date which coincides roughly with

Figure 24. Historic map.

Figure 25. Site 41KT84. The remains of an historic dugout in Section 60, Block 5, may date to the early 1880s when the land was one of three sections on Grape Creek owned by H. T. Cornelius, partner of the famous buffalo hunter, J. Wright Mooar (Texas. General Land Office 1900a, 1900b, 1900c; Anderson 1984:53). Later, the dugout functioned as a line camp for OS cowboys.

the period when Cornelius purchased Sections 56, 58, and 60, Block 5. The land involved included odd-numbered sections in Block 4 (Sections 1-69), Block 5 (Sections 1-139), and Block 6 (Sections 1-63) which the State of Texas had granted to the Houston and Great Northern Railroad Company in 1873 and which the Railroad had conveyed to the New York and Texas Land Company, Ltd. on November 20, 1880. The Mooar-Cornelius-Sloan lease cost the firm \$1,753.60 per year, and it ran from June 14, 1882, to June 13, 1887 (Texas. General Land Office 1873a; Garza County Deed Record 3:29-32).

The Colorado City partnership utilized the railroad lease and Cornelius retained ownership of the three sections on Grape Creek until December 14, 1886, when he sold the sections to Andy J. Long of Nolan County for \$500.00 (Texas. General Land Office 1900c). Presumably, Cornelius and his partners also transferred their legal interest in the 137 railroad sections to Long at the same time, although no record of the transfer was located during the current investigations.

The significance of the arrival of Andy J. Long and his brother, Francis M., in the project area cannot be overestimated, for it represented the earliest on-site use of the project area by individuals who would eventually become the first permanent settlers in southeastern Garza County. While it is likely that sites 41KT42 and 41KT84 date from the earliest use of the area by cowhands, or even hunters, employed by Mooar, Cornelius, and Sloan, permanent settlement did not occur until after the Long brothers entered the area, bringing with them a number of employees (Fig. 26) who eventually declared and lived on homesteads along the South Fork of the Double Mountain Fork.

Figure 26. OS cowboys, some of whom homesteaded sections in the project area, included O. B. Kelly, Joe Smith, Bud Boren, Hal McCarty, Bud Marable, and Will Williams. Photograph courtesy of Giles McCrary, Post, Texas.

Andy J. Long, the older of the two brothers, was born in Texas on October 23, 1849, to S. A. and Louisa J. (McFarren) Long. Shortly before 1860, the family moved to Uvalde County where a son was killed by Indians. They then moved to Medina County where Andy Long entered the cattle business. He sold out to Jim Lowe in 1875, then gathered cattle for J. N. Simpson in Taylor County and moved to Nolan County in 1877 where he remained until 1881 (Cox 1895:465).

On August 11, 1881, Andy Long married Queenie I. Boren in Bell County, Texas, and soon after moved to Garza County where Rollie Burns placed him in September 1881 with his brother Francis, who had been his partner in Taylor and Nolan counties (Cox 1895:400, 465; Holden 1932:76). While the exact manner in which the Longs acquired and utilized rangeland between 1881 and 1886 is not clear at this point, early employees such as Ed Scott, Sr., who began working for them in 1884, remembered that the Longs bought cattle belonging to the Overall & Street Ranch near present-day Fluvanna, consolidated them with cattle they already owned and with the "202" herd belonging to the Lexington Ranch Company, and branded them all "OS" (see Appendix B, rock art site 41GR51 for an example of the brand dating to 1889). By 1886 the supplemental tax rolls for Garza County showed that the Lexington Ranch Company owned by the Longs paid taxes on all of the even-numbered State sections in Block 6 and most of the even-numbered State sections in Block 5 lying between the eastern line of Block 6 and Little Grape Creek. The Company's use of the land continued in expanded form between 1888 and 1901 by means of a series of leases which they negotiated with the General Land Office. By 1893, the Longs controlled most of the land within the survey area (Garza County Deed Record 4:83-85, 280-282, 302-304; Deed Record 5:159-161) and still owned Sections 56, 58, and 60 which probably were the locations of line camps for the hands who rode fence.

The Long brothers, who were astute businessmen and owners of several large West Texas ranches, were obviously important to the successful operation of the OS Ranch. However, the cowboys who worked for them during the 1880s and 1890s, then continued to live in the project area as property owners after 1900, were equally important to the running of the Ranch and the development of southeastern Garza County. Men such as O. B. Kelly, W. V. Roy, Ed Scott, E. W. Clark, Will Williams, the Borens, and Ira Lee Duckworth (see Fig. 26), contributed substantial services first to their employers and later, with the passing of the free range, to the economic and political life of Garza and Kent counties.

While records concerning the earliest of the OS cowboys were not used during the current investigations, county records, information provided by descendants, and data collected from petroglyphs along the Double Mountain Fork suggest that one of the earliest employees who later homesteaded near the project area was Franklin Pierce Knox, who was born in Mississippi on November 24, 1856, and immigrated to Texas in 1874. In 1881 Knox moved to Colorado City and began working for rancher Bill Halloway. In 1884 he was employed by the Longs and married Florence Watkins in a log cabin belonging to early Kent County settler Smokey Brown on the Yellow House River. The couple's first home was a dugout on Grape Creek (possibly 41KT84) where they stayed while Knox rode OS fence (Didway 1973:35).

Another early employee of the ranch was James Minus Boren, whose aunt, Queenie Boren, had married Andy Long in 1881. Boren was born in Berryville, Arkansas, in 1870 and grew up in Bell County, Texas. His family made an attempt in 1879 to move to West Texas, but they lost their cattle in a snowstorm and were forced to return to Bell County. Boren then hired on with the Long brothers at their Garza County Ranch by 1887. He rode fence on the OS and stayed with other hands, including Ed Scott, Will Williams, and O. B. Kelly, at a camp which a son has described as being a half-dugout with a rock fireplace located on Grape Creek (possibly 41KT84).

Boren's brother, John S., hired on with the Longs in about 1889 but worked on their ranch near Sylvester before moving to the Justiceburg area in about 1900 (Ranch Headquarters Association 1970:20; Didway 1973:19-20). A third brother, S. D. Boren, is known to have worked for the Longs in the project area by the mid 1890s when he was riding fence and chased sheepherders from a camp (Fig. 27) they had established on Rocky Creek in a section leased from the State by the Longs (41GR443) (Boren 1987). Fellow employees in the 1890s included Will Williams, who brought his widowed mother and younger siblings to Garza County from Hamilton County (Women's Division of Post Chamber of Commerce n.d.:78); Walter V. Roy, who probably began working for the Longs in the late 1890s; and Ed Scott, Jr., who never settled permanently in the project area but was a frequent visitor to the line camps during his approximately 70 years of employment with the OS Ranch (The Post Dispatch, September 12, 1957:1).

Sites

Four of the historic sites recorded in or adjacent to the project area date from the period 1878 to 1899 (Table 16). They resulted directly from the earliest economic activities in the project area and are believed or known to have been associated with buffalo hunting (41GR528), sheepherding (41GR443), and cattle raising (41KT42 and 41KT84). The earliest of the sites, 41GR528, apparently was utilized by hunters for a brief period of

Figure 27. Site 41GR443. The remains of a dugout are located in Section 82, Block 5. The structure probably was built by N. P. Pyron in 1900; it was occupied later by O. H. Curtis and N. N. and Irene Rodgers, who lived in the 8x10-ft space in 1907 (Rodgers 1969).

time and may be associated with a grave dating from 1878 which was recorded as one feature of the site. The location of the site near running water (Sand Creek) and back from the canyon breaks, the sparsity of artifacts, and the types of artifacts (see Table 16) all point to temporary, short-term use of the site by hunters.

The second site, 41GR443, is comprised of a rock dugout, or chosa, and a rock corral which are located west of Rocky Creek and against the east face of a bluff. While sheepherding is not a well-documented activity north of Colorado City, east of the Caprock, or south of the greater Panhandle area, the two features at the site are typical of structures associated with sheep raising in West Texas; the presence of herders at the site has been affirmed by a local informant (Boren 1987).

The last two sites, 41KT42 and 41KT84, are associated with cattle ranching activities along the Double Mountain Fork prior to the fencing of the range. Their use as line camps continued into the twentieth century, but they date to the earliest period of ranching in Garza and western Kent counties. Informants and architectural evidence suggest that the line camps were of two distinctly different types: 41KT42 was a wooden structure with a rock fireplace, and 41KT84 was a half-dugout with partial rock walls. However, they were used for the same purpose -- as temporary shelter for ranch hands -- and shared a similar spatial relationship to Grape Creek, a permanent water source.

TABLE 16
HISTORIC SITES, 1878-1899

Site No.	Date of Use	Functions	Features	Artifacts	Elevation	Topographic Setting
41GR443	ca. 1890-1900	sheepherders campsite/ cowboy home- stead used by cowboy Dee Boren	rock chosa, rock corral, outbuilding site	tin cans, glass fragments, square cut nails, horse- shoes, misc. metal frag- ments, wood fragments, snuff can lid, flashlight, barbed wire, .44-40-caliber cartridge cases	2250 ft msl	bedrock terrace overlook- ing Rocky Creek to the east
41GR528	ca. 1878	hunters campsite/ grave	grave*	hand-carved sandstone grave marker; lead sprue; square nails; .44- and .45-70- caliber cartridge cases, primers, and slugs; can tops; brown and green glass; clay pipe fragment	campsite: 2245 ft msl grave: 2275 ft msl	erosional bedrock remnant overlooking Sand Creek floodplain
41KT42	ca. 1880s	cowboy line camp	stone footings, collapsed stone fireplace	glass; stone; .32-, .38-, and .44-caliber cartridge cases; crockery; square nails; wood fragments; metal buttons; hinged stein lid	2140-2160 ft msl	upper alluvial terrace near base of bluff over- looking Grape Creek and Double Mountain Fork
41KT84*	ca. 1880s	cowboy line camp	dugout and stone outbuilding site	glass, crockery, whiteware, stove parts, cast iron fragments, .38- or .40- caliber cartridge case	2260-2280 ft msl	lower alluvial terrace overlooking upper end of Grape Creek; near base of small erosional remnant area

*Outside project area

The Four-Section Act: Permanent Settlement
in the Project Area, 1899-1909

Historical Overview

One year shy of a new century, the rangeland along the Double Mountain Fork probably appeared much as it had for the preceding 50 years, with the exception of fencing which helped to separate the OS cattle from those belonging to other large ranches. There were no permanent settlements within the project area and no habitations of any kind with the exception of the dugout and log line camps located along Grape Creek and utilized sporadically by OS employees.

On April 4, 1895, however, the Legislature had passed an act which was designed to encourage permanent settlement on State lands. Known as the Four-Section Act, the legislation made it possible for an individual to purchase one section from the State for use as a homestead and then to purchase an additional three sections for grazing or agricultural purposes. The applicant was required to live on his homestead section, making permanent improvements to it, and then to file proof of his occupancy after three years (Garza County Deed Record 6:323-326; Texas. General Land Office 1926).

Response to the Act took two forms which strongly influenced the demographic and settlement patterns within the project area for the period 1899-1909. First, the Long brothers immediately recognized that their ranching operation was at risk because land they had previously leased from the State would no longer be available. To counter the effects of the Act, therefore, they induced their employees to file on four sections each and agreed that each hand would then be allowed to run his own few head of stock in with the large herds belonging to the OS Ranch. Employees who participated in this arrangement and constructed some kind of improvement on their homestead sections included Will Williams, who homesteaded Section 70, Block 5, immediately north of the project area and filed a proof of occupancy witnessed by Carl Clark, Dee [S. D.] Boren, and O. B. Kelly in 1903 (Texas. General Land Office 1933); and Walter Roy, who homesteaded Section 96, Block 5, where he built a dugout (41GR263), and who bought Sections 80 and 106 (Texas. General Land Office 1935a, 1935b; Williams and Ward 1987) and one unidentified section. On February 22, 1900, S. D. Boren swore that he was an actual settler on Section 114, Block 5, where he lived in the dugout (see Fig. 27) previously occupied by sheepherders (41GR443) and applied to purchase Sections 108, 110, and 138 for dry grazing land; his affidavit to demonstrate three-years' occupancy on Section 114 in 1903 was witnessed by OS cowboys O. B. Kelly, Carl Clark, and Will Williams (Texas. General Land Office 1919b, 1919c, 1919d). Boren's brother, James Minus Boren, declared Section 6, Block 6, to be his homestead in 1900 and applied to buy Sections 116 and 136, Block 5, and Section 4, Block 6, as dry grazing land (Texas. General Land Office 1921a, 1921b, 1921c). Finally, an agreement made in 1900 between N. P. Pyron and the firm of A. J. and F. M. Long suggests that Pyron may also have been an OS hand and provides a sample of agreements which the Longs may have signed with other employees. On April 20, Pyron, who had declared Section 82 (location of site 41GR392) to be his homestead tract (Fig. 28) and had purchased Sections 68, 92, and 94 from the State for dry grazing, leased the last three sections to the Longs "for grazing purposes only" for a 10-year period beginning March 17, 1900. The Longs were to pay \$75.00 per year to Pyron, all state and county taxes, and the money due to the State School Fund. Neither party was to run more than 50 cattle per 640-acre section, and Pyron was to have

Figure 28. Site 41GR392. In the early 1890s, OS cowboy S. D. "Dee" Boren drove sheepherders away from their camp on Rock Creek. Later, he used their dugout as his own residence while proving up on the surrounding 640 acres in Section 114, Block 5 (Texas. General Land Office 1919b; Boren 1987).

the right to run his bunch of cattle (approximately 35 head) on his home section in the Long pastures. Finally, if Pyron chose to sell the land in the future, it had to be with the agreement of the Longs and in such a fashion that their grazing lease would not be endangered (Garza County Deed Record 6:323-326; Texas. General Land Office 1914, 1938).

One effect of the Four-Section Act was to promote the settlement and construction of permanent improvements on the land within the project area by cowboys employed by the OS Ranch (see sites 41GR263, 41GR392, and 41GR443). A second effect of the Act was to promote the settlement of the balance of the project area by immigrants from other counties. These individuals came to the Double Mountain Fork with the intention of establishing homesteads. For the most part, they were agriculturalists who combined stock raising with a small amount of crop cultivation. Perhaps most importantly, they differed from the single, young OS cowboys because they brought their families with them, a factor which had significant social and economic implications for Garza County.

Because so much of the eastern portion of the project area was claimed by OS hands, much of the other homesteading activity occurred west of Sand Creek in Block 6. An affidavit filed by Thomas Jilson Payne with the General Land Office offers an excellent example of the fashion in which homesteaders went about locating and securing claims. Payne, a native of Lexington, Kentucky, who served as a Confederate soldier and moved to Colorado City, Texas, in about 1886 (Women's Division of Post Chamber of Commerce n.d.:55-56), wrote on December 28, 1899, that on or about December 8, he and his son, Thomas Eugene, reached the Double Mountain Fork in the company of H. J. Camp, a practical surveyor. Camp surveyed and located a number of sections for the Paynes, including 24, 26, and 32, Block 6. T. J.

selected 26 as his home section, and T. E. selected 32 as his home section (Texas. General Land Office 1936).

The Paynes camped on their home sections until December 11, then left for Snyder where they made application for the property. They returned to the Double Mountain Fork on December 13 and stayed until December 18, hiring a man named Thompson(?) to be in charge of their respective camps, the camps belonging to homesteaders Jeff and W. B. Justice, and their bedding, cooking utensils, clothes, and supplies.

On December 18, the Paynes traveled to Colorado City and then to Austin where they made application to purchase the Garza County land on the morning of December 22. They then left Austin, stopped briefly in Colorado City, and reached their home sections on the afternoon of December 28. To their consternation, they found the camp on Section 26 occupied by "one Scott" (possibly Ed Scott, an OS cowboy). Despite this possible challenge to their ownership, the Paynes prevailed, and Sections 24, 26, 32, 36, 38, 40, 44, and the west half of Block 6 remained in the family for a number of years, together with Sections 31, 37, and 45 which were purchased from the Railroad (Garza County Deed Record 9:396-397; Texas. General Land Office 1873g, 1873h, 1873i, 1919a, 1926, 1936, n.d.).

Fellow homesteaders in December 1899 were brothers Jeff D. and William B. Justice, born in Alabama in the early 1860s. Jeff Justice, who remained a resident of Garza County until his death on January 2, 1934, moved to Spur County in 1888 after his marriage to Mattie Humphreys of Red River County, Texas, and acquired ca. 18 sections of land there. A few years later, they moved to Snyder where Justice served as county treasurer from 1892 to 1894. In 1900 he filed a homestead claim on the south half of Section 20, Block 6, and built a dugout (site 41GR474); his brother filed a claim to Section 28, Block 6, south and west of the project area (U.S. Bureau of the Census 1900; The Post Dispatch, January 4, 1934; Texas. General Land Office 1939a, 1939c; Didway 1973:23-24).

After 1900 the Justices applied for and purchased part of Sections 12 and 20 and all of 14 and 17 for grazing and/or agricultural purposes; they bought Sections 11, 13, 19, and 25 from Thomas R. White, Jr. of Union County, New Jersey, who owned the interest of the New York and Texas Land Company in the Houston and Great Northern Railway Company lands; and they acquired Section 3, Block 6, from their neighbor to the east, S. D. Boren (Texas. General Land Office 1873a, 1873b, 1873c, 1873d, 1873e, 1873f, 1939a, 1939b, 1939c, 1939d).

By 1900 a significant proportion of the land in the project area had been homesteaded either by OS employees (see sites 41GR263, 41GR392, and 41GR443) or by homesteaders who raised livestock independently (41GR474). Perhaps as a result of the changes made by the Four-Section Act, the Longs, by now residents of Tarrant County, decided to sell their property in Kent and Garza counties. On June 1, 1901, they received \$200,239.20 for 9,500 head of stock cattle, cows, yearlings, and two-year-olds; 312 bulls; and 118 head of horses, all branded OS; all wagons, harness, plows, scrapers, cooking utensils, camp equipment, and fencing. They sold all leasehold interests, and in a deed dated June 7, 1901, they conveyed surveys in Kent and Garza counties totaling 26,411 acres. Sections included in the transaction which were in or adjacent to the project area were 56, 58, and 60 in Block 5 which had been conveyed to the Longs by H. T. Cornelius (Garza County Deed Record 7:40-41; Kent County Deed Record 8:199-202).

The partnership to which the Longs conveyed their holdings was comprised of three men. The first, E. W. "Shorty" Clark, was a well-known Scurry County businessman who purchased a

quarter interest in the OS Ranch. The second quarter-interest partner was John Scharbauer who was born in Albany County, New York, in 1852 and moved to Texas in 1880 where he raised sheep. After several years, Scharbauer moved to Abilene, then to Mitchell County in 1884, and finally to Midland in 1887, where he made his permanent home and headquarters for his livestock business.

In 1888 Scharbauer branched out into cattle raising and in the following year became a financial leader in West Texas. He later became President of the Pecos Valley Bank and Vice-President of the First National Bank of Midland, and he became a participant in two hardware stores and a grain business (Cox 1895:432).

Scharbauer's and Clark's 50% partner in the OS Ranch was Wilson Edward Connell, who was born in Bell County on April 12, 1858, to William and Loumisa (Wills) Connell. In 1860 the family moved to Brown County where Connell grew up and learned the cattle business. His success raising cattle enabled him to start a mercantile business with his brother, G. H., in Sweetwater, where they also acquired a buffalo hide warehouse.

In the mid 1880s, Connell moved to Midland where he opened another store and began carrying banking accounts for his customers. Within a few years, he went into banking as a separate endeavor in partnership with his brother and John Scharbauer under the name Connell Bros. & Scharbauer. In 1890 the bank received a charter and became the First National Bank of Midland (Cox 1895:463; McCrary 1970:8).

In January 1898, Connell moved to Fort Worth where he probably made contact with the Long brothers. He formed a partnership with Scharbauer and Clark in June 1901 for the purpose of buying the Long interests; approximately three months later, the new partners also purchased railroad sections belonging to Thomas R. White, Jr. in Blocks 5 and 6, six of which lay in or near the project area: Sections 55, 69, 71, and 79 in Block 5, and Sections 23 and 35 in Block 6 (Garza County Deed Record 7:179-183).

Most of the real property which Clark, Connell, and Scharbauer purchased from the Longs was well away from reliable water sources in the project area. For this reason, the leasehold interests which they had bought in 1901 were especially important to the success of the OS Ranch. Deed records indicate that these interests included 10-year leases on Sections 104, 120, and 132, Block 5, from John S. Boren; Sections 76, 80, and 106, Block 5, from Walter Roy; Sections 68, 92, and 94, Block 5, from N. P. Pyron; Sections 116 and 136, Block 5, and Section 4, Block 6, from James Minus Boren; Sections 108, 110, 114, and 138, Block 5, from S. D. "Dee" Boren; and Sections 54, 70, 72, and 78, Block 5, from Will Williams. In addition, Clark, Connell and Scharbauer leased Sections 66 and 84, Block 5, directly from Carl Clark (Garza County Deed Record 6:301-338, 349-352; Deed Record 7:17). All of these men had been employees of Andy and Francis Long. After the sale of the OS Ranch in 1901, they went to work for the new partnership.

A look at the 1900 Garza County census and a review of county histories which provide biographical data about early settlers in the project area reveals that southeastern Garza County experienced fundamental changes in the first decade of the twentieth century. The sparse population of single, young cowboys associated with the OS Ranch had been supplemented by numerous households comprised of married couples and their children. The majority of the population was still comprised of individuals born in Texas, Missouri, Kentucky, Alabama, Tennessee, and Mississippi, and many of the occupations pertained to stock raising; but a significant proportion of the area residents described themselves as farmers or

farm laborers (ca. 59%), suggesting a decided diversification in the local economy. The average age of the residents remained young, but almost 50% were less than 15 years old. Finally, the relative proportions of males and females changed, and women and female children represented over 70% of the total population.

These demographic changes and increases in total population resulted in a number of changes in the survey area. In simplest terms, increased population meant increased numbers of homesteads, and in and adjacent to the project area, approximately seven new homes were constructed either by families who moved out of their dugouts and into frame buildings or by individuals who moved into southeastern Garza County after 1900. A. O. Scarborough, for example, purchased Section 57, Block 5, from Thomas R. White, Jr. on June 18, 1901, and constructed a home east of Grape Creek in about 1905-1906 (site 41KT58). Scarborough then purchased Sections 59, 66-69, 81-83, and 92-94, Block 5, on which he ran a sizable cattle operation before moving into Snyder. His neighbors to the west, near Little Grape Creek, were Norman Nathaniel (Nonnie) and Irene (Van Leer) Rodgers, who bought Section 82 from Scarborough on May 18, 1907 (Garza County Deed Record 10:237-238). The Rodgerses moved into the old OS dugout (site 41GR392; see Fig. 28), then built a three-room house just outside the project boundary on Rodgers Hill in 1908 (Rodgers 1969).

To the north and west of the Rodgerses, across the Double Mountain Fork in Section 96, Block 4, Walter V. Roy got married and moved out of the dugout at 41GR263 where he lived as an OS cowboy. He constructed a frame house at 41GR565 which served as home for his new bride, Myrtle Hoffman of Denton, Texas (Didway 1973:30). In Section 107, Block 5, a member of the Williams family is thought to have occupied a home at 41GR412, while a short distance southwest in Section 114, Block 5, Dee Boren moved out of the dugout at 41GR443 and constructed a home out of the survey area in Section 138, Block 5, by 1913 (Garza County Deed Record 14:547). Northwest of Boren, in the south half of Section 20, Block 6, the Justices moved out of their dugout at 41GR474 and into a new late Victorian frame home on a low hill overlooking the Double Mountain Fork.

North and east of present-day Justiceburg, outside the project area, the newly arrived Arthur Tuffing family bought Section 10, Block 6, from T. J. Payne (Garza County Deed Record 7:222) and set up camp. Eventually, they built a house on the Section. Their neighbor to the east in Section 6, Block 6, was OS cowboy James Minus Boren who was an early mail carrier for the area, was elected Garza County's first judge, and drilled the first producing oil well in the county (Texas. General Land Office 1921b; Didway 1973:15).

An increase in home construction was one result of the increase in population after 1899. Concurrently, a demand for specific services occurred, and shortly after 1900, the Tuffings and their neighbors became frustrated with the irregularity of mail delivery from Light near present-day Fluvanna and Dark near present-day Dermott, both in Scurry County (Borden County Historical Survey Committee 1969:4). In response, the Tuffings established a post office in their home and named it Leforest after the first names of their two sons, Lee and Forrest Tuffing. At about the same time, the family started the area's first school on Section 10 which they also named Leforest. Children from the Tuffing, Justice, Knox, Smith, and Key families attended the school where Miss Ellen Kelly was the first teacher (The Post Dispatch, September 12, 1957:3; Didway 1973:28-30, 57-59).

Sites

Nine of the historic sites recorded in or adjacent to the project area either were constructed and occupied between 1899 and 1909 (41GR263, 41GR392, 41GR565, 41GR474, and 41KT58), were constructed prior to 1899 but were occupied after that date (41GR443, 41KT42, and 41KT84), or are dumps (41GR350) which can be positively identified with a habitation site occupied between 1899 and 1909 (Table 17). Of the nine sites, one is a dump (41GR350), four are dugouts or half-dugouts (41GR263, 41GR392, 41GR443, and 41KT84), two are the former locations of frame houses (41GR565 and 41KT58), and one is the location of an original homestead dugout and a later frame residence, both of which date between 1899 and 1909 (41GR474).

Eight of the sites were constructed and occupied by cowboys or ranchers, and the ninth (41KT58) was constructed and occupied by a doctor who probably engaged in some limited livestock production. Four structures (41GR263, 41GR392, 41GR443, and 41GR474) were constructed and/or occupied for the purpose of establishing a homestead claim under the terms of the Four-Section Act which required a three-year occupation of the desired section of land. Of those four, three dugouts (41GR263, 41GR392, and 41GR443) were occupied by employees of the OS Ranch for the purpose of holding land for the ranch owners; the fourth (41GR474) was constructed and occupied by an actual homesteader who intended to use the land himself. The remaining two structures (41KT42 and 41KT84) were on sections which had been purchased before passage of the Four-Section Act, and so they probably functioned as line camps rather than as devices for complying with a specific law.

Two sites (41GR474 and 41KT58) were occupied by individuals who derived income from nonagricultural sources -- commerce in the case of Jeff Justice at 41GR474 and medicine in the case of A. O. Scarborough at 41KT58. However, in all cases, the eight habitation sites were occupied by individuals or families who were engaged in livestock production, and their initial occupation occurred just prior to the construction of the Santa Fe Railroad and platting and development of the Justiceburg and Burnham townsites. Most of the sites (41GR263, 41GR392, 41GR443, 41KT42, and 41KT84) share the further characteristic of having been located immediately adjacent to freshwater resources, whether a spring or permanent creek. This is a characteristic which is shared, in fact, by all of the homestead/dugout sites or line camps occupied by employees of the OS Ranch (41GR263, 41GR392, 41GR443, 41KT42, and 41KT84).

The Railroad Arrives: Town-building and Industrial
Development in the Project Area, 1910-1945

Historical Overview

The period 1899-1909 saw a large influx of immigrants to the Double Mountain Fork of the Brazos River. Encouraged by the provisions of the Four-Section Act in some cases, and hoping to hold rangeland for livestock production in other cases, individuals and families established homesteads and participated in a basically agrarian community.

TABLE 17
HISTORIC SITES, 1899-1909

Site No.	Date of Use	Functions	Features	Artifacts	Elevation	Topographic Setting
41GR263*	ca. 1900-1905	homestead dugout used by cowboy Walter V. Roy	collapsed dugout and outbuilding foundation	metal parts and fragments, ceramics, bricks, stove part, barbed wire, wood fragments, pewter, whiteware	2250-2270 ft msl	on ridge overlooking confluence of a spring-fed creek with a major drainage to the Double Mountain Fork
41GR350	ca. 1905	dump probably associated with Walter V. Roy ranch headquarters (41GR565)	dump	tin cans, whiteware, glass, stove parts, bricks, wood fragments, Texas license plate (1929)	2200-2280 ft msl	upland margin overlooking major drainage to the Double Mountain Fork
41GR392*	ca. 1900-1963	homestead dugout used by cowboys; later a temporary camp	rock chimney, depression marking location of collapsed roof	stove parts, tin cans, bottles, enamelware, tobacco cans, brick fragments, crockery fragments, round nails, wagon axle and hub	2270 ft msl	sloping upland margin over Little Grape Creek near major spring
41GR443*	ca. 1890s	homestead dugout used by cowboy Dee Boren	rock chosa, rock corral, outbuilding site	tin cans, glass fragments, square nails, horseshoe, misc. metal fragments, wood fragments, snuff can lid, flashlight, barbed wire, .44-40-caliber cartridge cases	2250 ft msl	bedrock terrace overlooking Rocky Creek to the east

*Outside project area.

Table 17, continued

Site No.	Date of Use	Functions	Features	Artifacts	Elevation	Topographic Setting
41GR474	1899-1950	homestead dugout and site of permanent house owned by Jeff D. Justice	collapsed dugout, site of house and associated outbuildings, corrals, cistern	glass, cans, crockery fragments, whiteware, stove pipe, pots, windmill parts, wood fragments, horseshoe nail, .44-caliber cartridge case	2220-2260 ft msl	end of erosional remnant of an upland ridge
41GR565*	post-1905	Walter V. Roy ranch headquarters #2	housesite, stock tank and windmill	glass, crockery, whiteware, bricks	2320 ft msl	uplands west of major drainage to the Double Mountain Fork
41KT42	ca. 1880s	cowboy line camp	stone foundation with footings and collapsed fireplace	glass; stone; .32-, .38-, .44-caliber cartridge cases; crockery; square nails; wood fragments; metal buttons; hinged stein lid	2140-2160 ft msl	upper alluvial terrace near base of bluff overlooking confluence of Grape Creek and Double Mountain Fork
41KT58*	ca. 1905	A. O. Scarborough and W. G. Williams housesites	housesite, cisterns, outbuildings sites	whiteware, glass, metal, bricks, tin cans, paint cans, machinery parts, license plates (1928, 1958)	2300 ft msl	upland margin above Grape Creek
41KT84*	ca. 1880s	cowboy line camp	half-dugout and stone outbuilding sites	glass, crockery, whiteware, stove parts, cast iron fragments, .38- or .40-caliber cartridge case	2260-2280 ft msl	lower alluvial terrace overlooking upper end of Grape Creek; near base of small erosional remnant area

Transformation of the demographics and economy were in store for the project area again, however, as new technology replaced new land policy as the instigator of change. On May 10, 1909, the Santa Fe Railroad began grading a right-of-way from Plainview south to Lubbock; five months later, crews began laying track north from Coleman. On May 1, 1911, track laying was completed at Augustus southeast of Post, and the line was turned over to the operating department of the Railroad on December 1 (Didway 1973:240).

The effect on the western portion of the project area was immediate as the area became inundated with workers associated with the construction of the railroad. The 1910 Garza County census taken during the period when the tract was being laid shows that of 131 males over the age of 17, 59 were involved in some form of agriculture (stock farmer, stock farmer manager, farmer, farm laborer, grubber, and herder), 65 were railroad employees (contractor, cook, teamster, dump boss, blacksmith, laborer, civil engineer, surveying chainman, driver, and unspecified), 1 was a teacher, and 6 were involved in town-building or town-development activities (merchant and carpenter).

The large numbers of railroad employees left soon after the railroad was completed, but the impact of the line itself continued. In Sections 12 and 19, Block 6, the Railroad constructed Justiceburg Lake (41GR470) to supply water for the Santa Fe steam engines. In the 1930s, the Lake became a popular resort area among local residents who built small frame or stone cabins (Fig. 29) nearby and fished, swam, and picknicked from the spillway (Blakey 1987; Nance 1987). Another direct result of the construction of the Santa Fe was the platting of two towns in the project area. The first, Burnham, was not especially long lived, but the second, Justiceburg, remained a trade and educational center along the Double Mountain Fork until recent years.

Figure 29. Stone cabin at Justiceburg Lake. One result of the Santa Fe Railroad through Garza County in 1909-1910 was the construction of Justiceburg Lake which supplied water to the Railroad steam engines. During the 1930s and 1940s, the Lake became a popular recreational facility for area residents, who built small frame or stone fishing cabins such as the one depicted here.

Burnham, the first townsite platted, was located on Section 24, Block 6, and lay primarily on the east side of the Santa Fe Railroad tracks. The Section had been granted originally to Thomas Jilson Payne. By February 1910, when H. W. Stoneham, the surveyor of Mitchell County, divided the Section into numerous blocks and lots, the property was owned by Payne's son-in-law, John Wesley Person (Women's Division of Post Chamber of Commerce n.d.:55-56) and his partner from Mitchell County, L. E. Lasseter. The two men had formed the Brazos Valley Townsite Company for the purpose of promoting sales of lots, and Person functioned as the Garza County representative (Garza County Deed Record 13:163-164; Map and Plat Record No. 1:15).

Sales apparently were brisk at first and occurred throughout 1910 and 1911. Indeed, informants who recollect the appearance of the town prior to World War I note that several business houses were constructed as well as a post office. Benton's hotel and Lanotte's dry goods and grocery store were owned jointly by Alfred Clark and his brother-in-law, Nicolas John Lanotte. Other buildings included a blacksmith shop, section house, and a drug store which was converted later to a school (Didway 1973:38-39, 98-99; Women's Division of Post Chamber of Commerce n.d.:98-99).

In direct competition with Burnham was Justiceburg, platted on Section 25, Block 6, on August 9, 1910, by Snyder surveyor J. E. Eubank (Garza County Map and Plat Record No. 1:18). The townsite was located on property belonging to Jeff D. Justice, who sold the Section to the Justice Townsite Company on April 7, 1910, and then took an active role in its promotion by encouraging immigration to the area and establishing businesses. Judging from Garza County deed records, sales of town lots were brisk, with purchasers coming from Scurry, Garza, Nolan, Kent, Tarrant, and Hood counties, to name a few (Garza County Deed Record 11:15-17; Deed Record 13:201-204, 207-208, 232-233, 274-275, 299, 300-301, 308-309, 319-320, 336-340, 344, 386-387; Deed Record 14:250, 257-258, 379-381, 387, 422; Deed Record 15:43, 66, 85; Deed Record 16:22, 33; Deed Record 17:144, 582-583). By the 1930s, Justiceburg included a general store and post office (Fig. 30), a lumberyard, stockyards, grocery stores, confectionery, barber shop, garage, real estate office, a hotel run by the Leiningers, a church and school, a number of residences, and a railroad depot. Indeed, by World War I, Justiceburg was so successful that it had eclipsed Burnham, and owners of buildings in that town moved them to Justiceburg and other tracts of rural land (see Appendix G, Site Histories for 41GR13 and 41GR250) (Didway 1973:24, 38, 66, 86, 87; Women's Division of Post Chamber of Commerce n.d.:17)

Burnham became significant briefly after World War I when James Minus Boren sold town lots and blocks there to underwrite the drilling of an exploratory oil well. This first effort failed, but Boren's next endeavor resulted in the first successful oil well in Garza County. In about 1924, he leased his land to Phelps, Caldwell and Blackwell, who drilled near the north line of Section 5, Block 6 (Garza County Map and Plat Record No. 1:25) and completed the job on October 23, 1926. The well produced until 1932 when it was abandoned (Didway 1973:233-234).

Because oil production was relatively weak in the project area until the 1950s, the oil industry probably never had an impact equivalent to that of the Four-Section Act of 1895 or the construction of the Santa Fe Railroad in 1910. As a result, population in the project area remained fairly static through the mid twentieth century, the economy continued to be based on the production of livestock, and turn-over in land was a conservative affair. By the 1940s, most of the original settlers had died, but their ranches remained in the hands of children and grandchildren in a West Texas landscape that has changed very little since World War I.

Figure 30. Justiceburg Post Office. Construction of the Santa Fe Railroad also resulted in the platting and development of townsites such as Burnham in Section 24, Block 6, and Justiceburg in Section 25, Block 6. The Justiceburg post office depicted here is a vernacular frame structure which may date to the founding of the town in 1910.

Sites

Fifteen of the historic sites recorded were used during the period 1910-1945 (Table 18). Of these, six (41GR350, 41GR392, 41GR474, 41GR565, 41KT58, and 41KT84) were initially occupied prior to 1910, but the original owners or later occupants continued to use them after 1910. The remaining nine sites (41GR13, 41GR203, 41GR250, 41GR331, 41GR449, 41GR460, 41GR470, 41GR522, and 41GR530) were initially occupied in about 1910.

As a unit, the sites represent a wide range of functions, some of which were part of a continuation of the agricultural-based economy which typified the project area after the late 1870s, and some of which reflected the new populations and economic activities which resulted from the construction of the Santa Fe Railroad through the project area in 1910-1911. Those sites associated with ranching activities include 41GR13, 41GR250, 41GR350, 41GR392, 41GR474, 41GR565, 41KT58, and 41KT84. Seven other sites clearly reflect the increased variety of economic activities spawned by the railroad: the industrial Santa Fe Lake complex and associated residential and recreational facilities (41GR203 and 41GR470); buildings and building sites (41GR331) associated with Burnham, one of the two early townsites adjacent to the project area; and possible commercial sites (41GR460 and 41GR530) in the vicinity of Justiceburg. One site (41GR13) which was associated with ranching activities also is the location of a commercial structure moved from Burnham townsite; a final site (41GR449) was associated with the development of the oil industry in southeastern Garza County.

TABLE 18
HISTORIC SITES, 1910-1945

Site No.	Date of Use	Functions	Features	Artifacts	Elevation	Topographic Setting
41GR13*	ca. 1910-present; ca. 1930s-present	Forrest Tuffing ranch headquarters #2	standing structure (moved from Burnham townsite), outbuildings, corral, stock tank	ceramics, glass fragments, tin cans	2250 ft msl	upland margin overlooking Salt Branch
41GR203	post-1910	caretakers house associated with Santa Fe Lake complex	housesite, fruit trees	barbed wire, glass, ceramics	2265 ft msl	upland point overlooking Double Mountain Fork to north and Lake Justiceburg to south
41GR250	ca. 1920s (site); 1930s	Forrest Tuffing ranch headquarters #1	housesite	bricks, whiteware, crockery, glass, metal, tin cans, coffee pots, metal fork, barbed wire	2245 ft msl	upland ridge over alluvial terraces above Salt Branch
41GR331*	post-1910-ca. 1920s	Burnham townsite building site	possible foundations	whiteware, glass, crockery, stove parts, wash tub, metal pots, tin cans	2250 ft msl	upland plateau overlooking Salt Branch to the east

*Outside project area.

Table 18, continued

Site No.	Date of Use	Functions	Features	Artifacts	Elevation	Topographic Setting
41GR350	ca. 1905- post-1910	dump probably associated with Walter V. Roy ranch headquarters (41GR565)	dump	tin cans, whiteware, glass, stove parts, bricks, wood fragments, Texas license plate (1929), .44-40-caliber cartridge cases	2200-2280 ft msl	upland margin overlooking major drainage to the Double Mountain Fork
41GR392*	ca. 1900- 1963	homestead dugout used by cowboys; later a temporary camp	rock chimney, depression marking location of collapsed roof	stove parts, tin cans, bottles, enamelware, tobacco cans, brick fragments, crockery fragments, round nails, wagon axle and hub	2270 ft msl	sloping upland margin over Little Grape Creek near major spring
41GR449	ca. 1920s	oil pumpers housesite	housesite, landscaping features, oil pad	glass, china, tin cans, building debris, toy locomotive, cinder blocks, bricks, asphalt siding, asbestos, insulation	2250-2270 ft msl	upland knoll overlooking Rocky Creek to the east
41GR460	ca. 1920s	unidentified rock structure	rock wall	none	2220 ft msl	lower alluvial terrace of Sand Creek
41GR470	1910	Santa Fe Lake complex, resort	lake, dam, spillway, stone houses, pumphouse, trash dumps	glass, tin cans, whiteware	2240-2260 ft msl	lower alluvial terrace

Table 18, continued

Site No.	Date of Use	Functions	Features	Artifacts	Elevation	Topographic Setting
41GR474	1899-1950	homestead dugout and site of permanent house owned by Jeff D. Justice	collapsed dugout; site of house and associated out- buildings; corrals; cistern	glass, cane, crockery fragments, whiteware, stove pipe, pots, windmill parts, wood fragments, horseshoe nail, .44-caliber cartridge case	2220-2260 ft msl	end of erosional remnant of an upland ridge
41GR522	ca. 1910	cemetery	ca. 76 graves, 1 crypt	gravestones and markers, funerary offerings	2245 ft msl	upper alluvial terrace overlooking confluence of Salt Branch and Double Mountain Fork
41GR530	post-1920	possible house/gas station site	none	glass, whiteware, stove parts, tin cans, metal fragments, barbed wire	2240 ft msl	upper alluvial terrace over Sand Creek
41GR565*	post-1905	Roy ranch headquarters #2	housesite, stock tank and windmill	glass, crockery, whiteware, bricks	2320 ft msl	uplands west of major drainage to the Double Mountain Fork
41KT58*	ca. 1905	A. O. Scarborough and W. G. Williams housesites	housesite, cisterns, outbuildings sites	whiteware, glass, metal, bricks, tin cans, paint cans, machinery parts, license plates (1928, 1958)	2300 ft msl	upland margin above Grape Creek
41KT84*	ca. 1880s	cowboy line camp	half-dugout and stone outbuilding sites	glass, crockery, whiteware, stove parts, cast iron fragments	2260-2280 ft msl	lower alluvial terrace overlooking upper end of Grape Creek; near base of small erosional remnant area

As might be expected, the use of traditional ranching sites continued, but the variety of functions represented in all sites occupied after 1910 increased following railroad construction. In addition, as water resources such as Santa Fe Lake became available and the older natural sources were acquired by private interests, reliance on springs and other surface waters changed. As a result, there appear to have been changes in the concentration of populations as residents turned increasingly to the railroad as the supplier of goods, and immediate access to natural water resources became more restricted for the general population.

CHAPTER 10

ROCK ART RESOURCES

by Douglas K. Boyd

Kirkland and Newcomb (1967:14) define rock art as intentional "graphic representation on natural rock surfaces." For the purpose of defining the resources at Justiceburg Reservoir, rock art includes all human markings found on natural rock surfaces in the project area. These markings were made by either aboriginal peoples or by historic nonaboriginal Euro-Americans. Each of these two kinds of rock art constitutes a set of unique resources that must be considered separately. Table 19 lists 74 sites with rock art components. Thirty-three aboriginal rock art components are discussed in the following section; 54 historic nonaboriginal rock art components are discussed in the subsequent section.

TABLE 19
ROCK ART SITES AT JUSTICEBURG RESERVOIR

	Aboriginal		Mixed	Nonaboriginal		
ROCK ART ONLY (N = 70)	41GR238	41GR423	41GR51	41GR242	41GR416	41GR536
	41GR282	41GR424	41GR315	41GR244	41GR418	41GR537
	41GR344	41GR426	41GR317	41GR283	41GR419	41GR550
	41GR352	41GR457	41GR333	41GR284	41GR428	41GR552
	41GR353	41GR472	41GR437	41GR285	41GR448	41GR553
	41GR354	41GR490	41GR445	41GR294	41GR455	41GR556
	41GR409	41GR491	41GR494	41GR295	41GR464	41GR557
	41GR410	41KT55	41GR517	41GR298	41GR465	41GR558
	41GR420	41KT68	41GR545	41GR305	41GR473	41KT54
			41GR567	41GR307	41GR475	41KT60
			41KT50	41GR308	41GR516	41KT72
			41KT65	41GR313	41GR525	41KT73
				41GR321	41GR526	41KT76
				41GR322		
PREHISTORIC SITES WITH ROCK ART (N = 4)	41GR390	41KT57	41GR54		41GR559	

Aboriginal rock art resources of the Texas Panhandle were noted as early as 1853 when U.S. Army surveyors came upon and recorded the rock art at Rocky Dell in Oldham County (Whipple et al. 1856). Since that time, other investigators have become aware of the rock art of the Texas Panhandle and Lower Plains regions. Studer (1931) mentioned rock art as an important archeological resource in his early review of Panhandle archeology. Jackson (1938:315) later reviewed a number of rock art sites in the Texas Panhandle, as well as "a

dim trace of a red pictograph" in Motley County, about 120 km (75 miles) north of Justiceburg. It was not until Kirkland began actively recording rock art throughout Texas that widespread interest in the resource was spurred. Kirkland (1941, 1942) began in the Southern Plains by recording much of the rock art in the Abilene and Panhandle region. Most of Kirkland's splendid graphic record of rock art sites in the Panhandle and Lower Plains was not synthesized until the 1960s (Kirkland and Newcomb 1967). In this treatise, Newcomb describes and Kirkland illustrates most of the then known rock art sites in the Texas Panhandle and in north-central Texas. This includes such famous sites as Paint Rock in Concho County and Rocky Dell in the northern Panhandle. It is interesting to note that their Central Texas region ends near Abilene at the northern boundary of Scurry County, and their Panhandle region ends on the south at the southern boundary of Briscoe County (Kirkland and Newcomb 1967:144, 204). This completely omits a 160-km-wide (100-mile) section composed of 18 counties at the southern end of the Llano Estacado. The Justiceburg Reservoir project area in Kent and Garza counties is included in this large area.

Many aboriginal rock art sites have been discovered near the Justiceburg area, attesting to the fact that the region is not devoid of rock art, and other rock art sites have subsequently been discovered in the Panhandle and Central Texas regions. Three aboriginal rock art sites had been reported in the Justiceburg project area prior to the current investigations. Riggs briefly described the Dorward Ranch Site (41GR54) petroglyphs (1965b), and the petroglyphs found at Reed Shelter (41GR54) and a pictograph (41GR390) across from Reed Shelter (1966). The Dorward Ranch Site is a large vertical rock face displaying a series of nine oxen-drawn wagons which appear to be traveling toward a group of buildings (town?). The petroglyphs in Reed Shelter consist of a few faint images of two human figures, some simple lines, a snakelike figure, and a deer or an antelope figure. Across from Reed Shelter at 41GR390 is a very faint orange-red pictograph of a human figure and a circle containing a geometric design. These three sites represent the only previously known examples of rock art in the survey area.

A number of important rock art sites are known from Garza County, however. Riggs (1965b) reported two other Garza County rock art sites, Cowhead Mesa and Verbena. Cowhead Mesa consists of a large vertical rock art panel on an isolated mesa. The panel has numerous images of buildings, men, and animals (see Lorrain and Parsons 1968); a horse-mounted rider carrying a lance and shield is an obvious historic element. Some of the buildings are surmounted by crosses, possibly representing missions, and one human figure is thought to represent a priest. The Cowhead Mesa petroglyphs have been nominated to the National Register of Historic Places. The Verbena Site petroglyphs are composed of two panels containing images of humans, animals, and geometric symbols. Riggs (1965b:11) states that "no European influence is noted" in the Verbena glyphs, but Parsons (1987:269) disagrees, stating that historic elements are present.

Another petroglyph site (41GR57) in Garza County is located on the OS Ranch. One group of elements is in a cave, and another group is protected by an overhang (Riggs 1969). The petroglyphs include human and animal figures and geometric designs. One human figure of particular importance is interpreted as Kokopelli, the humpbacked flute player of Southwestern origin (Riggs 1969:29). A similar flute player has been reported in Armstrong County (Upshaw 1972:85, 88). Puebloan influence is also strong at Rocky Dell in the northern Panhandle (Whipple et al. 1856:38; Kirkland and Newcomb 1967:203-204).

Other rock art sites are known in the area surrounding Garza County. Riggs (1982) reported an historic red pictograph in Scurry County (41SC3) which depicts two figures

mounted on horseback and facing each other. Another rock art site in Scurry County (Portis et al. 1968:63) contains human, geometric, and bison figures. Pictographs at Fingerprint Caves in northeastern Dawson County include at least 20 white negative-image handprints varying in size from child to adult (Quinn and Holden 1949). Nearby unrecorded rock-shelters are reported to contain red negative-image handprints. Rock art in the Palo Duro drainage in Randall and Armstrong counties is reported by McKown (1981), and in Briscoe County by Willey and Hughes (1978c). Upshaw (1972) reports seven petroglyph and two pictograph sites in the Palo Duro drainage, only one of which was previously documented (Kirkland and Newcomb 1967:212).

Other rock art sites reported in the Texas Panhandle include sites in the Canadian River drainage (Mujares Creek, Brown's Camp, Castle Rock, Agua Piedra Creek, Alibates Creek, Gulf Camp, Lahey Creek, and Chimney Rock) and the Palo Duro drainage basin (Newton Harrell Ranch and Tulia Canyon) (Kirkland and Newcomb 1967:203-216). Newcomb notes that few rock art sites in the Texas Panhandle contain pictographs, but that a large number have obvious historic themes (i.e., horses, cattle or oxen, and guns) and were probably made by the Historic Period Plains Indian groups which lived in the area (Kirkland and Newcomb 1967:213-216).

Two recent studies indicate that historic Plains Indian rock art is very similar to, and can sometimes be interpreted by comparison with, Plains Indian art done on other mediums. Keyser (1987) presents a strong argument that some rock art in the Northern Plains is similar in style and context to hide paintings and ledger drawings of Plains Indian groups, and that these latter types of art provide a key to understanding some of the rock art. Keyser believes that much of the rock art is biographic picture-writing which tells stories of the artist's life and exploits or actual events in which the artist was involved. There are stylistic similarities between the two Northern Plains art forms, and Keyser proposes a lexicon of recognizable graphic images with which to interpret rock art. He also recognizes temporal changes in rock art styles which he feels evolved in ways similar to other Plains Indian biographic arts.

A second study (Parsons 1987) uses Keyser's technique to interpret two Texas rock art sites, Mujares Creek in Oldham County and the Verbena Site in Garza County. At these sites, "Plains Indian portable pictorial art" (PIPPA) is used to interpret certain historic elements. While this work can be criticized because it interprets Southern Plains rock art on the basis of Northern Plains Indian art forms, Parsons (1987:257) presents justification by stating that "the Plains Indian phenomenon, the equestrian-bison hunting culture, was remarkably uniform considering its extensive geographical range, limited temporal span, and diverse cultural origins of its participants. . . . PIPPA, as a part of that culture, partakes of this uniformity". Parsons (1987:258, 272) goes on to state the importance of the concept of counting coup in Plains Indian art and even considers the rock art sites to be "coup recounting stations." If strong links between these art forms can be adequately demonstrated in the Southern Plains, then this interpretation may be valid. At present, it is speculative. Parsons (1987:272) further speculates that "we should be able to predict" that associated occupational sites will be located very near these types of historic aboriginal rock art sites.

Despite the problems inherent to rock art interpretations, the work by Keyser (1987) and Parsons (1987) provides the most logical basis yet proposed for understanding the protohistoric and historic Plains Indian rock art. Unfortunately, much of the Southern Plains rock art has not yet been related to specific historic groups.

Aboriginal Rock Art

The current investigations documented 30 aboriginal rock art sites in addition to the 3 previously recorded sites. Table 20 details the characteristics of the aboriginal rock art at these 33 sites, and Table 21 lists their stylistic attributes. The rock art can be roughly divided into two categories based on the types of elements present. About half of the sites (n = 18) contain only geometric symbols, including what are commonly called "tally marks." These can be very simplistic, consisting only of a few markings or tally marks, or very complex, consisting of hundreds of symbols and marks. These geometric style rock art sites, all of which are petroglyphs, are difficult to interpret. Some of the deeper grooves probably functioned as "abrading" surfaces. Other geometric images are similar to the Fort Chadbourne style of petroglyphs (Kirkland 1941; Kirkland and Newcomb 1967:165-169). Although none of the geometric style petroglyphs can be dated, the nature of the local sandstone outcrops and the rate at which it deteriorates probably preclude an age of more than a few hundred years.

The other half (n = 15) of the rock art sites are stylistically more complicated and contain human or animal figures instead of, or in addition to, geometric figures. Of these sites, five are pictographs or pictograph/petroglyph combinations. Three sites (41GR51, 41GR282, and 41GR344) contain historic elements and date to the Protohistoric period. Only 41GR344 has pictographs in combination with petroglyphs.

These three sites share many historic motifs described by Keyser (1987:52-66) and Parsons (1987). They fall within Keyser's (1987) "biographic art" style which is essentially "picture-writing" used to tell a story. One (41GR54) is comparable to the late biographic rock art style, while the other two are more likely in the early biographic rock art style.

The complex sites which contain no historic elements vary considerably in style and complexity, but most seem to share some characteristics with either Keyser's (1987) "ceremonial style," "early biographic style," or the transitional "proto-biographic style." This does not imply that these are necessarily Plains Indian sites or that they are directly analogous to Northern Plains Indian rock art.

Descriptions of the aboriginal rock art sites are presented in Appendix F, Prehistoric Site Descriptions. Figures 31 through 34 illustrate the simplistic geometric style rock art sites. Some of this rock art may actually be stylized or crude anthropomorphic or zoomorphic representations (e.g., Figs. 32d and 34e), but the interpretive potential of these images is minimal at this level of study. It is felt that further discussions or interpretation of these images are beyond the scope of this report. Figures 35 through 39 illustrate the complex rock art which lacks recognized historic elements. Figures 41 and 43 through 45 illustrate the three protohistoric rock art sites. It should be cautioned that these reproductions are preliminary representations. The illustrations are reproduced from measured field sketches or field photographs, and conditions for recording were not always optimal. Further, there are problems in separating aboriginal art from natural features or historic inscriptions, and in the unavoidable bias in hand-reproducing rock art. In short, this Phase I reconnaissance is not designed to produce the final recording of the rock art at Justiceburg.

Complex Rock Art Sites
(without historic elements)

41GR54 (Fig. 35a and b)

These petroglyphs are in Reed Shelter, a Late Prehistoric rockshelter which was recorded and excavated in the 1960s (Riggs 1966). Two panels are present; the first consists of a single antelopelike animal or deer(?), and the second consists of what Riggs (1966:48) considers to be two rectangular human figures, a snake, and three parallel, near-vertical lines.

41GR238 (Fig. 35c)

This single faint petroglyph is etched into the resistant black sandstone bed which caps the canyon rim; only one other example (41GR410) is etched into this hard sandstone layer. The figure is an animal, possibly a cat, with either a large bushy tail or another animal on its back. This zoomorphic element is stylistically aberrant from most other animal figures in the area.

41GR390 (Fig. 36a)

This is a single pictograph panel directly across Gobbler Creek from Reed Shelter (Riggs 1966). It is described by Riggs (1966:51) as a human figure painted in vermillion adjacent to a maroon circle surrounding an orange cross with "T" ends. In 1987, the images were faint and reddish orange; different colors could not be discerned. Pictographs probably do not survive long on the sandstone in the region, and it is likely that this panel is protohistoric in age. The circle may represent a decorated shield, a frequent motif in Plains biographic and ceremonial art (Keyser 1987:45, 56).

41GR409 (Fig. 36b)

This petroglyph is a single rectangular-bodied human figure with a round head. The outstretched arms bent at the elbows (upturned) are typical of many rock art styles. The anthropomorphic figure is unusual in that it has no neck.

41GR410 (Fig. 36c)

This petroglyph panel consists of two parallel, near-vertical lines and two four-legged zoomorphic figures etched into resistant sandstone (see comments, site 41GR238). The animal figures are not conclusively identifiable, but one could be a deer. Stylistically, this panel is quite similar to the zoomorphic figure(s) at 41GR238.

TABLE 20
CHARACTERISTICS OF ABORIGINAL ROCK ART SITES AT JUSTICEBURG RESERVOIR

Site Number	Site Type	Setting	Panels*	Elements**	Technique	Colors Used	Degree of Certainty	Integrity of Site	Warrants Further Work
41GR51	Mixed aboriginal/ nonaboriginal rock art only	Bluff face	1	7+	Petroglyph	-	Definite	Fair	Yes
41GR54	Prehistoric site with mixed rock art	Bluff shelter/ overhang	2	4	Petroglyph	-	Definite	Good	Yes
41GR238	Aboriginal rock art only	Bluff shelter/ overhang	1	1	Petroglyph	-	Definite	Good	Yes
41GR282	Aboriginal rock art only	Bluff shelter/ overhang	4	16+	Petroglyph	-	Definite	Excellent	Yes
41GR315	Mixed aboriginal/ nonaboriginal rock art only	Bluff shelter/ overhang	1	4	Petroglyph	-	Possible	Fair	No
41GR317	Mixed aboriginal/ nonaboriginal rock art only	Bluff face	4	7	Petroglyph	-	Definite	Good	Yes

*Number of distinct rock art faces

**Number of rock art elements

Table 20, continued

Site Number	Site Type	Setting	Panels*	Elements**	Technique	Colors Used	Degree of Certainty	Integrity of Site	Warrants Further Work
41GR333	Mixed aboriginal/ nonaboriginal rock art only	Erosional remnant	1	1+	Petroglyph	-	Definite	Poor	No
41GR344	Aboriginal rock art only	Bluff shelter/ overhang	1	15	Mixed	Red, white, black	Definite	Excellent	Yes
41GR352	Aboriginal rock art only	Bluff shelter/ overhang	1	1	Petroglyph	-	Definite	Good	No
41GR353	Aboriginal rock art only	Bluff shelter/ overhang	1	2	Petroglyph	-	Definite	Good	Yes
41GR354	Aboriginal rock art only	Bluff shelter/ overhang	1	1	Petroglyph	-	Possible	Good	No
41GR390	Prehistoric site with aboriginal rock art	Erosional remnant	1	2	Pictograph	Red	Definite	Fair	Yes
41GR409	Aboriginal rock art only	Bluff face	1	1	Petroglyph	-	Definite	Good	Yes
41GR410	Aboriginal rock art only	Bluff shelter/ overhang	1	3	Petroglyph	-	Definite	Good	Yes
41GR420	Aboriginal rock art only	Bluff shelter/ overhang	1	1	Petroglyph	-	Probable	Good	Yes

Table 20, continued

Site Number	Site Type	Setting	Panels*	Elements**	Technique	Colors Used	Degree of Certainty	Integrity of Site	Warrants Further Work
41GR423	Aboriginal rock art only	Bluff face	1	2	Mixed	Red	Definite	Excellent	Yes
41GR424	Aboriginal rock art only	Bluff face	1	1	Petroglyph	-	Definite	Good	Yes
41GR426	Aboriginal rock art only	Erosional remnant	1	1	Pictograph	Red	Definite	Excellent	Yes
41GR437	Mixed aboriginal/nonaboriginal rock art only	Bluff shelter/overhang	2	5	Pictograph	Black	Definite	Good	Yes
41GR445	Mixed aboriginal/nonaboriginal rock art only	Bluff face	1	1	Petroglyph	-	Possible	Good	No
41GR457	Aboriginal rock art only	Bluff shelter/overhang	5	6	Petroglyph	-	Definite	Poor	Yes
41GR472	Aboriginal rock art only	Bluff shelter/overhang	1	1	Petroglyph	-	Definite	Good	Yes
41GR490	Aboriginal rock art only	Bluff face	2	3	Petroglyph	-	Definite	Good	Yes
41GR491	Aboriginal rock art only	Bluff shelter/overhang	3	6	Petroglyph	-	Definite	Good	Yes
41GR494	Mixed aboriginal/nonaboriginal rock art only	Bluff shelter/overhang	2	6+	Petroglyph	-	Definite	Fair	Yes

Table 20, continued

Site Number	Site Type	Setting	Panels*	Elements**	Technique	Colors Used	Degree of Certainty	Integrity of Site	Warrants Further Work
41GR517	Mixed aboriginal/ nonaboriginal rock art only	Bluff face	1	1	Petroglyph	-	Possible	Good	No
41GR545	Mixed aboriginal/ nonaboriginal rock art only	Bluff shelter/ overhang	1	1	Petroglyph	-	Probable	Good	Yes
41GR567	Mixed aboriginal/ nonaboriginal rock art only	Bluff shelter/ overhang	1	1	Petroglyph	-	Definite	Good	Yes
41KT50	Mixed aboriginal/ nonaboriginal rock art only	Bluff shelter/ overhang	3	10+	Petroglyph	-	Definite	Good	Yes
41KT55	Aboriginal rock art only	Bluff shelter/ overhang	4	6	Petroglyph	-	Definite	Good	Yes
41KT57	Prehistoric site with aboriginal rock art	Bluff shelter/ overhang	3	6	Petroglyph	-	Definite	Good	Yes
41KT65	Mixed aboriginal/ nonaboriginal rock art only	Bluff shelter/ overhang	3	10+	Petroglyph	-	Definite	Fair	Yes
41KT68	Aboriginal rock art only	Bluff shelter/ overhang	1	12+	Petroglyph	-	Definite	Poor	Yes

TABLE 21
 STYLISTIC ATTRIBUTES OF ABORIGINAL ROCK ART SITES
 AT JUSTICEBURG RESERVOIR

Site	Types of Elements Present	Historic Aboriginal Motifs	Aboriginal Motifs
41GR51	Geometric, anthropomorphic figures, zoomorphic figures	Wagon, buildings, European dress, cattle/oxen, horse	Human figure, tipi
41GR54	Geometric, anthropomorphic figures, tally marks, zoomorphic figures	-	Human figures, deer, unidentified zoomorphic figure
41GR238	Anthropomorphic figure	-	Miscellaneous zoomorphic figure
41GR282	Geometric, anthropomorphic figures, tally marks, zoomorphic figures	Horse and rider, horse accoutrements	Deer, aboriginal dress
41GR315	Geometric, anthropomorphic figures	-	-
41GR317	Geometric	-	-
41GR333	Geometric	-	-
41GR344	Geometric, anthropomorphic figures, tally marks, zoomorphic figures	Buildings, cattle/oxen, European dress, crosses	Human figures, tipi
41GR352	Tally marks	-	-
41GR353	Geometric, tally marks	-	Arrow
41GR354	Tally marks	-	-
41GR390	Geometric, anthropomorphic figures	-	Human figures
41GR409	Anthropomorphic figure	-	Human figure
41GR410	Tally marks, zoomorphic figures	-	Deer

Table 21, continued

Site	Types of Elements Present	Historic Aboriginal Motifs	Aboriginal Motifs
41GR420	Geometric	-	-
41GR423	Anthropomorphic figures	-	Human figures
41GR424	Geometric	-	-
41GR426	Anthropomorphic figure	-	Human hand
41GR437	Geometric, tally marks, zoomorphic figure	-	Bison
41GR445	Geometric	-	-
41GR457	Geometric	-	-
41GR472	Tally marks	-	-
41GR490	Geometric	-	-
41GR491	Geometric, tally marks	-	-
41GR494	Geometric, tally marks	-	-
41GR517	Geometric	-	-
41GR545	Geometric	-	-
41GR567	Anthropomorphic figure	-	Human hand
41KT50	Geometric	-	-
41KT55	Geometric, anthropomorphic figure, tally marks	-	Possible human figure
41KT57	Geometric, tally marks	-	-
41KT65	Geometric, anthropomorphic figures, tally marks	-	Human figures
41KT68	Geometric, anthropomorphic figure, tally marks	-	Human figure

Figure 31. Geometric petroglyphs. (a-d) 41GR315; (e-h) 41GR317; (i) 41GR333.

Figure 32. Geometric petroglyphs. (a) 41GR352; (b) 41GR353; (c) 41GR354; (d) 41GR420; (e) 41GR424; (f) 41GR445; (g) 41GR457.

Figure 33. Geometric petroglyphs. (a) 41GR472; (b-c) 41GR490; (d-e) 41GR491; (f) 41GR494.

Figure 34. Geometric petroglyphs. (a) 41GR517; (b) 41GR545; (c-e) 41KT50; (f-h) 41KT57.

Figure 35. Anthropomorphic and zoomorphic petroglyphs. (a) petroglyphs at 41GR54 (from Riggs 1966:49, Figure 4); (b) zoomorphic petroglyph at 41GR54 (from Riggs 1966:50, Figure 5); (c) zoomorphic petroglyph at 41GR238.

Figure 36. Anthropomorphic and zoomorphic rock art. (a) pictograph at 41GR390 (from Riggs 1966;52, Figure 6); images are painted in reddish orange; (b) anthropomorphic petroglyph at 41GR409; dashed lines indicate faint image; (c) zoomorphic petroglyphs at 41GR410.

41GR423 (Fig. 37a)

This combination petroglyph/pictograph panel consists of two rectangular-bodied human figures. Stylistically, the figures are similar to the petroglyph at 41GR409. The outlines of the bodies are etched into soft sandstone, and the body and legs are painted red. One figure has outstretched arms which are upturned at the elbows and a round head with no neck. The other figure probably had similar arms and head, but they are too faint to discern. The two rigid figures are about 60 cm tall. These anthropomorphic images resemble Keyser's (1987) ceremonial style rock art. The figures are on a large, vertical-walled sandstone cliff.

41GR426 (Fig. 37b)

This pictograph is a red negative-image handprint. It is on the vertical face of a small eroded sandstone remnant which is protected from direct rainfall by an overhanging slab. The image is faint but very distinct. It is a small handprint (i.e., small male or average-sized female) which was made by placing the right hand on the rock surface and spattering (or blowing) red paint onto the surface. It seems to have been applied using a left to right motion because the right sides of the fingers are distinct but the left sides are more irregular. This suggests that the paint was applied with the left hand and bled slightly under the left side of the fingers.

Handprints are a widespread rock art phenomenon. This example is the only negative-image handprint pictograph in the project area (site 41GR567 is a petroglyph handprint). Negative-image handprints (both red and white) are reported from rockshelters in northeast Dawson County (Quinn and Holden 1949:123-124) about 50 km (31 miles) southwest of Justiceburg. Negative handprints in red or red-orange are reported in Nolan and Shackelford counties (Kirkland and Newcomb 1967:164, 172) and in Upton and Loving counties (Jackson 1938:137-143). Positive-image red handprints are recorded in Briscoe County (Kirkland and Newcomb 1967:216).

41GR437 (Fig. 37c)

Simple geometric petroglyphs and black pictographs under a rock overhang are found at this site. The pictographs consist of parallel vertical lines or tally marks and a zoomorphic figure. The animal image is partially obscured by spalling but appears to represent a bison. Bison are a fairly common motif and are known to occur at a site in Scurry County (Portis et al. 1968) about 40 km (25 miles) south of Justiceburg.

41GR567 (Fig. 38a)

This single petroglyph is in a well-sheltered overhang. The image is of a small human left hand; the fingers are well defined, but the thumb area is somewhat obscure. Handprint pictographs are common in the region (see discussion, site 41GR426) but petroglyph hand images are not.

Figure 37. Anthropomorphic and zoomorphic rock art. (a) red-painted anthropomorphic petroglyphs at 41GR423; dashed lines indicate faint image; (b) negative-image handprint pictograph at 41GR426; painted red; (c) pictographs and petroglyphs at 41GR437; upper row of images are black pictographs; lower images are petroglyphs.

Figure 38. Geometric and anthropomorphic petroglyphs. (a) petroglyph hand print at 41GR567; dashed lines indicate faint weathered image; (b) geometric petroglyphs at 41KT55; (c) anthropomorphic petroglyph at 41KT55; dashed lines indicate faint image; (d-e) geometric petroglyphs at 41KT55; dashed lines indicate faint image.

41KT55 (Fig. 38b-e)

This petroglyph site consists of four dispersed sets of elements in a wind-worn cavity in the sandstone bluff. Three are simple geometric designs, one with deeply gouged lines. The fourth appears possibly to be a crude anthropomorphic representation.

41KT65 (Fig. 39a-c)

The petroglyphs at this site consist of three panels of geometric figures and/or tally marks. Included in one panel are three rectangular-bodied human figures with outstretched arms. The arms of two figures are bent upward at the elbow, and one has three fingers (or is holding objects in its hands). The figures depict no action, and they either have pointed heads or are headless. The complex arrangement of the geometric images at this site is reminiscent of the Fort Chadbourne style petroglyphs (Kirkland and Newcomb 1967: 166-169).

41KT68 (Fig. 39d)

This petroglyph consists of a single panel damaged by recent graffiti. The elements are geometric figures, tally marks, and one anthropomorph that appears to represent a simple round-headed, rectangular-bodied human figure. It is difficult to separate the recent markings from the aboriginal art at this site.

Complex Rock Art Sites
(with historic elements)

Three rock art sites in the project area contain Historic Period motifs. These are the most important rock art sites found because of the elaborate nature of the panels. Two are petroglyph sites, and the third is a combination of pictographs and petroglyphs.

41GR51, Dorward Ranch Site

The Dorward Ranch Site (Riggs 1965b) is a very large vertical sandstone wall covered with aboriginal rock art and Euro-American inscriptions (Fig. 40). Since the aboriginal petroglyphs are previously recorded, the aboriginal art was not recopied during the current investigations. However, the many historic Euro-American inscriptions and additional elements identified which are most likely aboriginal but were not included in the original recording of the site were recorded during these Phase I investigations.

Riggs (1965b:11, 12) illustrated portions of the aboriginal art (Fig. 41) and described it as follows:

The petroglyphs consist of a single row of nine wagons, each preceded by a pair of animals with long necks and proportionally long waving horns or ears. The carving of names, dates, and drawings is destroying the badly weathered petroglyphs. The animals in the left

Figure 39. Geometric and anthropomorphic petroglyphs. (a) geometric petroglyphs at 41KT65; (b) anthropomorphic and geometric petroglyphs at 41KT65; bold lines are aboriginal art; thin lines are damaged areas; (c) geometric petroglyphs at 41KT65; (d) anthropomorphic and geometric petroglyphs at 41KT68.

Figure 40. General view of the Dorward Ranch Site, 41GR51.

half of the panel are carved separately and in single column [sic]. The animals in the right half are carved in an imposed manner. The man in the center is seven inches tall and has a body width of one inch. The author could not determine if the group of triangles were of the same age as the wagon train; but, weathering is similar.

This description fails to mention a cluster of buildings which were included in the original illustration. It appears that the buildings are part of the same panel and represent the destination of the wagon train. An anthropomorphic figure, not shown in the original illustration, stands among the structures and adjacent to the small triangular building. A single-feather head ornament suggests this figure is an aboriginal. Similarly, a separate panel composed of a horse-drawn coach (possibly a Spanish *carreta*) accompanied by two additional horses is illustrated but not mentioned. A human figure wearing a brimmed hat appears to be driving the coach but was omitted from the original recording. Other images also not included in the original illustration appear to be part of the aboriginal petroglyphs. Although these elements may be vandalism (i.e., Euro-Americans adding their own images to the aboriginal artwork), they may also be aboriginal elements which the original recorders edited out because of uncertainty of origin. The most significant element is a rider mounted on the lead horse of the last wagon. The rider is adorned with a cowboy hat and is firing a gun toward the rear of the wagon train. Three shots are depicted. This is likely an authentic aboriginal element which was omitted.

The major panels obviously depict specific events, a characteristic of the Plains biographic style (Keyser 1987). They likely represent a Plains Indian account of an actual event involving a wagon train and a community or town. Parsons (1987) suggests that many aboriginal rock art scenes are depictions of actual events and that these events are sometimes documented in the historical record. Given the right circumstances, it might be possible to correlate documented events with the rock art.

Figure 41. Petroglyphs at the Dorward Ranch Site, 41GR51. (a) wagon train (on petroglyph panel, wagon train is one continuous row); (b) horse-drawn cart and horses; (c) buildings (from Riggs 1965b:12, Figure 1).

In terms of Plains Indian biographic style art, this site contains many recognizable motifs described by Keyser (1987) and Parsons (1987). The wagons are the most immediately obvious historic elements and are documented in other areas (Keyser 1987:61). The wagons are pulled by animals with long, distinctive curved horns. These are similar to animals identified by Kirkland and Newcomb (1967:208) and Parsons (1967:259) as longhorn cattle or oxen. Both were used to pull wagons and were used extensively in the Southern Plains as early as the 1830s on the Santa Fe Trail. Similar horned animals are found at other sites in the region, including one (41GR344) in the Justiceburg project area. They are also found at Mijares Creek (Kirkland and Newcomb 1967:208-209; Parsons 1967:259-260) and Rocky Dell (Kirkland and Newcomb 1967:207) in the northern Texas Panhandle.

The buildings are another obvious historic motif. The two buildings representing the wagon train destination appear to be of board-and-batten construction. A similar pair of board-and-batten buildings may be associated with the horse-drawn coach panel. Buildings are frequently depicted at Plains rock art sites (Keyser 1987:61), and they are sometimes identifiable as particular types of buildings, such as forts or missions. Buildings are possibly depicted at one site (41GR344) in the project area and at another site (Yellowhouse Crossing Mesa) in Garza County (Riggs 1969:27). Possible missions are depicted at Cowhead Mesa, also in Garza County (Riggs 1965b:11), and a possible church or mission is depicted at Rocky Dell (Kirkland and Newcomb 1967:207).

Other biographic Plains Indian art motifs are represented at the Dorward Ranch Site. If the man shooting the gun is an aboriginal glyph, then his cowboy hat and gun firing several bullets all fit well into the biographic art style. It is significant that the wagon train and the horse-drawn coach panels are underlined with possible landscape representations (not shown in the original illustration), both of which show an elevation change that may represent the Caprock Escarpment. If so, the wagon train is traveling east while the coach is traveling west.

41GR282, Ward Petroglyph Site

This site is a rock overhang (Fig. 42) containing a large number of petroglyphs; most are anthropomorphic, but some are zoomorphic, geometric, or unidentifiable figures (Figs. 43 and 44). All are etched into soft sandstone. They are either single elements or are clustered into groups of two to four elements spaced under the protective overhanging cliff. There is a horizontal layer of harder sandstone along the bluff, and the glyphs are found above and below this layer.

One element, a left-facing horse and rider (Fig. 43e), obviously dates to the Historic Period. The horse has a decorated halter under its head, similar to those illustrated by Keyser (1987:57). The rider appears to be wearing a long garment or headdress which reaches the ground. This is very typical, according to Keyser (1987). Horse-and-rider glyphs are found at other Panhandle sites in the Palo Duro drainage (Upshaw 1972:61, 69). Another historic element consists of two or possibly three horses shown facing left and running (Fig. 44a). Other zoomorphic figures (not necessarily of Historic age) are one, possibly two, running deer which are depicted facing left. This panel is partially destroyed by spalling.

The remaining elements consist of geometric designs and at least 10 human figures. The human figures all have rectangular bodies; some have outstretched arms bent at the

Figure 42. General view of the Ward Petroglyph Site, 41GR282.

elbows with up to five lines (fingers or objects?) radiating from their hands. Similar shamanlike figures are found in the Panhandle (Kirkland and Newcomb 1967:203-216) and at the Verbena Site in Garza County (Riggs 1965b). Most of the human figures appear to be wearing decorated garments, some with V-shaped necks. One is either wearing a loincloth or has exposed male genitalia similar to human figures at the Verbena Site (Parsons 1987:267-268).

There are no indications of the relative ages of the petroglyphs at this site. All appear to be similar in degree of weathering and in workmanship. The soft sandstone is wind-worn, and it is suspected that rock art at this location cannot have survived long. All of these elements are probably no older than 100-200 years.

41GR344, Huddleston Shelter

This is a well-preserved, elaborate panel composed primarily of painted petroglyphs (Fig. 45). Some are pictographs only and others are petroglyphs only, but most are combination pictographs outlined by petroglyphs. The single panel is on a vertical rock face at the back of a rockshelter along the north canyon rim, overlooking the Double Mountain Fork of the Brazos (Fig. 46).

The elements are concentrated in the center of the panel and disperse toward the margins. Unlike site 41GR282, the elements are tightly clustered and overlap. Some are very faint, while others are more vivid. Colors used in the pictographs include black, red, and white; these occur only on the human figures in the center of the panel. Black-painted images seem to be the faintest, possibly because the black pigment deteriorated more rapidly. Petroglyphs underlying the central concentration of human figures are obviously older, and there may also be very faint images underlying even these. Red is used to

Figure 43. Petroglyphs at the Ward Petroglyph Site, 41GR282. (a-c) anthropomorphic petroglyphs; (d) geometric petroglyph; (e) anthropomorphic and zoomorphic petroglyphs.

10cm
a

10cm
b

10cm
c

Figure 44. Petroglyphs at the Ward Petroglyph Site, 41GR282. (a) anthropomorphic and zoomorphic petroglyphs; (b) zoomorphic petroglyph(s); (c) anthropomorphic and geometric (?) petroglyphs.

Figure 45. Pictograph/petroglyph panel at Huddleston Shelter, 41GR344.

a

b

Figure 46. Huddleston Shelter, 41GR344. (a) general view of site; (b) view of rock art panel.

highlight the chest area of some of the human figures, and white is used to highlight many of the etched lines of the human figures.

Most of the human figures obviously depict individuals in European dress. Stylistic variations suggest that it is likely they were rendered at different times by more than one artist. The rock art probably represents repeated use of the shelter, possibly on the order of the "coup recounting stations" described by Parsons (1987). The elements on the fringes and underlying the central area of the panel may predate most of the other rock art, but one of these is historic also. The elements around the edges of the panel (see Fig. 45) consist of an ox or longhorn, several crosses or X marks, an hourglass-bodied human figure, a tipi, and miscellaneous geometric figures. A series of adjoining buildings appears to underlie the central human figures.

The horned animal is clearly historic and is similar to animals depicted at the Dorward Ranch Site (41GR51), Mijares Creek, and Rocky Dell (Kirkland and Newcomb 1967:207-209). A common motif in Plains rock art (Keyser 1987:59-61), tipis are also depicted at the Dorward Ranch Site and Rocky Dell (Kirkland and Newcomb 1967:207). Buildings, another common motif (Keyser 1987:61), are also found at the Dorward Ranch Site and Cowhead Mesa in Garza County (Riggs 1965b), at Rocky Dell and Mijares Creek (Kirkland and Newcomb 1967:207-209), and possibly at Yellowhouse Crossing Mesa (Riggs 1969:27), also in Garza County. The small human figure is not particularly diagnostic, the crosses may be of religious significance or incidental, and the other elements are not identifiable.

It seems clear that the human figures etched and painted into the center part of the panel overlie and postdate at least some of the petroglyphs. There are 20 or more human figures, some of which are petroglyphs, some pictographs, and others combine the two techniques. Red and white are used together in some of the elements, but black is only used separately. Possibly, the use of these colors could reflect temporal differences.

European influence in the later pictographs/petroglyphs is abundant. At least six figures are adorned with headgear which almost certainly represent brimmed hats worn by Euro-Americans (Keyser 1987:64). The chests of a number of these hatted figures are red, perhaps representing wounds or garments. One hatted figure is shown upside down and may be falling or deceased. One figure is wearing headgear which is not a typical brimmed hat and may or may not represent a European. Similar brimmed hats are noted in pictographs on Brady Creek near Abilene (Kirkland and Newcomb 1967:171-172) where one of the figures is mounted on a horse. At Mijares Creek, a brim-hatted figure is shown under attack by a mounted figure, presumably an Indian (Parsons 1967:259-260). A hatted figure firing a gun at the Dorward Ranch Site (41GR51) may be associated with the wagon train petroglyph.

Two figures with red chests in the immediate center of the panel are holding staffs in their right hands and hold their left arms akimbo with hands on the hips. The figure on the right is faint, and the head is completely faded. The figure on the left is wearing a brimmed hat and has a small white cross on the chest, probably representing a priest. At Cowhead Mesa, one figure is interpreted as being a priest, and some buildings with crosses on top are thought to be missions (Riggs 1965b). At Brady Creek near Abilene, a brim-hatted figure standing next to a large cross may be holding smaller crosses in its hands (Kirkland and Newcomb 1967:171). A probable church or mission building with crosses on it is depicted at Rocky Dell (Kirkland and Newcomb 1967:207).

Some of the figures at 41GR344, mostly petroglyphs, probably do not represent Europeans. These have outstretched arms bent upward at the elbow, and objects are held in the hands. While some of the hatted figures also have their arms in this position and may be holding objects, most have one or both hands resting on their hips.

Nonaboriginal Rock Art

The historic nonaboriginal rock art in the Justiceburg project area is fundamentally no different from the aboriginal rock art. The images are graphic representations which have specific meaning to the person who made them and are intended to convey a message to others. In most cases, the nonaboriginal art is no more than initials or a name and a date inscribed into rock. These may be very crude, or they may be rendered in elaborate stylistic script; both have little interpretive value other than that the artist was saying "I was here" at some specific time. Some nonaboriginal art conveys other messages or phrases, or occasionally pictures, representing some event or experience. In all cases, nonaboriginal rock art is relatively easy to interpret. The artist is speaking to the viewer in his own language and from a similar cultural perspective.

For most purposes, nonaboriginal rock art over 50 years old is considered historic and must be regarded as such. Nonaboriginal rock art younger than 50 years is considered to be simply graffiti and is ignored as such. Recent rock art which happens to coincide with and obscure other historic or aboriginal rock art is considered vandalism and is scorned as such. Along with the innate human desire to leave a mark on the world (i.e., write your name on a wall), some people have an innate desire when doing so to destroy other's marks. Modern graffiti is frequently found to cover aboriginal and historical art.

At Justiceburg, all nonaboriginal inscriptions which were dated older than 1945 were recorded as historic resources. All markings not dated but which were considered possibly historic because of stylistic characteristics or recognizable historic names were also recorded. One-hundred sixty-four separate historic (or possibly historic) inscriptions were recorded at 54 sites.

Table 22 lists the individual historic inscriptions, arranged alphabetically within each site. Thirteen of these sites are historic inscriptions at aboriginal rock art sites, and a number of these are popular gathering places (i.e., picnicking spots) for local residents. The Dorward Ranch Site (41GR51) is the best example. All of the local residents know of the site with the "wagons carved into the rock" (referring to the aboriginal petroglyphs). This site contains the largest number of historic inscriptions (n = 41) of all the historic rock art sites. It also has a large number of very recent inscriptions and graffiti. Many inscriptions throughout the project area are associated with prominent historical figures, for example, Ed Scott, C. J. Leininger, and the Justice family. The significance of the important historic inscriptions and historic rock art sites is discussed in Chapter 9.

The inscriptions in Table 22 include all names or initials which have historic dates associated or are thought to be historic for some other reason (e.g., style of inscription or recognizable name). Cattle brands or ranch names without dates are also included. This list does not include dates with no associated names or recognizable symbols, or unrecognized names without dates which appeared to be of recent origin. At most of these sites,

TABLE 22
HISTORIC ROCK ART SITES AND INSCRIPTIONS

Site	Name	Date	Associated Artwork or Comments
41GR51	R B	1/23/1925	
	M K B	1933	
	MR. AND MRS. JOHN BOREN	3/31/1918	
	R C BURNS	7/21/1883	
	L E ENGLISH	7/28/1922	A surveyor's alidade and plane table; "GEOLOGIST"
	J C FRITZ	4/1/1937	
	PEARLE J	8/20/1902	
	E S JACKSON	1889	
	TRUMAN JONES	1938	
	BOYD JONES	1940	
	JEFF JUSTICE	4/16/1904	
	MYRTLE JUSTICE	3/4/1913	
	EARL JUSTICE	12/5/1915	
	JEFF JUSTICE JR.	6/14/1931	
	LITTLE JEFF	6/14/1931	
	SHIRLEY JUNE	6/14/1931	
	O B KELLY	10/17/1897	
	MONA KEY	3/ /1940	
	(Key), J	1945	Last name indicated by a drawing of a key
	(Key), MONA	1945	Last name indicated by a drawing of a key
	C J LEININGER	4/26/1918	
	JACK LEWIS	12/31/1922	
	C J LEININGER	2/ /1929	
	EMMETT LONG	7/30/1915	
	C E McREYNOLDS	1/23/1925	
	W C McMEANS	2/24/1930	
	ELLEN MOORE	1938	
	PERCY OLIVE	1/23/1925	
	OS	1/ 1/1889	
	RANCH	1923	
	-		- ear tag symbol, probably OS Ranch
	H L PUMPHREY	2/11/1921	
	EUGENIA REED	5/22/1932	
	M S	1940	
	WILLIAM L STRICKLAND	3/15/1944	
	E G STRICKLAND	3/15/1944	
	FULTON STRICKLAND	3/15/1944	
	VERNE WAIKEN	8/17/1912	
	(or Walden?)		

PHASE I INVESTIGATIONS, JUSTICEBURG RESERVOIR

Table 22, continued

Site	Name	Date	Associated Artwork or Comments
41GR51, cont'd.	SALLIE WILLIAMS	6/28/1900	1900 scratched out and 1911 added below
	H M WILLIAMS	2/26/1909	
	E V A	1912	
41GR54	S M S	8/26/1916	
41GR242	W R C	4/2/1914	Arrow through heart
	E M L	1929	
41GR244	A B		A and B are combined; possible brand
41GR283	J T B		
41GR284	E V B	7/11/1914	
41GR285	MYRTL	1/3/1915	
41GR294	WILL W	5/27/1904	
41GR295	BR...GE (?)		
	JONNY		
	L P L		
	S P		
	T		
41GR298	L E J		Heart
	E C W		
41GR305	W S B	1936	
	D K C	1888	
	R K K	1886	
41GR307	E M W	3/26/1934	
41GR308	S D B		
	DEE		
	OBADEN	1887	Arrow drawn over name; "7" in date is reversed
	W V R		
	W G WILLIAMS		
41GR313	W S B	1934	
	R J	1937	
41GR315	BANDY CASH	9/9/1935	
	NORM CASH		
	LINCOLN	1841	Date and name appear recent; probably a hoax
	MELVIN McCALLOM		
	W W		
41GR317	S B		
	R J		

Table 22, continued

Site	Name	Date	Associated Artwork or Comments
41GR317, cont'd.	E E W B U		
41GR321	ETHEL R J	1932	
41GR322	D C D ED SCOTT	1940 3/1887	
41GR333	A Y JENNINGS U S R	8/26/1923 6/6/1849	"N's" are written backwards The "N" in June and "S" in USR are written backwards
41GR416	E M WOODARD	5/1/1912	"BACK IN DEC 1917"
41GR418	V H		"19" and "4" also visible on panel
41GR419	W G McMEANS	6/19/1928	
41GR428	VALO...THVS		
41GR437	H NUNN		May be associated with a nearby 1899 date
41GR445	ROBERT BENEM ROSA BOYEN (or Boren) X K BOYEN (or Boren) DEE BOYEN (or Boren)	1854(?) 8/5/1901 1901 8/5/1901	Association of date is questionable Year is illegible, but others nearby are 1901
	L C J C MANN NAN OA VERNE WLDEN	1911(?) 1881 1854(?) 12/ /1917	Date is questionable Association of date is questionable
41GR448	CECIL BOREN B J F A L C V.AL.	12/27/1917 1941 1941	Cartoon face with hat; "M D" written below date
41GR455	LEE TUFFING	1913	"SPRING"
41GR464	ANNA LEA COWAN BILL COWAN E COWAN C J LEININ... J C PINTLE	 5/7/1915 11/12/1918 6/ /1930	"Sunday fishing is a sin;" "N"s are reversed "FLUVANNA, TEX.;" "N"s are reversed
41GR465	C J L	11/12/1918 5/1/1925	Also associated with C J L

PHASE I INVESTIGATIONS, JUSTICEBURG RESERVOIR

Table 22, continued

Site	Name	Date	Associated Artwork or Comments
41GR473	BUFORD BROWNING JESSE BROWNING A H J G J	4/10/1901 4/10/1901	Uncertain year, probably 1901
41GR475	F E C J L	10/14/1901 10/11/1915	
41GR494	AJ		A and J are together, could be a brand mark or initials
41GR516	EARL JUSTICE	6/27/1915	
41GR517	CECIL H H	1936	Three cartoon figures are associated
41GR525	HOLLIS AND VERDA DRAKE J MELZA		
41GR526	W L GROVES - KELLY & ROY FRED ANTELOP[?] AL GROVES ORA & EMMA	1897 5/12	"No Rain"; date could be May 1912
41GR536	J A FERGUSON C J LEININGER HOWARD PENN	10/31/1926 11/25/1918 11/16/1935	"POST, TEX." Written in script with "Justiceburg Texas" "FT. WORTH, TEX."
41GR537	NEWTON RENFROE	1935	
41GR545	AB J M B A B M E D I C EVANS J E F GENNEVA JA GLADYS C J L J A N NANNIE OS PEARL G P H D R ROY W ROY	1887 1935 1931 3/16/1911 7/7/1901 7/4/1927 11/20/18 7/4/1927 1925 1887	Possible brand Surrounded by rectangle outline Possible brand or initials "S" is reversed Written sideways, "S" is reversed, brand mark

Table 22, continued

Site	Name	Date	Associated Artwork or Comments
41GR545, cont'd.	R T W R W V R	1889	
41GR550	L M J	11/9/1918	Date is questionable, could be 1910, 1916, or 1918
41GR552	C J LEININGER	11/9/1918	
41GR553	EARL STEVENS A L T M T F B T A L T A L T A L T A L T -	11/9/1918 4/21/1901 7/15/1901 1904 1904 3/1908 6/1910 3/1911	"WAUSE . . . , OHIO" Drawing of cowboy with hat, cigarette, etc. near historic inscriptions
41GR556	N J C J L	5/19/1927 10/20/1918	Drawing of owl on stump or mesa top; initials are within owl drawing Drawing of rattlesnake; probably associated with 1918 inscription
41GR557	R B VADA JUSTICE W B W	1936 1918	
41GR558	J J J JEFF JUSTICE JERRY ODAM WALLACE	3/7/1909	
41GR559	E V B C J L	10/13/1926 11/25/1918	
41GR567	P C BENNETT	1/5/1923	"Bluffdale, Tex.;" "N"s are written backwards
41KT50	J C SMITH	1/3/1886	"-E BRND" brand mark written after name
41KT54	MAUD DAVIS EVA DAVIS P M ESQUEDA ADAM G McCOY DELLA STELL AGNES JEP STELL WILLE STELL	2/23/1908 9/1924 10/1937 12/24/1885 2/23/1908 9/1924 9/1924 9/1924	Age "19" Age "11" Age "15" Age "8" is probably associated Age "14"

PHASE I INVESTIGATIONS, JUSTICEBURG RESERVOIR

Table 22, continued

Site	Name	Date	Associated Artwork or Comments
41KT60	VANIE DUKE	1912	Year is uncertain
	HOLL R	3/11/1944	Associated with Stell inscription
	JFP STELL	3/11/1944	
41KT65	J H G		
	W W G	1908	
41KT72	H G	12/1910	12 may not indicate the month
41KT73	P E WARE	1931	
41KT76	JIM E		
	C S P	8/24/1907	"9" is written backwards
	B T S		
	D A S		Written in block print
	D S		
	F K S		

the historic names are greatly outnumbered by recent inscriptions and graffiti, but some are isolated finds. Additional information on these historic inscriptions is found in Appendix E, which lists the inscriptions alphabetically and provides pertinent biographical data.

CHAPTER 11

SUMMARY AND CONCLUSIONS

by Douglas K. Boyd, Martha Doty Freeman,
and Elton R. Prewitt

A 100% intensive pedestrian survey was conducted of the approximately 8,600-acre Justiceburg Reservoir project area from March-June 1987. Several kilometers of proposed access road and pipeline were also surveyed. These archeological investigations resulted in the recording of 375 sites. Three categories of sites were recorded: (1) rock art sites; (2) surface or buried sites with tangible physical remains; and (3) sites which have both rock art and tangible physical remains. Some of the rock art is obviously historic Euro-American, some is obviously historic aboriginal, and other rock art is aboriginal and probably prehistoric in age. Sites with tangible cultural remains span most of the Prehistoric and Historic periods and may be single component or multicomponent. To further confuse matters, a few sites with surface or buried remains also have associated rock art. Table 23 presents the recorded sites by components.

TABLE 23
RECORDED SITES IN JUSTICEBURG RESERVOIR

Surface/ Buried Remains	Rock Art				Total	Percent
	Aboriginal	Euro-American	Mixed Aboriginal/ Euro-American	None		
Single-component prehistoric	2	1	1	262	266	70.9
Multicomponent prehistoric	-	-	-	9	9	2.4
Historic only	-	-	-	17	17	4.5
Mixed, single- component prehistoric/ historic	-	-	-	10	10	2.7
Mixed, multi- component prehistoric/ historic	-	-	-	3	3	0.8
Rock art only	<u>18</u>	<u>40</u>	<u>12</u>	<u>-</u>	<u>70</u>	<u>18.7</u>
Totals:	20	41	13	301	375	
Percent:	5.3	10.9	3.5	80.3		100.0

The majority of the sites are either exclusively rock art (18.7%) or exclusively buried or surface, single-component prehistoric sites (69.8%). The remaining sites are either single-component prehistoric with rock art (1.1%), multicomponent prehistoric (2.4%), historic only (4.5%), or mixed prehistoric and historic components (3.5%).

Of the 375 sites recorded, 288 contain one or more prehistoric components in surface and/or buried contexts, 30 contain historic components in surface and/or buried contexts, 54 contain historic Euro-American rock art, and 33 contain aboriginal rock art. These sites are described in Appendices F and G and are discussed in more detail in Chapter 8 (prehistoric sites), Chapter 9 (historic sites), and Chapter 10 (rock art sites).

Of the 243 prehistoric sites (excluding 45 isolated finds) recorded, no Paleoindian or early Archaic localities were recognized, and only sparse evidence of middle Archaic cultures was found. Most of the prehistoric sites are temporally undefined, but of those which could be assigned a probable age, the vast majority are late Archaic and Late Prehistoric. Of the 54 historic Euro-American rock art sites, 1 dates from 1849 and is contemporaneous with the earliest documented United States military activity known in this portion of West Texas; the remainder span the Historic Period in the project area, with the bulk of inscriptions dating after 1900.

Thirty historic sites were recorded. They are representative of a variety of functions, including ranch headquarters, homesteads, line camps, trash dumps, burials, and functions related to specialized social groups such as buffalo hunters or railroad and oilfield workers. The span of time represented by the historic sites is estimated to be ca. 1878 to the present.

A number of sites were previously recorded when the current investigations began. The previous work in the reservoir and the problems with site designations in the area are discussed in Chapter 3. Few of the sites already assigned numbers had been adequately recorded or could be relocated. Some previously recorded sites were redefined, while others were simply rerecorded and new site data added to the existing data. Two previously recorded sites in the project area could not be relocated. Sites 41GR391 (three bedrock mortar holes in a 3x3-m area) and 41GR397 (a single "possible cairn" rock pile) are both indicated marginally inside the project boundary, but neither could be relocated at the plotted locations.

A total of 740 prehistoric artifacts and other materials and 15 historic artifacts were collected because they were thought to be temporally or functionally diagnostic or because they came from subsurface shovel tests, backhoe trenches, or natural cutbank exposures. Twenty backhoe trenches were excavated during the geoarcheological investigations; four of these were located at archeological sites, two of which yielded archeological materials. All shovel tests which yielded cultural materials were considered to be on-site shovel tests. A number of on-site shovel tests, however, did not yield cultural materials. A total of 270 on-site shovel tests were excavated; 93 (34%) were positive and yielded prehistoric cultural materials, and only 1 yielded historic cultural materials. Hundreds of off-site shovel tests excavated in areas considered to have potential for cultural remains were negative and were not recorded.

It should be noted that most sites were discovered through natural erosional or man-made exposures. On-site shovel tests were extremely useful in estimating the depth and

nature of subsurface materials, but in only a few cases were sites actually discovered through shovel tests.

The analysis of recovered prehistoric and historic artifacts is presented in Appendix A. Lithic artifacts and debitage were identified as to type of artifact, material, and condition or stage of manufacture. Use-wear was noted when it was obviously present, but no detailed use-wear analysis was attempted. The site and artifact data computer analyses were aided by the use of the Minark Archeological Database System (Johnson 1985). When appropriate, specialists were consulted to help identify or analyze some remains. Ceramics, freshwater shells, obsidian, charred organic materials, and faunal remains were all given special attention. The analysis of the faunal remains is presented in Appendix C.

The research design (see Chapter 5) presents a wide-ranging slate of questions pertinent to Justiceburg Reservoir and the Southern Plains region. As was expected, survey-level data are insufficient to fully address the questions posed, but they do provide a basis for evaluating the potential to address particular problem domains. These are briefly reviewed here.

Cultural chronology dominates the prehistoric research problems in the region. Wulfkuhle (1986:410-411) summarized the situation by stating that "even a hypothetical chronology of the Lower Plains region is not warranted at this time." Quite simply, there has been insufficient archeological research with which to establish a detailed local prehistoric chronology, and researchers have been forced to look to neighboring regions for comparative purposes. As indicated in the Chapter 3 (see Fig. 8), the working chronology outline is simple, inconclusive, and requires substantial refinement. The survey findings at Justiceburg indicate excellent potential to address this problem through geoarcheological studies, radiocarbon dating of soil humates and charcoal or bone from features in sites, investigation of stratified terrace sites, and continued interregional artifact cross-dating.

Paleoindian, early Archaic, and middle Archaic sites on and near the Llano Estacado are relatively scarce. Justiceburg Reservoir is no exception and demonstrates a comparable lack of early sites and a relative abundance of later sites. A number of explanations are valid, and it is probably a combination of these that account for the low number of sites from these periods. Some of the suggested explanations include:

- (1) Strata of appropriate late Pleistocene and early Holocene age are rare, most having been removed by later erosion (possibly accelerated erosional episodes brought on by climatic changes, i.e., the proposed Altithermal period).

- (2) Late Pleistocene and early Holocene strata are buried and obscured by subsequent deposition, and archeological researchers sometimes fail to recognize or adequately search for these deposits.

- (3) Archeological research in the region is creating a sampling problem due to the biased selection of project areas (such as reservoirs).

- (4) Recognition of Paleoindian and early to middle Archaic sites may be difficult. Projectile points are the only diagnostic artifacts which readily distinguish these sites. Scarcity of projectile points and the lack of other diagnostic artifacts are probably major factors contributing to the inability to recognize these sites.

(5) Local amateur collecting (possibly selective collecting) may contribute significantly to the lack of diagnostic projectile points and the inability to recognize site chronology.

(6) The scarcity of diagnostic projectile points (especially early and middle Archaic) may be due to subsistence strategies which placed very little emphasis on hunting. A subsistence less oriented toward hunting could have been brought about by climatic conditions (i.e., the Altithermal) which affected animal populations.

These are by no means the only explanations; however, they suggest potential areas of research. The site data from Justiceburg Reservoir, with an overrepresentation of late sites, seem to conform to the regional pattern. The preliminary geoarcheological investigations at Justiceburg Reservoir strongly suggest that the first two propositions contribute greatly to the lack of identified early sites. In the uplands, late Pleistocene and early Holocene deposits are evidently deeply buried; they are rarely exposed by erosion and can only be located through subsurface testing. In the floodplain, deposits of that age are rare. Subsurface testing suggests that most of the late Pleistocene and early Holocene deposits have been removed by subsequent erosion or are very deeply buried. They were recognized at only one floodplain location in the project area -- the wide valley portion at the confluence of Grape Creek and the Double Mountain Fork. At this location, a late-Pleistocene-age paleosol is buried by several meters of alluvial fan sediments.

In regard to prehistoric settlement patterns, the Justiceburg survey data are hampered by lack of diagnostics. Only 39 of the 243 sites (excluding isolated finds) contain chronologically recognizable components (see Table 12). At these 39 sites, 48 components are assigned temporal affiliations, often on the basis of a single artifact. There appears to be no significant correlation between temporal affiliation and topographic setting. Archaic and Late Prehistoric components are relatively evenly distributed among the floodplain, erosional remnant, and upland settings. Temporally undefined sites are similarly distributed.

Functional assessments of sites on the basis of surface data are tenuous in most cases, but limited activities are inferred. Evidence of lithic reduction in natural gravel outcrop areas, for example, is thought to represent lithic procurement, while burned rock concentrations or features are thought to represent camping activities, especially cooking. No significant correlations between the suspected age of a component and its presumed function were observed. Sites at which lithic procurement seems to be the sole activity could rarely be assigned to a chronological period. Sites with evidence of camp activities are evenly distributed between the Archaic and Late Prehistoric periods.

Gouges have been considered diagnostic of the Archaic period; however, this artifact group lacks firmly associated contextual dating in the Lower Plains. Gouges were documented at 27 sites; 8 have chronologically defined components. Four (41GR207, 41GR376, 41GR393, and 41KT49) contain Archaic components, three (41GR33, 41GR263, and 41GR388) are mixed Archaic and Late Prehistoric, and one (41GR383) is Late Prehistoric. Although this seems to support the assumption that gouges are predominantly of Archaic age in the Lower Plains, age confirmation through absolute dating is needed.

Function is another poorly understood aspect of gouges. Use-wear studies of gouges from other regions have been quite revealing, but no such studies have been undertaken in the Lower Plains. Until a regional use-wear analysis of gouges is undertaken, it is

speculative to suggest that gouges in the Lower Plains were similar in primary function (i.e., woodworking) to those found elsewhere.

Pointed-oval, "boat-shaped" bedrock mortars seem to be a localized phenomenon in the area surrounding Garza County. These distinctive features were found at eight sites in the project area, and less-distinctive shallow-basin mortar holes were found at five sites (see Table 13). The pointed-oval mortar holes probably represent a different function than the round mortar holes commonly found in nearby regions.

Other features include rock piles which represent possible cairn burials and a variety of burned rock features. The function(s) of the cairns have yet to be determined. Burned rock features are the most numerous features encountered and appear to be of several distinct types. These probably represent different functions, but this remains to be conclusively demonstrated. Burned sandstone clusters are thought to represent fire hearths. Burned Potter chert clusters are also abundant. These randomly arranged clusters of intensively heated, fire-cracked stones differ from sandstone clusters in that they do not appear to have been burned in situ. The most widely accepted explanation for these clusters of fire-cracked materials is that they are "boiling stone dumps." These features are often suggested to be predominantly Archaic in age. Indeed, stone boiling would have been a very efficient method of cooking for nonceramic, nomadic hunter-gatherers. This may also help explain the lack of early and middle Archaic sites. An emphasis on gathering could result in fewer projectile points (hunting), thus limiting their recognition by traditional means.

However, the site data do not necessarily support the contention that stone boiling was predominantly Archaic. Burned sandstone features, fire-cracked Potter chert features, and features with mixed burned sandstone and fire-cracked Potter chert are almost equally distributed among Archaic and Late Prehistoric sites. There seems to be no significant difference in the ages of site components where these features are found. Ultimately, the way to adequately address these problems is with absolute dates or diagnostic artifacts in association with features from an excavated context.

An unexpected type of burned rock feature found at Justiceburg is, for lack of a more appropriate term, the burned rock midden. Six sites appear to contain burned rock middens analogous in morphology to those in Central Texas. The Justiceburg middens are diminutive in comparison but have many of the same attributes (e.g., associated mussel shells and chipped lithic debris) as those in Central Texas. These features have been recognized at few other locations in the Texas Southern Plains. They are important for their potential to address research questions relating to the distribution of burned rock middens and to unrecognized subsistence activities in the Lower Plains.

Identified Archaic dart points collected from Justiceburg include Castroville, Ensor, Mahomet, and Nolan. All of these types have been previously reported in the region. It should be noted that Mahomet has only recently been recognized as a type and may have been previously identified in the Lower Plains as the Darl type.

Late Prehistoric sites are relatively abundant and are characterized by much more variation in exotic materials. At Justiceburg, a variety of exotic ceramic types are found in local collections, but these have neither been systematically documented nor identified. Ceramics found during the survey include El Paso Polychrome, Pecos Glaze Polychrome V, Pecos Faint Striated plainware, and unidentified plainware sherds. The El Paso Polychrome

indicates a fairly early connection between the Southern Plains and the Southwest, while the two Pecos wares indicate continued exchange into protohistoric times. The earlier ceramic types, however, cannot be conclusively associated with local cultural complexes in the Lower Plains, and the exchange mechanism is undetermined.

Pecos ceramics are not uncommon in the Southern Plains. They have been found at a number of sites attributed to the locally defined Garza Complex. This does not imply that Pecos ceramics are exclusively assignable to this cultural manifestation, but previous studies suggest this is likely. While no diagnostic Garza or Lott arrow points were found in the project area, the Pecos ceramics possibly indicate Garza Complex sites. One site in particular, 41KT53, contains considerable potential for addressing research questions relating to the Garza Complex.

One other recognizable prehistoric cultural complex may be represented in the Justiceburg project area. Deadman's arrow points found along the eastern Caprock Escarpment and into the Lower Plains have been suggested as belonging to a recently defined Palo Duro Complex. These points were found at a few of the sites in the survey area, and the possibility that these sites may be similar to Palo Duro sites should be considered. An arrow point from one site in the project area, 41GR33, has been identified as a possible Livermore, and the site previously yielded Perdiz arrow points. The occurrence of these two point types in the Southern Plains suggests contact with peoples in the Trans-Pecos and Central Texas regions, respectively.

Silicate lithic materials are extremely abundant locally in the form of Quaternary gravel deposits. These materials are predominantly derived and redeposited from the Tertiary Ogallala Formation but also include varying amounts of redeposited gravels from Triassic conglomerates and small amounts of varying grades of Edwards chert from the northernmost Cretaceous outcrops in the State. These materials include Potter chert, distinctive maroon or purple Ogallala quartzite, other coarse-grained quartzites, silicified wood, Edwards chert, possibly Tecovas jasper, and a variety of unidentified materials. Tecovas jasper is not definitely known to occur in the local gravels, and the few artifacts made of this material are of a finer quality probably imported from outcrops to the north. The Edwards chert found in the local gravels is of chippable quality and was undoubtedly utilized, but a large number of artifacts are made from a very fine quality, dark gray Edwards chert that was probably brought in from north-central Texas.

Exotic lithic materials imported into the project area from greater distances include Alibates agate and obsidian. Both of these materials are found in small quantities throughout the Lower Plains; they are more abundant in Late Prehistoric sites than in Archaic sites. Alibates agate comes from a limited outcrop area about 300 km to the north in the Texas Panhandle. The source of the obsidian found at site 41GR13 is identified as the Jemez Mountain area in northern New Mexico. This supports other obsidian source studies in the Lower Plains and suggests this material was an important trade commodity in the Pueblo-Plains interaction.

Aboriginal rock art sites provide the only direct evidence of Plains Indian horse nomads found in the project area. Historic Period Plains Indian burials and campsites are known in the Southern Plains and in the immediate vicinity surrounding the project area. However, these types of sites are difficult to identify, and none were recognized during the current investigations. Historic documents and historic elements in the aboriginal rock art attest to the presence of these groups, and both burials and campsites also probably exist in the project area.

The majority of the aboriginal rock art contain no historic elements and appear to be stylistically older. The quantity of rock art at Justiceburg is greater than expected. Only recently have any advances been made in interpreting the rock art in the Lower Plains, and these advances are limited to the later protohistoric elements. The sites at Justiceburg form an important resource from which to pursue this aspect of prehistoric lifeways.

In contrast to the difficulties which were encountered in attempting to identify and define a prehistoric cultural chronology for the project area, an equivalent historic chronology was readily discernible. Local and regional histories, together with special studies and the data available in primary documents, facilitated the formulation of a regional historical model. Comparison of the model with sites recorded in 1987 aided in the refinement of the model and suggested the use of additional documentary sources in future work.

During the Historic Period, the project area was located within a region which was crisscrossed by trails utilized by comancheros, participants in the well-documented Plains-New Mexico trade network which flourished from the last quarter of the eighteenth century to 1880. The area was contiguous to regions explored by military expeditions after 1849, and it was again traversed in the 1870s by military groups in pursuit of Comanche Indians.

While the initial research design failed to identify buffalo hunting as a significant activity in the region, subsequent research generated by the recording of site 41GR528 suggested that the hunting which was widespread in areas east of Garza County in Kent, King, and Stonewall counties, and south in Scurry County, occurred in or near the project area as well. Other historic activities and periods which were identified prior to the commencement of fieldwork include large-scale ranching, permanent Anglo settlement, town-building, and specialized economic activities associated with railroads and the oil industry. Finally, it was assumed that the area had some special, probably economic, relationship with larger communities such as Post and Lubbock.

The results of the fieldwork and historical research failed to confirm the existence of Plains-European trade within the project area, the presence of pre-Civil War military personnel is only tentatively supported by a petroglyphic rock art site (41GR333), and there appears to be no direct evidence of U.S. military activity in the area during the 1870s. On the other hand, artifacts collected at site 41GR528 by Emmett Shedd, the presence of a grave dated 1878 at the same site, and data about the activities of buffalo hunters J. Wright Mooar, J. W. and A. B. Woody, and Raymond and Matt Rumph strongly suggest that buffalo hunters may have been active in the area by the late 1870s.

The significance of open-range cattle raising in the project area during the 1880s and of fenced-range ranching during the 1890s was confirmed at archeological sites (41KT42 and 41KT84) and rock art sites (41GR51, 41GR305, 41GR308, 41GR322, 41GR445, 41GR545, 41KT50, and 41KT54), which also extends the chronological range of such activities by specific individuals and ranch companies, and in the historic literature. However, the literature failed to identify sheep as a component of the livestock industry along the Double Mountain Fork (as at 41GR443) or to describe the significance and impact of the 1895 Four-Section Act which resulted in the construction and occupation of numerous homesteads within the survey area (41GR263, 41GR392, 41GR412, 41GR443, 41GR474, and 41KT58). Furthermore, there was no suggestion prior to fieldwork of the apparently unusual character of homesteading and ranching activities in southeastern Garza County or of the ways in which ranches there differed in origin and size from contemporaneous ranches to the north and east.

Finally, the impact of the railroad, platting and growth of Justiceburg, and development of the oil industry on the project area was substantiated in census data, and the economic and social relationships which existed between the area and communities such as Colorado City, Snyder, and Post were supported in primary and secondary sources. However, insufficient work was done at archeological sites known to have been occupied prior to and following 1910 to determine the type and degree of change which the railroad, local towns, and development of the petroleum industry had on residential sites and material culture along the Double Mountain Fork of the Brazos.

Analysis of the historic archeological sites which were recorded in 1987 suggests that there is at least one representative site from each significant period or each discrete type of historic activity after 1875. Of the 30 historic sites recorded, 1 is a ranch headquarters with standing architecture; 11 are archeological sites which functioned as ranch headquarters, line camps, or homesteads (dugouts or buildings); 5 are dumps associated with specific homesteads; 6 are random dumps which could not be identified with specific occupational sites; 2 are housesites or other features related to railroad activities; 1 site probably resulted from town-building activities; 1 site resulted from oil-industry-related activities; 1 site is comprised of a feature whose function is unclear; 1 site is a dedicated cemetery containing multiple interments; and a final site contains burial and campsite components, both of which may have been related to buffalo-hunting activities. Of the historic habitation sites for which dates of initial occupation could be estimated based on preliminary historic research and artifactual analysis, one dates from the period 1870-1879, two from 1880-1889, two from 1890-1899, five from 1900-1909, two from 1910-1919, one from 1920-1929, and two from 1930-1939. The historic rock art sites demonstrate a similar chronological frequency, with the bulk of the inscriptions dating from the early to mid twentieth century, probably reflecting the large increase in population which occurred after 1899.

In short, the archeological resources of Justiceburg Reservoir possess extensive research potential. Continued investigations in the project area will add significantly to the existing knowledge of Southern Plains prehistory and history.

CHAPTER 12

SITE ASSESSMENTS AND RESERVOIR IMPACTS

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This chapter provides assessments of site significance that are based on the research design proposed in Chapter 5. These relationships to research questions form the basis for initial assessments of National Register eligibility. As noted in Chapter 5, survey-level data are usually not adequate to assess accurately and fully the specific research contributions that individual sites may make. As a result, most sites are judged here to be potentially eligible for listing on the National Register of Historic Places. Other sites are judged to be not eligible for listing on the National Register based on certain criteria (e.g., excessive degree of disturbance) which negate a site's research potential.

Following a presentation of individual site assessments, the position of the resources in relation to impact zones is considered. This framework provides the foundation for making management decisions and for prioritizing future investigations, as discussed in the Chapter 13.

All sites on lands owned by the State of Texas and its component local entities are considered to be eligible for designation as State Archeological Landmarks. The Texas Antiquities Committee recommends that they eventually be designated as such during or subsequent to Phase III investigations.

Site Assessments

The process of determining site significance (i.e., research potential) must be linked with some theoretical orientation which builds on the existing data by asking pertinent questions to govern future investigations. The current state of archeological knowledge in the Southern Plains of Texas is summarized in Chapter 3. The underlying theoretical orientation for Justiceburg Reservoir is one of cultural adaptation through 10,000 years of changing environmental conditions. In Chapter 5, this theme is developed into a research design to guide future investigators toward meaningful and productive research. Five general categories of research domains are defined: environment, chronology, subsistence, site function/settlement patterns, and cultural affiliation/interrelations. Within these domains, specific research questions are relevant to understanding the cultural history of the region. These questions undoubtedly will be refined and new questions will be asked as research in the region progresses.

The Phase I survey recorded 330 sites and 45 isolated finds. These localities have already provided evidence to address, at least in part, some of the research questions proposed. Their full significance lies not in the data that they have yielded; rather, it lies in their potential to yield both qualitatively and quantitatively greater evidence with which to address research questions.

Ideally, each site is evaluated upon those research questions which it alone may potentially address. However, this is not practical in view of the limited scope of survey data and the large number of sites involved. Most of the prehistoric sites cannot yet be attributed to specific time periods, much less to any particular group of people. This does not necessarily limit a site's potential to address a wide range of research problems, but it does limit the specific questions that may be asked. A more practical approach is to evaluate sites by functional groups or site types within the framework of the problem domains. Therefore, site assessments are organized into the following classes: prehistoric, aboriginal rock art, nonaboriginal rock art, and historic. Prehistoric sites are subdivided into classifications used throughout this report: lithic procurement areas, campsites, lithic procurement/campsites, rockshelters, faunal localities, lithic scatters, and isolated finds. Table 24 lists the five research domains and provides a matrix that describes the potential for each site type to address each domain.

TABLE 24
POTENTIAL FOR SITE TYPES TO ADDRESS RESEARCH PROBLEMS

Site Type	Environmental Domain	Chronological Domain	Subsistence Domain	Site Function/ Settlement Patterns	Cultural Affiliation/ Interrelations
Lithic procurement areas	no	possibly	no	yes	possibly
Campsites	yes	yes	yes	yes	yes
Lithic procurement/campsites	yes	yes	yes	yes	yes
Rockshelters	yes	yes	yes	yes	yes
Faunal localities	yes	yes	possibly	possibly	possibly
Lithic scatters	no	possibly	no	possibly	possibly
Isolated finds	no	possibly	no	possibly	possibly
Aboriginal rock art sites	no	yes	no	yes	yes
Nonaboriginal rock art sites	no	yes	no	possibly	yes
Historic sites	yes	yes	yes	yes	yes

Lithic Procurement Areas

One of the most common prehistoric activities represented is the acquisition and utilization of lithic resources from local Quaternary gravels throughout the project area. While lithic procurement sites are abundant, they exhibit a wide range of variation in the materials present and in the extent and character of lithic reduction. These sites have the greatest potential to address questions in the site function/settlement pattern domain. By characterizing and quantifying the available lithic materials, the lithic reduction debitage, and the relationship between campsites and lithic procurement areas, it may be possible to define more precisely the functional importance of these sites. To a lesser degree, questions in the chronology and cultural affiliation/interrelations domains can possibly be addressed through the recognition of tool production, material preferences, and reduction strategies which are temporally and/or culturally distinctive.

Prehistoric Campsites

Prehistoric campsites will provide the majority of the interpretive data for the project area and the region. The research potential of the prehistoric campsites is vast, and it is expected that questions in each of the problem domains can be addressed by investigations of these sites. The environmental domain can be approached through special studies such as site sediments and stratigraphy; pollen, phytolith, and/or macrobotanical remains associated with features or stratigraphic profiles; and organic residues obtained from tools.

The chronological domain can be addressed in relative terms through site stratigraphy, seriation, and/or crossdating; and in absolute terms by such methods as radiocarbon, thermoluminescence, and archeomagnetism. Particular attention should be given to correlating absolute dates with features and diagnostic stone tools.

The subsistence domain is critical to understanding human adaptation throughout prehistory. Prehistoric campsites have a considerable potential for addressing subsistence-related research questions. Analyses of faunal remains in conjunction with stone tool morphology and organic residue obtained from stone tools are critical to interpreting subsistence activities. Identifiable features such as hearths and boiling stone dumps will also contribute to understanding subsistence. Special studies such as pollen, phytolith, macrobotanical, and organic residue in conjunction with the recognition and classification of feature morphology will potentially contribute considerable subsistence data. Whether obtained through artifact associations and/or absolute dating of strata and features, it is crucial to date the subsistence activities represented.

Site function and settlement pattern questions are intimately related to the other problem domains. Determination of intrasite patterning and activities is extremely important, as is the recognition of intersite settlement patterns. These questions are best addressed if supplemented with subsistence and environmental data and assume greater meaning when the time dimension is added. The geographical distribution of prehistoric campsites will address research questions related to settlement patterns.

The final problem domain which can potentially be addressed at prehistoric campsites is that of cultural affiliation/interrelations. This currently consists of very few specific questions, merely because of the lack of recognizable regional cultural complexes. A synthesis of data relating to the other problem domains is needed in order to recognize new cultural units and interactions among units. Again, prehistoric campsites are expected to provide the greatest quantity of data to address research questions in this domain. Ultimately, when research progresses to the point where questions in the cultural affiliation/interrelations domain may be answered, then considerable progress toward realizing the ultimate goal of understanding human adaptations will have been made.

Lithic Procurement/Campsites

Sites classified as lithic procurement/campsites can potentially contribute data to each of the five defined problem domains. These sites retain the same research potentials as discussed for each of the two previous site types and may also have particular potential to contribute additional data to the site function/settlement patterns domain. Since both habitation and lithic procurement activities are present at these sites, they may contribute to refining the intrasite functional relationships and possibly contribute to understanding the implications of lithic resources in settlement patterning.

Rockshelters

Rockshelters have similar potential for contributing useful information as do the prehistoric campsites. They are expected to contain tools, features, and contextual (e.g., stratigraphic) data which can be studied in various ways to address specific questions in each of the five problem domains. Rockshelters are also expected to have a greatly increased potential for the preservation of perishable materials. Preservation of macrobotanical and faunal remains, pollen, phytoliths, organic residues, and fibrous artifacts provides an opportunity to address many environmental, subsistence, and functional questions that is not available in open campsites.

Faunal Localities

Faunal localities derive their prime importance from their potential as culturally related, i.e., kill sites or butchering sites. If a faunal locality is found to be cultural in origin, then it has potential to address any of the five problem domains. If investigation of a faunal locality indicates it is noncultural or indeterminate, it still is expected to provide environmental and chronological data relating to the availability of specific animals through time.

Lithic Scatters

The classification of lithic scatters as used here refers to very ephemeral sites. Lithic scatters have limited value beyond the initial survey data obtained, although they

possibly could contribute to research questions in the chronology, site function/settlement patterns, and cultural affiliation/interrelations domains. These sites have minimum potential, however, for yielding additional significant data.

Isolated Finds

Like the ephemeral lithic scatters, isolated finds retain little potential to yield additional data beyond survey level. Diagnostic artifact finds might potentially address some specific chronology domain or cultural affiliation/interrelation domain research questions. Tool-loss patterns could also help elucidate questions in the site function/settlement pattern domain. None of these potential contributions require further in-field examination of the isolated find spots.

Aboriginal Rock Art Sites

Aboriginal rock art sites are not expected to provide environmental or subsistence data, but they have considerable potential for addressing chronological, site function/settlement patterns, and cultural affiliation/interrelations problems. The extent to which rock art sites may make meaningful contributions to these areas is dependent on accurate recording and on the ability to interpret aboriginal iconography. Only through regional synthesis and detailed comparisons with ethnohistorically documented iconography will the full significance of these sites be realized.

Nonaboriginal Rock Art Sites

Nonaboriginal rock art sites are expected to have contributed the bulk of their information from survey-level data, but they may retain limited potential to yield additional data. These sites have already contributed to the chronology and cultural affiliation/interrelations domains, but additional investigations may contribute contextual and other information with which to address research questions in the chronology, site function/settlement patterns, and cultural affiliation/interrelations domains. In addition, the data they provide may serve to supplement or modify data obtained from other, more-conventional historical documents, or to suggest possibilities for research which may not have been identified previously. The potential to contribute new data is dependent to a large extent on further historic archival/informant research that poses new research questions or to successfully integrate information available from rock art sites with that available in historic texts.

Historic Sites

Historic sites are classified into several types, all of which have comparable research potentials. The historic sites are expected to have potential for yielding only limited environmental data, which can be integrated with that obtained from archival

records. The sites are expected to have considerable potential to yield information relative to the other four problem domains -- chronology, subsistence, site function/settlement patterns, and cultural affiliation/interrelations. While realization of some of the potential may depend upon additional archival/informant research, the sites potentially should provide data in other ways. The chronology domain especially may be addressed through artifact assemblages at dump, habitation, and special-activity sites, and through detailed recording of biographic data and stylistic attributes of graves and cemetery sites.

National Register Eligibility

As presented in the preceding section, site significance is assessed (under Criterion D) as the potential for sites to yield information useful for addressing research questions posed in Chapter 5. This research-oriented assessment forms the basis for the following initial National Register assessments of all sites; assessments of some of the historic sites and structures are based on other applicable National Register criteria.

Cultural resources are eligible for listing on the National Register of Historic Places and therefore are worthy of avoidance, protection, or mitigation through data recovery, if they are significant in American history, architecture, archeology, engineering, or culture (U.S. Department of the Interior, National Park Service, National Register Division 1982:1). Significant properties are those that:

possess integrity of location, design, setting, materials, workmanship, feeling, and association, and

- A. that are associated with events that have made a significant contribution to the broad patterns of our history; or
- B. that are associated with the lives of persons significant in our past; or
- C. that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- D. that have yielded or may be likely to yield information important in prehistory or history. [U.S. Department of the Interior, National Park Service, National Register Division 1982:1]

Under these National Register eligibility criteria, the cultural resources fall into two groups: (1) sites that are potentially eligible* for listing; and (2) sites that are not eligible for listing. The determination of eligibility is based on each site's potential

*Only the Keeper of the Register may determine eligibility or noneligibility. Until the opinion of the Keeper is obtained, sites are assessed to be "potentially eligible" or "not eligible" for purposes of cultural resource management.

to address questions presented under the problem domains (see Chapter 5), on its associations with significant events or historical figures, or on the extent to which it has architectural significance.

Three general categories of cultural resources were identified during this Phase I investigation; prehistoric resources, historic resources, and rock art. The first two categories are based on time and culture, while the third is based on function. The first category, prehistoric resources, encompasses varied site types and temporal/cultural affiliations which have the potential to address regional research problems. The second category, historic resources, includes sites representing a range of activities and constitutes a data base which can contribute to understanding of the historical development of the region. The second category also includes sites associated with important historical events and peoples and may include one site with significant standing architecture. The third category is rock art which contains both aboriginal and nonaboriginal iconography which can address a number of questions.

Prehistoric archeological resources and aboriginal rock art are evaluated under Criterion D, while historic sites are evaluated under Criteria A, B, C, and D. Table 25 lists the National Register criteria under which each historic site is evaluated. A group of sites may possess collective significance or a common theme and thus can be considered as an historic district. Only sites which lack integrity, have no significant associations, or which are extremely limited in their research potential are judged to be not eligible for listing on the National Register. Of the 375 sites recorded during Phase I, only 137 are considered to be not eligible for listing on the National Register. Table 26 summarizes the assessments of National Register eligibility of the broad categories of documented resources.

Reservoir Impacts

Since all 375 sites will not be affected in the same manner, the degree and kind of impact(s) to each resource must be considered. The National Reservoir Inundation Study, conducted by the National Park Service over the course of several years, researched the impacts to cultural resources within or adjacent to reservoirs. The findings of this study (Lenihan et al. 1981) indicate five main zones of impact -- the permanent conservation pool, the shoreline fluctuation zone, the upper (maximum) floodpool zone, the backshore zone, and the downstream zone. The study noted that, while varying in kind, the total impacts to resources in the first two zones are comparable. Lenihan et al. (1981:219) recommend that "those areas of the fluctuation zone which are subject to frequent cycling be accorded equal weight with those areas in the permanent pool when considering mitigation alternatives." Direct impacts to sites in both the permanent conservation pool and the shoreline fluctuation zones are severe. In these two zones, long-term preservation of resources is possible but is generally prohibitively expensive. Traditional mitigation measures (i.e., excavation) usually are far less expensive and are by far the most feasible alternative.

Impacts to resources in the upper or maximum floodpool zone ("that portion of the impoundment area that is subject to occasional inundation, e.g., during a period of extremely heavy runoff" [Lenihan et al. 1981:212]) and in the backshore zone ("that portion of the reservoir beyond the level of the maximum flood pool which should never be subjected

TABLE 25

NATIONAL REGISTER EVALUATIONS OF HISTORIC SITES BY CRITERIA

Site No.	Site Type	Eligibility	Criterion
41GR13	ranch headquarters	potentially eligible	C, D
41GR33	trash dump	not eligible	
41GR203	housesite	potentially eligible	A, D
41GR250	housesite	potentially eligible	D
41GR263	dugout homestead site	potentially eligible	B, D
41GR273	trash dump	not eligible	
41GR287	trash dump	not eligible	
41GR288	trash dump	not eligible	
41GR289	trash dump	not eligible	
41GR290	trash dump	not eligible	
41GR292	isolated find	not eligible	
41GR304	trash dump	not eligible	
41GR331	unidentified historic	potentially eligible	A, D
41GR350	trash dump	potentially eligible	D
41GR370	trash dump	not eligible	
41GR375	trash dump	not eligible	
41GR392	line camp/homestead site	potentially eligible	A, B, D
41GR412	housesite	potentially eligible	A, B, D
41GR443	homestead site	potentially eligible	A, D
41GR449	oil pumper's housesite	potentially eligible	A, D
41GR460	rock wall	potentially eligible	D
41GR470	railroad/resort complex	potentially eligible	A, C, D
41GR474	homestead site	potentially eligible	A, B, D
41GR522	cemetery	potentially eligible	B, D
41GR528	grave/campsite	potentially eligible	A, D
41GR530	housesite	potentially eligible	D
41GR565	housesite	not eligible	
41KT 42	line camp site	potentially eligible	A, B, D
41KT58	homestead site	potentially eligible	D
41KT84	line camp site	potentially eligible	A, B, D
All	rock art	potentially eligible	D

TABLE 26
INITIAL ASSESSMENTS OF NATIONAL REGISTER ELIGIBILITY*

Site	Site Type	Prehistoric	Aboriginal		Nonaboriginal
			Rock Art	Historic	Rock Art
41GR13	lithic procurement/campsite; ranch headquarters	PE	-	PE	-
41GR31	campsite	PE	-	-	-
41GR33	lithic procurement/campsite; trash dump	PE	-	NE	-
41GR51	rock art	-	PE	-	PE
41GR54	rockshelter/rock art	NE	PE	-	PE
41GR203	campsite; housesite	NE	-	PE	-
41GR204	lithic procurement/campsite	PE	-	-	-
41GR205	campsite	PE	-	-	-
41GR206	lithic procurement/campsite	PE	-	-	-
41GR207	campsite	PE	-	-	-
41GR238	rock art	-	PE	-	-
41GR239	lithic procurement/campsite	PE	-	-	-
41GR240	campsite	PE	-	-	-
41GR242	rock art	-	-	-	PE
41GR243	lithic procurement/campsite	PE	-	-	-
41GR244	rock art	-	-	-	PE
41GR245	isolated find	NE	-	-	-
41GR246	campsite	NE	-	-	-
41GR248	isolated find	NE	-	-	-
41GR249	faunal locality	PE	-	-	-
41GR250	lithic procurement/campsite; housesite	PE	-	PE	-
41GR251	lithic procurement	PE	-	-	-
41GR253	campsite	PE	-	-	-
41GR254	campsite	PE	-	-	-
41GR255	lithic procurement	PE	-	-	-
41GR256	campsite	PE	-	-	-
41GR257	isolated find	NE	-	-	-
41GR258	campsite	PE	-	-	-
41GR259	lithic procurement	NE	-	-	-
41GR260	lithic procurement	NE	-	-	-
41GR261	lithic procurement	PE	-	-	-
41GR262	lithic procurement	PE	-	-	-
41GR263	lithic procurement/campsite; dugout homestead site	PE	-	PE	-

*PE = potentially eligible; NE = not eligible

NOTE: Prehistoric sites and aboriginal rock art are assessed under Criterion D; historic sites and nonaboriginal rock art are assessed under Criteria A, B, C, or D.

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Table 26, continued

Site	Site Type	Prehistoric	Aboriginal Rock Art	Historic	Nonaboriginal Rock Art
41GR264	campsite	PE	-	-	-
41GR265	lithic procurement	PE	-	-	-
41GR266	lithic procurement	NE	-	-	-
41GR267	lithic procurement	PE	-	-	-
41GR268	lithic procurement/campsite	PE	-	-	-
41GR269	lithic procurement/campsite	PE	-	-	-
41GR270	faunal locality	PE	-	-	-
41GR271	lithic procurement/campsite	PE	-	-	-
41GR272	lithic procurement/campsite	PE	-	-	-
41GR273	lithic procurement/campsite; trash dump	NE	-	NE	-
41GR274	lithic procurement/campsite	PE	-	-	-
41GR275	lithic procurement/campsite	PE	-	-	-
41GR276	lithic procurement/campsite	NE	-	-	-
41GR277	campsite	PE	-	-	-
41GR278	isolated find	NE	-	-	-
41GR279	isolated find	NE	-	-	-
41GR280	lithic procurement	PE	-	-	-
41GR281	lithic procurement	NE	-	-	-
41GR282	rock art	-	PE	-	-
41GR283	rock art	-	-	-	PE
41GR284	rock art	-	-	-	PE
41GR285	rock art	-	-	-	PE
41GR286	lithic procurement/campsite	PE	-	-	-
41GR287	campsite; trash dump	PE	-	NE	-
41GR288	trash dump	-	-	NE	-
41GR289	trash dump	-	-	NE	-
41GR290	trash dump	-	-	NE	-
41GR291	campsite	PE	-	-	-
41GR292	isolated find	-	-	NE	-
41GR293	lithic procurement	NE	-	-	-
41GR294	rock art	-	-	-	PE
41GR295	rock art	-	-	-	PE
41GR296	lithic procurement	NE	-	-	-
41GR297	lithic procurement	NE	-	-	-
41GR298	rock art	-	-	-	PE
41GR299	isolated find	NE	-	-	-
41GR300	lithic procurement/campsite	NE	-	-	-
41GR301	isolated find	NE	-	-	-
41GR302	campsite	PE	-	-	-
41GR303	campsite	PE	-	-	-
41GR304	trash dump	-	-	NE	-
41GR305	rock art	-	-	-	PE
41GR306	lithic procurement/campsite	NE	-	-	-
41GR307	rock art	-	-	-	PE

Table 26, continued

Site	Site Type	Prehistoric	Aboriginal		Nonaboriginal
			Rock Art	Historic	Rock Art
41GR308	rock art	-	-	-	PE
41GR309	campsite	PE	-	-	-
41GR310	faunal locality	PE	-	-	-
41GR311	lithic procurement/campsite	NE	-	-	-
41GR312	campsite	PE	-	-	-
41GR313	rock art	-	-	-	PE
41GR314	lithic procurement/campsite	PE	-	-	-
41GR315	rock art	-	PE	-	PE
41GR316	lithic procurement/campsite	NE	-	-	-
41GR317	rock art	-	PE	-	PE
41GR318	lithic procurement	NE	-	-	-
41GR320	lithic procurement	PE	-	-	-
41GR321	rock art	-	-	-	PE
41GR322	rock art	-	-	-	PE
41GR323	campsite	PE	-	-	-
41GR324	campsite	NE	-	-	-
41GR325	campsite	PE	-	-	-
41GR326	rockshelter	PE	-	-	-
41GR327	lithic procurement	PE	-	-	-
41GR328	lithic procurement/campsite	PE	-	-	-
41GR329	lithic procurement	PE	-	-	-
41GR330	lithic procurement/campsite	PE	-	-	-
41GR331	lithic procurement; unidentified historic	NE	-	PE	-
41GR332	lithic procurement/campsite	PE	-	-	-
41GR333	rock art	-	PE	-	PE
41GR334	lithic procurement	PE	-	-	-
41GR335	isolated find	NE	-	-	-
41GR336	campsite	NE	-	-	-
41GR337	lithic procurement/campsite	PE	-	-	-
41GR338	campsite	PE	-	-	-
41GR339	lithic procurement/campsite	PE	-	-	-
41GR340	lithic procurement/campsite	PE	-	-	-
41GR342	campsite	PE	-	-	-
41GR343	lithic procurement	NE	-	-	-
41GR344	rock art	-	PE	-	-
41GR345	lithic procurement	PE	-	-	-
41GR346	isolated find	NE	-	-	-
41GR347	lithic procurement	NE	-	-	-
41GR348	lithic procurement	PE	-	-	-
41GR349	lithic procurement/campsite	PE	-	-	-
41GR350	lithic procurement/campsite; trash dump	PE	-	PE	-
41GR351	lithic procurement/campsite	NE	-	-	-
41GR352	rock art	-	PE	-	-

Table 26, continued

Site	Site Type	Prehistoric	Aboriginal Rock Art	Historic	Nonaboriginal Rock Art
41GR353	rock art	-	PE	-	-
41GR354	rock art	-	PE	-	-
41GR355	isolated find	NE	-	-	-
41GR356	campsite	NE	-	-	-
41GR357	isolated find	NE	-	-	-
41GR358	isolated find	NE	-	-	-
41GR359	lithic procurement/campsite	PE	-	-	-
41GR360	lithic procurement	NE	-	-	-
41GR361	lithic procurement	NE	-	-	-
41GR362	lithic procurement	PE	-	-	-
41GR363	lithic procurement/campsite	PE	-	-	-
41GR364	lithic procurement/campsite	NE	-	-	-
41GR365	lithic procurement	NE	-	-	-
41GR366	lithic procurement	NE	-	-	-
41GR367	lithic procurement	PE	-	-	-
41GR368	campsite	NE	-	-	-
41GR369	campsite	PE	-	-	-
41GR370	trash dump	-	-	NE	-
41GR371	lithic procurement	NE	-	-	-
41GR372	campsite	NE	-	-	-
41GR373	lithic scatter	NE	-	-	-
41GR374	campsite	NE	-	-	-
41GR375	trash dump	-	-	NE	-
41GR376	lithic procurement/campsite	PE	-	-	-
41GR377	lithic procurement/campsite	NE	-	-	-
41GR378	lithic procurement/campsite	PE	-	-	-
41GR379	lithic procurement/campsite	PE	-	-	-
41GR380	lithic procurement	NE	-	-	-
41GR381	lithic procurement	PE	-	-	-
41GR382	isolated find	NE	-	-	-
41GR383	campsite	PE	-	-	-
41GR384	campsite	NE	-	-	-
41GR385	lithic procurement/campsite	PE	-	-	-
41GR386	lithic procurement/campsite	PE	-	-	-
41GR388	lithic procurement/campsite	PE	-	-	-
41GR390	campsite; rock art	PE	PE	-	-
41GR392	line camp/homestead site	-	-	PE	-
41GR393	campsite	PE	-	-	-
41GR395	lithic procurement	NE	-	-	-
41GR396	lithic procurement/campsite	PE	-	-	-
41GR403	lithic procurement/campsite	NE	-	-	-
41GR404	isolated find	NE	-	-	-
41GR405	campsite	NE	-	-	-
41GR406	lithic procurement/campsite	PE	-	-	-
41GR407	lithic procurement/campsite	PE	-	-	-

Table 26, continued

Site	Site Type	Prehistoric	Aboriginal		Nonaboriginal
			Rock Art	Historic	Rock Art
41GR408	lithic procurement	PE	-	-	-
41GR409	rock art	-	PE	-	-
41GR410	rock art	-	PE	-	-
41GR411	isolated find	NE	-	-	-
41GR412	housesite	-	-	PE	-
41GR416	rock art	-	-	-	PE
41GR417	lithic procurement	PE	-	-	-
41GR418	rock art	-	-	-	PE
41GR419	rock art	-	-	-	PE
41GR420	rock art	-	PE	-	-
41GR421	isolated find	NE	-	-	-
41GR422	campsite	PE	-	-	-
41GR423	rock art	-	PE	-	-
41GR424	rock art	-	PE	-	-
41GR425	campsite	PE	-	-	-
41GR426	rock art	-	PE	-	-
41GR427	campsite	PE	-	-	-
41GR428	rock art	-	-	-	PE
41GR429	campsite	PE	-	-	-
41GR430	campsite	PE	-	-	-
41GR431	campsite	NE	-	-	-
41GR432	campsite	PE	-	-	-
41GR433	campsite	NE	-	-	-
41GR434	lithic procurement/campsite	NE	-	-	-
41GR435	campsite	NE	-	-	-
41GR436	isolated find	NE	-	-	-
41GR437	rock art	-	PE	-	PE
41GR438	campsite	PE	-	-	-
41GR439	campsite	PE	-	-	-
41GR440	campsite	NE	-	-	-
41GR441	campsite	PE	-	-	-
41GR442	campsite	PE	-	-	-
41GR443	sheepherders camp; homestead site	-	-	PE	-
41GR444	campsite	PE	-	-	-
41GR445	rock art	-	PE	-	PE
41GR446	lithic procurement/campsite	PE	-	-	-
41GR447	isolated find	NE	-	-	-
41GR448	rock art	-	-	-	PE
41GR449	oil pumper's housesite	-	-	PE	-
41GR450	campsite	PE	-	-	-
41GR451	campsite	PE	-	-	-
41GR452	isolated find	NE	-	-	-
41GR453	lithic scatter	NE	-	-	-
41GR454	campsite	NE	-	-	-

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Table 26, continued

Site	Site Type	Prehistoric	Aboriginal Rock Art	Historic	Nonaboriginal Rock Art
41GR455	rock art	-	-	-	PE
41GR456	campsite	PE	-	-	-
41GR457	rock art	-	PE	-	-
41GR458	campsite	PE	-	-	-
41GR459	campsite	PE	-	-	-
41GR460	rock wall	-	-	PE	-
41GR461	isolated find	NE	-	-	-
41GR462	campsite	NE	-	-	-
41GR463	isolated find	NE	-	-	-
41GR464	rock art	-	-	-	PE
41GR465	rock art	-	-	-	PE
41GR466	lithic procurement	NE	-	-	-
41GR467	campsite	PE	-	-	-
41GR468	isolated find	NE	-	-	-
41GR469	isolated find	NE	-	-	-
41GR470	railroad/resort complex	-	-	PE	-
41GR471	campsite	PE	-	-	-
41GR472	rock art	-	PE	-	-
41GR473	rock art	-	-	-	PE
41GR474	campsite; homestead site	PE	-	PE	-
41GR475	rock art	-	-	-	PE
41GR476	campsite	NE	-	-	-
41GR477	campsite	NE	-	-	-
41GR478	campsite	PE	-	-	-
41GR479	campsite	NE	-	-	-
41GR480	lithic procurement	PE	-	-	-
41GR481	campsite	NE	-	-	-
41GR482	isolated find	NE	-	-	-
41GR483	campsite	PE	-	-	-
41GR484	campsite	PE	-	-	-
41GR485	campsite	PE	-	-	-
41GR486	isolated find	NE	-	-	-
41GR487	campsite	NE	-	-	-
41GR488	faunal locality	PE	-	-	-
41GR489	lithic procurement	NE	-	-	-
41GR490	rock art	-	PE	-	-
41GR491	rock art	-	PE	-	-
41GR492	isolated find	NE	-	-	-
41GR493	campsite	PE	-	-	-
41GR494	rock art	-	PE	-	PE
41GR495	lithic procurement	NE	-	-	-
41GR496	isolated find	NE	-	-	-
41GR497	campsite	PE	-	-	-
41GR498	isolated find	NE	-	-	-
41GR499	isolated find	NE	-	-	-

Table 26, continued

Site	Site Type	Prehistoric	Aboriginal		Nonaboriginal
			Rock Art	Historic	Rock Art
41GR500	isolated find	NE	-	-	-
41GR501	isolated find	NE	-	-	-
41GR502	isolated find	NE	-	-	-
41GR503	lithic procurement	NE	-	-	-
41GR504	lithic procurement/campsite	PE	-	-	-
41GR505	lithic procurement	PE	-	-	-
41GR506	lithic procurement	PE	-	-	-
41GR507	lithic procurement	NE	-	-	-
41GR508	isolated find	NE	-	-	-
41GR509	lithic procurement/campsite	NE	-	-	-
41GR510	isolated find	NE	-	-	-
41GR511	lithic procurement/campsite	NE	-	-	-
41GR512	faunal locality	PE	-	-	-
41GR513	lithic scatter	NE	-	-	-
41GR514	campsite	PE	-	-	-
41GR515	lithic procurement/campsite	PE	-	-	-
41GR516	rock art	-	-	-	PE
41GR517	rock art	-	PE	-	PE
41GR518	campsite	NE	-	-	-
41GR519	isolated find	NE	-	-	-
41GR520	lithic procurement	NE	-	-	-
41GR521	lithic scatter	NE	-	-	-
41GR522	cemetery	-	-	PE	-
41GR523	campsite	PE	-	-	-
41GR524	campsite	NE	-	-	-
41GR525	rock art	-	-	-	PE
41GR526	rock art	-	-	-	PE
41GR527	lithic procurement/campsite	PE	-	-	-
41GR528	campsite; grave/campsite	PE	-	PE	-
41GR529	campsite	PE	-	-	-
41GR530	housesite	-	-	PE	-
41GR531	campsite	NE	-	-	-
41GR532	isolated find	NE	-	-	-
41GR533	campsite	NE	-	-	-
41GR534	lithic procurement	NE	-	-	-
41GR535	isolated find	NE	-	-	-
41GR536	rock art	-	-	-	PE
41GR537	rock art	-	-	-	PE
41GR538	lithic procurement	PE	-	-	-
41GR539	faunal locality	PE	-	-	-
41GR540	lithic procurement	PE	-	-	-
41GR541	lithic procurement/campsite	PE	-	-	-
41GR542	lithic procurement	PE	-	-	-
41GR543	campsite	PE	-	-	-
41GR544	lithic procurement/campsite	NE	-	-	-

Table 26, continued

Site	Site Type	Prehistoric	Aboriginal Rock Art	Historic	Nonaboriginal Rock Art
41GR545	rock art	-	PE	-	PE
41GR546	rockshelter	PE	-	-	-
41GR547	lithic procurement	NE	-	-	-
41GR548	lithic procurement	NE	-	-	-
41GR549	campsite	NE	-	-	-
41GR550	rock art	-	-	-	PE
41GR551	lithic procurement/campsite	PE	-	-	-
41GR552	rock art	-	-	-	PE
41GR553	rock art	-	-	-	PE
41GR554	lithic procurement	NE	-	-	-
41GR555	campsite	PE	-	-	-
41GR556	rock art	-	-	-	PE
41GR557	rock art	-	-	-	PE
41GR558	rock art	-	-	-	PE
41GR559	rockshelter/rock art	PE	-	-	PE
41GR560	lithic procurement/campsite	PE	-	-	-
41GR561	isolated find	NE	-	-	-
41GR562	campsite	PE	-	-	-
41GR563	lithic procurement/campsite	NE	-	-	-
41GR564	lithic procurement/campsite	NE	-	-	-
41GR565	housesite	-	-	NE	-
41GR566	campsite	PE	-	-	-
41GR567	rock art	-	PE	-	PE
41GR568	faunal locality	PE	-	-	-
41KT33	campsite	PE	-	-	-
41KT34	campsite	PE	-	-	-
41KT35	lithic procurement	NE	-	-	-
41KT36	campsite	NE	-	-	-
41KT37	campsite	PE	-	-	-
41KT38	campsite	PE	-	-	-
41KT39	isolated find	NE	-	-	-
41KT40	campsite	NE	-	-	-
41KT41	campsite	NE	-	-	-
41KT42	campsite; line camp site	NE	-	PE	-
41KT43	lithic procurement	PE	-	-	-
41KT44	faunal locality	PE	-	-	-
41KT45	lithic procurement	PE	-	-	-
41KT46	isolated find	NE	-	-	-
41KT47	campsite	PE	-	-	-
41KT48	isolated find	NE	-	-	-
41KT49	lithic procurement/campsite	PE	-	-	-
41KT50	rock art	-	PE	-	PE
41KT51	campsite	PE	-	-	-
41KT52	campsite	PE	-	-	-

Table 26, continued

Site	Site Type	Prehistoric	Aboriginal		Nonaboriginal
			Rock Art	Historic	Rock Art
41KT53	campsite	PE	-	-	-
41KT54	rock art	-	-	-	PE
41KT55	rock art	-	PE	-	-
41KT56	campsite	NE	-	-	-
41KT57	rockshelter/rock art	PE	PE	-	-
41KT58	homestead site	-	-	PE	-
41KT59	isolated find	NE	-	-	-
41KT60	rock art	-	-	-	PE
41KT61	lithic procurement/campsite	PE	-	-	-
41KT62	lithic scatter	NE	-	-	-
41KT63	lithic scatter	NE	-	-	-
41KT64	isolated find	NE	-	-	-
41KT65	rock art	-	PE	-	PE
41KT66	campsite	PE	-	-	-
41KT67	lithic procurement	NE	-	-	-
41KT68	rock art	-	PE	-	-
41KT69	faunal locality	PE	-	-	-
41KT70	lithic procurement/campsite	NE	-	-	-
41KT71	isolated find	NE	-	-	-
41KT72	rock art	-	-	-	PE
41KT73	rock art	-	-	-	PE
41KT74	isolated find	NE	-	-	-
41KT75	campsite	NE	-	-	-
41KT76	rock art	-	-	-	PE
41KT77	campsite	PE	-	-	-
41KT78	campsite	PE	-	-	-
41KT79	campsite	PE	-	-	-
41KT80	campsite	NE	-	-	-
41KT81	campsite	PE	-	-	-
41KT82	campsite	NE	-	-	-
41KT83	campsite	PE	-	-	-
41KT84	campsite; line camp site	PE	-	PE	-

to inundation" [Lenihan et al. 1981:213]) are both direct and indirect but are very real in terms of their destructive nature. Direct mechanical and biochemical impacts are still operative, but less severe, in the upper floodpool zone and are almost nonexistent in the backshore zone. The most-severe impacts in these zones result from increased human activities. Increased human accessibility to resources causes severe damage. Shoreline and backshore recreational activities are often very destructive, and vandalism to high-visibility archeological sites increases exponentially. Site stabilization and preservation are sometimes viable alternatives in these zones, but a long-term commitment to preservation can be as costly as, or more costly than, traditional mitigation measures. It is extremely important to consider the visibility/fragility of the resources in these zones when reviewing the alternatives.

The final impact zone is the downstream area. Unlike other impact zones, there is "no precedent for an agency accepting responsibility for downstream impacts" (Lenihan et al. 1981:215). At Justiceburg Reservoir, only the four impact zones upstream of the dam and special impact zones, such as the dam and borrow pit construction areas and public access and recreational areas, are considered (Table 27).

The service spillway (uncontrolled) elevation is 2220 ft msl, which defines the top of the conservation pool. Periodic drawdown of the reservoir and other impoundment features will cause the shoreline fluctuation zone to be at and below the 2220-ft elevation. All resources which fall entirely or partially below 2220 ft msl will be in primary impact zones -- the conservation pool zone and the shoreline fluctuation zone.

The emergency spillway (uncontrolled) will be at 2240 ft msl. This elevation corresponds to the predicted level of a 100-year-frequency flood event. All resources which fall entirely or partially between the 2220- and 2245-ft msl elevations will be subjected to secondary impacts of the upper floodpool zone. (Note: The predicted elevation of flooding for the probable maximum flood event is 2257.5 ft msl. All resources below this elevation will be subject to impacts of the upper or maximum floodpool zone. For the purposes of site impacts, however, the 2240-ft msl elevation of the 100-year flood event plus a 5-ft buffer is considered the top of the upper floodpool zone.)

All cultural resources which are entirely or partially above the 2245-ft msl elevation but within 300 linear feet of 2220 ft msl are subject to secondary impacts of the backshore zone. The project boundary consisting of fee lands and flowage easements defines the upper limit of the backshore zone.

The special impact zones (see Fig. 2) that are currently defined include: construction area (includes dam footprint and the upland tract at the north dam abutment to be used for an equipment staging area), access road (from Cedar Hill area to the north dam abutment), pipeline (only partially surveyed as yet; runs northwest from near the north dam abutment), emergency spillway construction area (includes entire upland tract between Grape Creek and South Sage Creek), primary borrow area (at mouth of Grape Creek), secondary borrow area (at mouth of South Sage Creek), upland area (between Grape Creek and Little Grape Creek; no current plans for development), and public access and recreation area (north of Double Mountain Fork extending approximately 1.6 km east and 1.6 km west of Cat Hollow).

For the purposes of defining the overall impacts to resources, there are three categories: primary, secondary, and none. Primary impacts occur at sites entirely or partially within the conservation pool/shoreline fluctuation zone or within the special impact zones. Secondary impacts occur at sites entirely above the conservation pool (2220 ft msl) but within 300 linear feet of 2220 ft msl or on the upland area of unspecified use. Sites with no impacts are restricted to a few sites marginal to but immediately outside the project boundary.

TABLE 27
SUMMARY OF SITE-SPECIFIC IMPACTS AND NATIONAL REGISTER ASSESSMENTS

Site No.	Site Elevation (ft msl)	Impact Zone*	Overall Impact	National Register Assessment
41GR13	2240-2260	2, 3	secondary	potentially eligible
41GR31	2240-2260	2, 3	secondary	potentially eligible
41GR33	2240-2260	2, 3	secondary	potentially eligible
41GR51	2200-2220	1	primary	potentially eligible
41GR54	2240	2	secondary	potentially eligible
41GR203	2240-2280	2, 3	secondary	potentially eligible
41GR204	2230	2	secondary	potentially eligible
41GR205	2250	3	secondary	potentially eligible
41GR206	2230	2, 5	primary	potentially eligible
41GR207	2240-2300	2, 3, 5	primary	potentially eligible
41GR238	2250	3	secondary	potentially eligible
41GR239	2260-2330	3, 5	primary	potentially eligible
41GR240	2255	3	secondary	potentially eligible
41GR242	2260-2280	3	secondary	potentially eligible
41GR243	2220-2280	2, 3, 5	primary	potentially eligible
41GR244	2250	3	secondary	potentially eligible
41GR245	2290	3	secondary	not eligible
41GR246	2170	1	primary	not eligible
41GR248	2240	2	secondary	not eligible
41GR249	2210	1	primary	potentially eligible
41GR250	2240-2260	2, 3	secondary	potentially eligible
41GR251	2240-2270	2, 3	secondary	potentially eligible
41GR253	2250	3	secondary	potentially eligible
41GR254	2230	2	secondary	potentially eligible
41GR255	2250	3	secondary	potentially eligible
41GR256	2250	3	secondary	potentially eligible
41GR257	2260	3	secondary	not eligible
41GR258	2240-2270	2, 3	secondary	potentially eligible
41GR259	2260-2270	3, 5	primary	not eligible
41GR260	2240-2250	2, 3	secondary	not eligible
41GR261	2230-2250	2, 3	secondary	potentially eligible
41GR262	2170-2240	1, 2	primary	potentially eligible
41GR263	2250-2270	3	secondary	potentially eligible

*1 = conservation pool/shoreline fluctuation zone, below 2220 ft msl service spillway elevation

2 = upper floodpool zone, 2220-2245 ft msl, conservation pool to 100-year flood plus 5 ft

3 = backshore zone, above 2245 ft msl but within 300 linear ft of 2220 ft msl

4 = outside project survey area

5 = recreation areas, borrow pits, dam construction area, emergency spillway, pipeline, access road

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Table 27, continued

Site No.	Site Elevation (ft msl)	Impact Zone	Overall Impact	National Register Assessment
41GR264	2220-2265	2, 3	secondary	potentially eligible
41GR265	2265	3	secondary	potentially eligible
41GR266	2240-2260	2, 3	secondary	not eligible
41GR267	2240-2270	2, 3	secondary	potentially eligible
41GR268	2240-2260	2, 3	secondary	potentially eligible
41GR269	2250-2260	3	secondary	potentially eligible
41GR270	2200	1	primary	potentially eligible
41GR271	2240-2270	2, 3	secondary	potentially eligible
41GR272	2180-2260	1, 2, 3	primary	potentially eligible
41GR273	2230-2250	2, 3	secondary	not eligible
41GR274	2220-2300	2, 3	secondary	potentially eligible
41GR275	2260-2305	3	secondary	potentially eligible
41GR276	2280-2305	3	secondary	not eligible
41GR277	2230-2250	2	secondary	potentially eligible
41GR278	2210	1	primary	not eligible
41GR279	2245	2	secondary	not eligible
41GR280	2220-2240	2	secondary	potentially eligible
41GR281	2190	1	primary	not eligible
41GR282	2220	1, 5	primary	potentially eligible
41GR283	2250	3, 5	primary	potentially eligible
41GR284	2240	2, 5	primary	potentially eligible
41GR285	2220	1, 5	primary	potentially eligible
41GR286	2240-2270	2, 3, 5	primary	potentially eligible
41GR287	2280-2290	3, 5	primary	potentially eligible
41GR288	2280	3, 5	primary	not eligible
41GR289	2260	3, 5	primary	not eligible
41GR290	2260	3, 5	primary	not eligible
41GR291	2260-2290	3, 5	primary	potentially eligible
41GR292	2230	2, 5	primary	not eligible
41GR293	2220-2240	2, 5	primary	not eligible
41GR294	2230	2, 5	primary	potentially eligible
41GR295	2240	2, 5	primary	potentially eligible
41GR296	2190	1, 5	primary	not eligible
41GR297	2215	1, 5	primary	not eligible
41GR298	2195	1, 5	primary	potentially eligible
41GR299	2175	1, 5	primary	not eligible
41GR300	2260-2270	3, 5	primary	not eligible
41GR301	2260	3, 5	primary	not eligible
41GR302	2270-2280	3, 5	primary	potentially eligible
41GR303	2220-2310	2, 3, 5	primary	potentially eligible
41GR304	2270-2300	3, 5	primary	not eligible
41GR305	2230	2, 5	primary	potentially eligible
41GR306	2220-2250	2, 3, 5	primary	not eligible
41GR307	2190	1, 5	primary	potentially eligible

Table 27, continued

Site No.	Site Elevation (ft msl)	Impact Zone	Overall Impact	National Register Assessment
41GR308	2260	3, 5	primary	potentially eligible
41GR309	2220-2260	2, 3	secondary	potentially eligible
41GR310	2185	1, 5	primary	potentially eligible
41GR311	2220-2240	2, 5	primary	not eligible
41GR312	2175-2185	1, 5	primary	potentially eligible
41GR313	2220	1, 5	primary	potentially eligible
41GR314	2240-2260	2, 3, 5	primary	potentially eligible
41GR315	2220	1, 5	primary	potentially eligible
41GR316	2240-2260	2, 3, 5	primary	not eligible
41GR317	2220	1, 5	primary	potentially eligible
41GR318	2220-2230	2	secondary	not eligible
41GR320	2230-2250	2, 3	secondary	potentially eligible
41GR321	2260	3	secondary	potentially eligible
41GR322	2230	2	secondary	potentially eligible
41GR323	2140	1, 5	primary	potentially eligible
41GR324	2200-2220	1	primary	not eligible
41GR325	2260-2280	3	secondary	potentially eligible
41GR326	2240-2250	2, 3	secondary	potentially eligible
41GR327	2220-2260	2, 3	secondary	potentially eligible
41GR328	2180-2240	1, 2	primary	potentially eligible
41GR329	2200-2240	1, 2	primary	potentially eligible
41GR330	2200-2260	1, 2, 3	primary	potentially eligible
41GR331	2250	3	secondary	potentially eligible
41GR332	2260-2280	3	secondary	potentially eligible
41GR333	2250	3	secondary	potentially eligible
41GR334	2230-2240	2	secondary	potentially eligible
41GR335	2240	2	secondary	not eligible
41GR336	2240-2260	2, 3	secondary	not eligible
41GR337	2240-2300	2, 3	secondary	potentially eligible
41GR338	2200-2250	1, 2, 3	primary	potentially eligible
41GR339	2260-2270	3	secondary	potentially eligible
41GR340	2240-2260	2, 3	secondary	potentially eligible
41GR342	2290	3	secondary	potentially eligible
41GR343	2180-2240	1, 2	primary	not eligible
41GR344	2240	2	secondary	potentially eligible
41GR345	2240-2260	2, 3	secondary	potentially eligible
41GR346	2230	2, 5	primary	not eligible
41GR347	2220	1, 5	primary	not eligible
41GR348	2200-2220	1, 5	primary	potentially eligible
41GR349	2200-2240	1, 2, 5	primary	potentially eligible
41GR350	2200-2280	1, 2, 3	primary	potentially eligible
41GR351	2200-2240	1, 2	primary	not eligible
41GR352	2200	1	primary	potentially eligible
41GR353	2190-2200	1	primary	potentially eligible

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Table 27, continued

Site No.	Site Elevation (ft msl)	Impact Zone	Overall Impact	National Register Assessment
41GR354	2220	1	primary	potentially eligible
41GR355	2230-2250	2, 3, 5	primary	not eligible
41GR356	2160	3	secondary	not eligible
41GR357	2260	3	secondary	not eligible
41GR358	2250	3	secondary	not eligible
41GR359	2200-2260	1, 2, 3	primary	potentially eligible
41GR360	2220-2250	2, 3	secondary	not eligible
41GR361	2200-2260	1, 2, 3	primary	not eligible
41GR362	2260-2300	3	secondary	potentially eligible
41GR363	2230-2270	2, 3	secondary	potentially eligible
41GR364	2260-2290	3	secondary	not eligible
41GR365	2260-2290	3	secondary	not eligible
41GR366	2260-2280	3	secondary	not eligible
41GR367	2240-2280	2, 3	secondary	potentially eligible
41GR368	2285	3	secondary	not eligible
41GR369	2260	3	secondary	potentially eligible
41GR370	2285	3, 5	primary	not eligible
41GR371	2210-2265	1, 2, 3	primary	not eligible
41GR372	2320	3, 5	primary	not eligible
41GR373	2290	3, 5	primary	not eligible
41GR374	2280	3, 5	primary	not eligible
41GR375	2300	3, 5	primary	not eligible
41GR376	2280-2300	3, 5	primary	potentially eligible
41GR377	2280	3, 5	primary	not eligible
41GR378	2260-2280	3, 5	primary	potentially eligible
41GR379	2270	3, 5	primary	potentially eligible
41GR380	2240-2270	2, 3, 5	primary	not eligible
41GR381	2240-2280	2, 3, 5	primary	potentially eligible
41GR382	2240	2	secondary	not eligible
41GR383	2240-2280	2, 3	secondary	potentially eligible
41GR384	2300	3	secondary	not eligible
41GR385	2240-2260	2, 3	secondary	potentially eligible
41GR386	2260-2300	3	secondary	potentially eligible
41GR388	2240	2	secondary	potentially eligible
41GR390	2240-2280	2, 3	secondary	potentially eligible
41GR392	2270	4	none	potentially eligible
41GR393	2240-2290	2, 3, 5	primary	potentially eligible
41GR395	2240-2280	2, 3, 5	primary	not eligible
41GR396	2260-2300	3, 5	primary	potentially eligible
41GR403	2230-2240	2	secondary	not eligible
41GR404	2220	1	primary	not eligible
41GR405	2180	1, 5	primary	not eligible
41GR406	2220-2230	2	secondary	potentially eligible
41GR407	2220-2240	2	secondary	potentially eligible

Table 27, continued

Site No.	Site Elevation (ft msl)	Impact Zone	Overall Impact	National Register Assessment
41GR408	2220-2280	2, 3	secondary	potentially eligible
41GR409	2230	2	secondary	potentially eligible
41GR410	2240	2	secondary	potentially eligible
41GR411	2210	1	primary	not eligible
41GR412	2220-2260	2, 3	secondary	potentially eligible
41GR416	2230	2	secondary	potentially eligible
41GR417	2280-2300	3	secondary	potentially eligible
41GR418	2230	2	secondary	potentially eligible
41GR419	2200	1	primary	potentially eligible
41GR420	2200	1	primary	potentially eligible
41GR421	2260	3	secondary	not eligible
41GR422	2220-2240	2	secondary	potentially eligible
41GR423	2220	1	primary	potentially eligible
41GR424	2210	1	primary	potentially eligible
41GR425	2190	1	primary	potentially eligible
41GR426	2210	1	primary	potentially eligible
41GR427	2210-2245	1, 2	primary	potentially eligible
41GR428	2240	2	secondary	potentially eligible
41GR429	2240-2250	2, 3	secondary	potentially eligible
41GR430	2220	1	primary	potentially eligible
41GR431	2220-2230	2	secondary	not eligible
41GR432	2240	2	secondary	potentially eligible
41GR433	2260	3	secondary	not eligible
41GR434	2220-2240	2	secondary	not eligible
41GR435	2230	2	secondary	not eligible
41GR436	2280	3	secondary	not eligible
41GR437	2230	2	secondary	potentially eligible
41GR438	2240	2	secondary	potentially eligible
41GR439	2280	3	secondary	potentially eligible
41GR440	2220	1	primary	not eligible
41GR441	2220-2230	2	secondary	potentially eligible
41GR442	2230-2240	2	secondary	potentially eligible
41GR443	2250	3	secondary	potentially eligible
41GR444	2240-2260	2, 3	secondary	potentially eligible
41GR445	2240	2	secondary	potentially eligible
41GR446	2220-2230	2	secondary	potentially eligible
41GR447	2210	1	primary	not eligible
41GR448	2240	2	secondary	potentially eligible
41GR449	2250-2270	3	secondary	potentially eligible
41GR450	2220-2240	2	secondary	potentially eligible
41GR451	2220-2240	2	secondary	potentially eligible
41GR452	2240	2	secondary	not eligible
41GR453	2220-2240	2	secondary	not eligible
41GR454	2260	3	secondary	not eligible

Table 27, continued

Site No.	Site Elevation (ft msl)	Impact Zone	Overall Impact	National Register Assessment
41GR455	2260	3	secondary	potentially eligible
41GR456	2180-2220	1	primary	potentially eligible
41GR457	2230	2	secondary	potentially eligible
41GR458	2240-2270	2, 3	secondary	potentially eligible
41GR459	2220	1	primary	potentially eligible
41GR460	2240	2	secondary	potentially eligible
41GR461	2240	2	secondary	not eligible
41GR462	2260	3	secondary	not eligible
41GR463	2260	3	secondary	not eligible
41GR464	2260	3	secondary	potentially eligible
41GR465	2260	3	secondary	potentially eligible
41GR466	2260	3	secondary	not eligible
41GR467	2230	2	secondary	potentially eligible
41GR468	2230	2	secondary	not eligible
41GR469	2235	2	secondary	not eligible
41GR470	2240-2260	2, 3	secondary	potentially eligible
41GR471	2220-2245	2	secondary	potentially eligible
41GR472	2280	3	secondary	potentially eligible
41GR473	2250	3	secondary	potentially eligible
41GR474	2220-2260	2, 3	secondary	potentially eligible
41GR475	2240	2	secondary	potentially eligible
41GR476	2245	2	secondary	not eligible
41GR477	2230-2240	2	secondary	not eligible
41GR478	2240	2	secondary	potentially eligible
41GR479	2240	2	secondary	not eligible
41GR480	2280	3, 5	primary	potentially eligible
41GR481	2320	3	secondary	not eligible
41GR482	2370	3, 5	primary	not eligible
41GR483	2160	1, 5	primary	potentially eligible
41GR484	2130-2150	1, 5	primary	potentially eligible
41GR485	2170	1	primary	potentially eligible
41GR486	2280	3	secondary	not eligible
41GR487	2260	3	secondary	not eligible
41GR488	2240	2	secondary	potentially eligible
41GR489	2220-2260	2, 3	secondary	not eligible
41GR490	2210	1	primary	potentially eligible
41GR491	2220	1	primary	potentially eligible
41GR492	2265	3	secondary	not eligible
41GR493	2260-2280	3	secondary	potentially eligible
41GR494	2260	3	secondary	potentially eligible
41GR495	2240-2270	2, 3	secondary	not eligible
41GR496	2260	3	secondary	not eligible
41GR497	2260	3	secondary	potentially eligible
41GR498	2260	3	secondary	not eligible

Table 27, continued

Site No.	Site Elevation (ft msl)	Impact Zone	Overall Impact	National Register Assessment
41GR499	2260	3	secondary	not eligible
41GR500	2280	3	secondary	not eligible
41GR501	2260	3	secondary	not eligible
41GR502	2220	1	primary	not eligible
41GR503	2240-2260	2, 3	secondary	not eligible
41GR504	2220-2240	2	secondary	not eligible
41GR505	2240-2260	2, 3	secondary	potentially eligible
41GR506	2260-2270	3	secondary	potentially eligible
41GR507	2220-2240	2	secondary	not eligible
41GR508	2240	2	secondary	not eligible
41GR509	2220-2240	2	secondary	not eligible
41GR510	2230	2	secondary	not eligible
41GR511	2240-2270	2, 3	secondary	not eligible
41GR512	2200-2220	1	primary	potentially eligible
41GR513	2280	3	secondary	not eligible
41GR514	2260	3	secondary	potentially eligible
41GR515	2220	1	primary	potentially eligible
41GR516	2240	2	secondary	potentially eligible
41GR517	2270	3	secondary	potentially eligible
41GR518	2200-2220	1	primary	not eligible
41GR519	2230	2	secondary	not eligible
41GR520	2240	2	secondary	not eligible
41GR521	2220	1	primary	not eligible
41GR522	2245	2	secondary	potentially eligible
41GR523	2260-2280	3	secondary	potentially eligible
41GR524	2260-2280	3	secondary	not eligible
41GR525	2220	1	primary	potentially eligible
41GR526	2240	2	secondary	potentially eligible
41GR527	2220-2240	2	secondary	potentially eligible
41GR528	2240-2260	2, 3	secondary	potentially eligible
41GR529	2230-2245	2	secondary	potentially eligible
41GR530	2240	2	secondary	potentially eligible
41GR531	2230	2	secondary	not eligible
41GR532	2230	2	secondary	not eligible
41GR533	2245	2	secondary	not eligible
41GR534	2240-2260	2, 3	secondary	not eligible
41GR535	2240	2	secondary	not eligible
41GR536	2240	2	secondary	potentially eligible
41GR537	2250	3	secondary	potentially eligible
41GR538	2200-2240	1, 2	primary	potentially eligible
41GR539	2220	1	primary	potentially eligible
41GR540	2260	3	secondary	potentially eligible
41GR541	2220-2240	2	secondary	potentially eligible
41GR542	2260	3	secondary	potentially eligible

Table 27, continued

Site No.	Site Elevation (ft msl)	Impact Zone	Overall Impact	National Register Assessment
41GR543	2220-2240	2	secondary	potentially eligible
41GR544	2240	2	secondary	not eligible
41GR545	2260-2280	3	secondary	potentially eligible
41GR546	2250	3	secondary	potentially eligible
41GR547	2240-2260	2, 3	secondary	not eligible
41GR548	2280	3	secondary	not eligible
41GR549	2210	1	primary	not eligible
41GR550	2230	2	secondary	potentially eligible
41GR551	2290	3	secondary	potentially eligible
41GR552	2230	2	secondary	potentially eligible
41GR553	2260	3	secondary	potentially eligible
41GR554	2230	2	secondary	not eligible
41GR555	2240	2	secondary	potentially eligible
41GR556	2250	3	secondary	potentially eligible
41GR557	2240	2	secondary	potentially eligible
41GR558	2240	2	secondary	potentially eligible
41GR559	2240-2250	2, 3	secondary	potentially eligible
41GR560	2260-2300	3	secondary	potentially eligible
41GR561	2240	2	secondary	not eligible
41GR562	2240	2	secondary	potentially eligible
41GR563	2240	2	secondary	not eligible
41GR564	2240	2	secondary	not eligible
41GR565	2320	4	none	not eligible
41GR566	2360-2385	3, 5	primary	potentially eligible
41GR567	2240	2	secondary	potentially eligible
41GR568	2150	1, 5	primary	potentially eligible
41KT33	2150-2170	1, 5	primary	potentially eligible
41KT34	2140	1, 5	primary	potentially eligible
41KT35	2180	1, 5	primary	not eligible
41KT36	2245-2255	3, 5	primary	not eligible
41KT37	2250	3, 5	primary	potentially eligible
41KT38	2270	3, 5	primary	potentially eligible
41KT39	2250	3, 5	primary	not eligible
41KT40	2220-2240	2, 5	primary	not eligible
41KT41	2240-2270	2, 3, 5	primary	not eligible
41KT42	2140-2160	1, 5	primary	potentially eligible
41KT43	2240-2260	2, 3, 5	primary	potentially eligible
41KT44	2180	1, 5	primary	potentially eligible
41KT45	2250	3, 5	primary	potentially eligible
41KT46	2280	3, 5	primary	not eligible
41KT47	2270-2280	3, 5	primary	potentially eligible
41KT48	2265-2270	3, 5	primary	not eligible
41KT49	2230-2280	2, 3, 5	primary	potentially eligible

Table 27, continued

Site No.	Site Elevation (ft msl)	Impact Zone	Overall Impact	National Register Assessment
41KT50	2260	3, 5	primary	potentially eligible
41KT51	2170	1	primary	potentially eligible
41KT52	2170	1	primary	potentially eligible
41KT53	2160-2180	1	primary	potentially eligible
41KT54	2260	3	secondary	potentially eligible
41KT55	2245	2	secondary	potentially eligible
41KT56	2170	1	primary	not eligible
41KT57	2250	3	secondary	potentially eligible
41KT58	2280-2310	3	secondary	potentially eligible
41KT59	2260	3	secondary	not eligible
41KT60	2150	1	primary	potentially eligible
41KT61	2180-2220	1	primary	potentially eligible
41KT62	2280-2300	3	secondary	not eligible
41KT63	2290-2300	3	secondary	not eligible
41KT64	2190	1	primary	not eligible
41KT65	2270	3	secondary	potentially eligible
41KT66	2210	1	primary	potentially eligible
41KT67	2280	3	secondary	not eligible
41KT68	2245	2	secondary	potentially eligible
41KT69	2220	1	primary	potentially eligible
41KT70	2280-2300	3	secondary	not eligible
41KT71	2200	1	primary	not eligible
41KT72	2280-2290	3	secondary	potentially eligible
41KT73	2250	3	secondary	potentially eligible
41KT74	2270	3	secondary	not eligible
41KT75	2220-2240	2	secondary	not eligible
41KT76	2240-2260	2, 3	secondary	potentially eligible
41KT77	2230	2	secondary	potentially eligible
41KT78	2240-2260	2, 3	secondary	potentially eligible
41KT79	2240	2	secondary	potentially eligible
41KT80	2240	2	secondary	not eligible
41KT81	2240-2265	2, 3	secondary	potentially eligible
41KT82	2230-2240	2	secondary	not eligible
41KT83	2260	3	secondary	potentially eligible
41KT84	2260-2280	4	none	potentially eligible

CHAPTER 13

RECOMMENDATIONS/TREATMENT PLAN

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A comprehensive series of recommendations is presented here in the form of a treatment plan designed to extract sufficient data to assess and eventually mitigate the expected loss of nonrenewable cultural resources. These recommendations have been formulated directly from the findings of this project and represent a continuation of the research design.

Table 28 provides a summary of National Register potential for sites in the three impact zones. While impacts to resources will vary in nature and degree of severity, it is recommended that the entire project area be treated as a single study universe without regard to impact variability. Primary impacts will be severe and likely will result in destruction of sites and loss of the resources. Secondary impacts potentially may be severe in cumulative long-term effect. The possibilities for preservation and protection of secondary impact sites are thought by the authors to be very low, of unknown effectiveness, and expensive compared to other mitigation alternatives such as data recovery.

TABLE 28
SUMMARY OF NATIONAL REGISTER POTENTIAL
FOR SITES IN THE IMPACT ZONES

	Primary Impact	Secondary Impact	No Impact	Totals
Potentially eligible	89	147	2	238
Not eligible	<u>53</u>	<u>83</u>	<u>1</u>	<u>137</u>
Totals:	142	230	3	375

Vandalism of sites already is evident throughout the project area, and its intensity is directly proportional to site accessibility. Based on experiences at other reservoirs, this problem will worsen subsequent to dam closure and impoundment of water. As an example, rock art sites will be readily visible and easily accessible. Many, including the Dorward Ranch Site (41GR51), have already suffered considerable damage. With the exception of buried floodplain or eolian dune sites which are well below the conservation pool, both the prehistoric and historic sites are highly visible. Many of them are partially exposed and damaged by erosion and/or by modern oil and agricultural development. Long-term preservation of sites in the reservoir is risky and expensive, if not impossible. Rock art and rockshelters are particularly difficult to protect.

The most effective method for managing the Justiceburg cultural resources is to consider them equal in terms of impact and preservation potential. Therefore, it is recommended that all cultural resources within the project area be treated as a single data base (study universe) and that the existing research design should continue to guide the ensuing testing and mitigation phases. The ultimate goal of these recommendations is to address questions proposed in the various problem domains (see Chapter 5). This can best be accomplished through a testing and mitigation program directed toward a wide range of the identified site types that are of differing ages, situated in differing topographic settings, and which exhibit special or unique characteristics.

Assessments of individual site potential indicate no further work is required at 137 (36%) sites, while additional work is warranted at the remaining 238 (64%) sites (see Table 28). This figure may be significantly reduced by using a sampling design drawn from the various site categories. All sites that are potentially eligible for listing on the National Register do not require individual mitigation when there is a sampling plan that is derived directly from a comprehensive research design that is employed as a guide to data recovery.

Therefore, the recommendations made here will result in testing and data recovery at far fewer than 238 sites through implementation of a sampling program. The amount of work required at any given site is highly variable; some sites may require only a few days of fieldwork with a small crew, while other sites will require testing followed by excavations, or other appropriate data recovery activities (e.g., recording rock art). The goal is to balance the adequate treatment of cultural resources with fiscal restraint. If for some reason all 238 sites are not considered the universe from which the sample is drawn, then substantial changes to the following recommendations will be required.

The recommendations for the subsequent phases of investigation are presented under four subsections: (1) special studies; (2) prehistoric sites; (3) rock art sites; and (4) historic sites. Finally, a summary describes a suggested two-phase treatment plan designed to accomplish the recommendations.

Special Studies

To be fully effective, testing and data recovery within a sampling universe require a suite of special studies to elucidate various aspects of natural and cultural history. Several categories of special studies appear appropriate, and it is recommended they be pursued in the subsequent phases.

Geoarcheology

Preliminary geoarcheological investigations yielded insights into understanding the Quaternary history and in defining the correlation between archeological sites and geomorphic landforms for the region. Several archeological and potential archeological localities were located, and late Pleistocene and Holocene geomorphic landforms were recognized and dated.

Sediments dating to Paleoindian and early to middle Archaic times (late Pleistocene to middle Holocene) are recognized in three locations: (1) the upland eolian sand sheets; (2) the alluvial fan sediments near the mouth of Grape Creek; and (3) the wide valley alluvial terraces at the upper end of the proposed reservoir. These constitute the only possible settings for early sites and are of limited extent within the project area. Since the Paleoindian and early to middle Archaic periods are poorly represented here and throughout the Southern Plains, these settings assume a special importance. Intensive subsurface geoarcheological investigations (ca. 65 backhoe trenches) are warranted at these locations to fully characterize the depositional environments and search for intact early sites.

Most of the project area consists of alluvial floodplains within narrow, steep-walled canyons. Extant stream terraces appear to be relatively recent, i.e., younger than 4,000 years. These settings contain sites which are late Archaic to Late Prehistoric in age. Limited subsurface mechanical testing (ca. 20 trenches) is recommended to more fully develop the age configuration of these settings, to search for additional sites in primary sealed contexts, and to search for possible buried older terrace remnants. Mechanical testing will be subject to the limitations of backhoe accessibility.

Eolian dunes on alluvial terraces along the main channel of the Double Mountain Fork are thought to be very recent landforms, i.e., within the past millenium. In some cases, these eolian dunes either contain archeological remains or cover alluvial terraces containing such remains. Moderate to extensive mechanical subsurface testing (ca. 40 trenches) of these landforms is recommended to determine their ages, the nature of the underlying alluvium, and to search for buried cultural remains.

Faunal and Floral

During the Phase I investigations, no studies were made of the local biological resources. Both the historic and prehistoric inhabitants of the area were dependent upon the natural plant and animal resources for food, tools, fuel, and shelter. Data on prehistoric utilization of flora and fauna can be obtained from archeological studies. Many of the plants and animals available for human exploitation in the past are probably found there today. Indeed, during the Late Prehistoric period, the region is thought to have had an essentially modern climate and an environment very similar to that of today. Even though modern industrial and historic activities may have permanently altered the plant and animal communities, much of the project area retains remnants of its natural state.

In order to better understand the cultural ecology of the project area and the region, it is necessary to document the modern environmental conditions. A thorough literature search and synthesis of the modern and historic floral and faunal resources and their documented (historical and/or archeological) human utilization is needed. This should be augmented with limited field studies.

A special effort should be made to document the existing invertebrate species in the area. Neck (1987) has identified several molluscan species in the invertebrate materials already collected and has provided the following observations on the small sample. The freshwater mussels (family Unionidae) found in archeological sites and in direct association with burned rock features not only indicate their probable use as a food resource, but they also indicate that fish were present in the stream at the time the shells were taken.

These freshwater clams require fish to complete their life-cycle and cannot survive without them. The snail Helisoma sp., which was found at two sites in the project area, confirms the stability of the water supply at certain times in the past. These snails need a permanent source of running water in order to live. The snail Polygyra sp. was found in the project area, but it prefers wooded habitats and is not known to exist today along the eastern Caprock Escarpment. Studies of these invertebrates from archeological sites can provide useful paleoenvironmental data. In order to utilize the invertebrate samples which are likely to be found in archeological contexts, an inventory of the modern species in the project area is needed. Limited fieldwork is necessary to compile the inventory.

In the upcoming phases of investigations, provisions should be made for flotation and phytolith, palynological, and macrobotanical analyses. There is no way to predict the quantity and types of materials which might be recovered. However, charred organic remains were found at a number of prehistoric sites and in all of the rockshelter sites containing cultural deposits. A cursory examination of the charred seed fragments from rockshelter site 41GR326 identified them as either Cucurbita sp. or Phaseolus sp., and charred wood fragments from two of the rockshelters were identified as white oak (Jack Jackson, personal communication 1987). This suggests that some variety of squash or bean may have been used as a food source and that live oak (a variety of white oak) was probably the preferred wood for burning. A wealth of important information relating to subsistence strategies and plant domestication could be obtained from detailed analyses and identification of botanical remains. These studies should be an integral part of future investigations.

The possibility of utilizing large samples of burned or unburned wood of certain species for dendrochronological samples or paleoclimatic studies should be considered. Oak is especially well suited to this type of study, and there are established tree-ring chronologies for oak in Texas. Both historic and prehistoric sites might yield suitable quantities of wood, and special attention should be given to taking dendrochronological samples.

Consideration of the possibility of recovering other perishable organic remains is also important. Perishable remains are occasionally found in unexpected places, but they are most likely to be found in rockshelters. Three woven fiber baskets were found in Moore's Rock Shelter in Borden County, and matted grass and cordage were found in Finger-print Caves in Dawson County (Quinn and Holden 1949). These dry shelters are only 60 km (37 miles) from the project area and demonstrate the excellent potential for encountering perishable remains. Special recovery and/or conservation techniques are needed if perishable remains are encountered, and planning for their proper handling could eliminate problems in the field.

Human Remains

Human skeletal remains are of special concern to future researchers. The only Euro-American remains currently known in the project area are ca. 75 graves in the Justiceburg Cemetery (41GR522) and the isolated grave of A. W. McCormick (41GR528). Both locations are above the maximum floodpool and will not be directly impacted by reservoir construction or inundation. However, increased public access may create a vandalism problem. Measures should be taken to protect the Justiceburg Cemetery (e.g., fencing). The isolated grave would be difficult to protect in its present location, and vandalism is a very real threat.

It should be properly excavated, studied, and relocated to a protected cemetery. Attempts to notify existing kin should be made prior to any relocation.

No Native American skeletal remains were encountered; however, the potential for encountering such remains during future investigations exists. Beyond their scientific value, these remains have special significance to ethnic groups which can demonstrate a cultural affinity. Prehistoric burials with no identifiable tribal association may be considered for their scientific value, but human remains with identifiable modern descendants must be dealt with according to the customs and practices of the descendants or related group. If aboriginal human remains are discovered, the Office of the State Archeologist should be notified immediately. Treatment of the remains should be handled in consultation with the Office of the State Archeologist, the Texas Indian Commission, and appropriate tribal authorities.

Lithic Artifacts

Gouges are perhaps the least understood artifacts found in the Southern Plains, and special efforts to document their attributes are applicable. A regional literature review should be followed by detailed use-wear analyses of these tools from specific contexts to determine their function(s) and variation. Gouges in the project area are predominantly made of Potter chert, and replicative use-wear experiments on this material could be useful to determine function and the materials on which these tools were used. If gouges are found in an excavated context, it is important to obtain samples of datable associated materials (e.g., soil or charcoal). Special precautions are required during the field collection of such specimens so that organic residue and use-wear analyses can be accomplished.

Without a doubt, the most abundant culturally altered materials in the region are burned rocks. Even though burned rocks are practically everywhere, their importance tends to be validated only when they are clustered into some distinctive type of feature. Analytical experiments on the different locally available materials (i.e., sandstone, limestone, Potter chert, and maroon Ogallala quartzite) could aid in understanding their different thermal properties and perhaps their use. A special effort should be made to determine if there is any visual (macroscopic or microscopic) means of distinguishing between Potter chert which has been fired only, and Potter chert which has been fired and used as boiling stones. The feasibility of dating burned Potter chert or Ogallala quartzites by thermoluminescence should be investigated. Thermoluminescence dates on burned specimens from features datable by other means is a useful cross-dating method.

Thermal alteration of lithic materials used to manufacture chipped stone tools is known to have been a common practice in many areas, but the extent of heat-treating of lithic materials in the Lower Plains is not known. Some lithic tools from Justiceburg Reservoir appear to have been heat-treated. Special analyses and replicative experiments to identify the characteristics of heat-treatment of locally available lithic materials should be accomplished.

Prehistoric Features

Concurrent with experimental studies of the thermal properties of different lithic materials, different types of burned rock features should be investigated during the testing phase in order to ascertain the interpretive potential of each type. An important consideration during testing is the nature and integrity of these features. Distinct features such as sandstone-lined hearths, Potter chert boiling stone dumps, and the larger burned rock midden features, although they are likely candidates for later large-scale excavation, should be tested in order to define their basic characteristics. A range of specialized study techniques (e.g., flotation, radiocarbon assay, and phytolith analysis) should be carried out in order to assess their utility as an interpretive aid. Sites which contain burned rock middenlike features include 41GR264, 41GR383, 41GR396, 41GR422, 41GR432, and 41GR441. These features deserve special attention since they have not been investigated in the region.

Pointed-oval bedrock mortar holes are specialized features which merit special attention. Pollen analysis of the residue trapped in mortar holes filled with sediment is sometimes productive and should be attempted. It is cautioned that all of the bedrock mortars in the project area which were known prior to the current investigations were cleaned out by previous investigators (Kirkpatrick 1978). Only nine mortar holes at five sites (41GR33, 41GR258, 41GR264, 41GR269, and 41GR388) may retain intact deposits and possibly preserved organic residues. The mortar holes which were previously cleaned, however, could serve as pollen traps for comparisons between modern and archeological samples. There is a chance that at sites 41GR264 and 41GR388 there are mortars buried under sand draped onto bedrock. An attempt to locate buried mortar holes at these sites, possibly by shovel scraping selected areas, should be made.

Cairns are another type of rock feature discovered. While the majority of these seem to be piles of rocks of unknown function, cairn-covered prehistoric burials have been found throughout the Southern Plains. Cairns occasionally have been excavated by amateur archeologists; more commonly, however, they have been found and destroyed by relic hunters. This is unfortunate because very little is known about these burials or the groups they represent. Only two sites, 41GR264 and 41GR271, are known to contain cairns which should be investigated, but similar features may be discovered at other sites.

No historic Plains Indian crevice burials were found in the project area. In view of the dense springtime vegetation and the extremely rugged nature of the canyon rim and bluffs, and the fact that such interments were intentionally well hidden (typically in crevices or small shelters along the canyon rim), there remains a strong possibility that such sites were missed during the current survey. The potential value of one scientifically investigated historic Plains Indian burial site cannot be overstated. They are known to occur in the vicinity because one was found by relic hunters in Garza County not far from the Justiceburg project area (The Post Dispatch, November 27, 1969:1). It is recommended that during the winter, when vegetation and snakes are less-limiting factors, limited resurvey of selected areas be directed toward a continued search for crevice burials.

Prehistoric Sites

The majority of the cultural resources recorded consist of 288 prehistoric sites. A key problem is the large number of sites and the fact that a large percentage of them require further investigations as they exhibit significant research potential. Because the research potential of different types of sites varies greatly, it is appropriate to deal with the site types as separate groups. In order to devise an effective and efficient sampling strategy, it is necessary to divide the prehistoric sites into the smallest common denominator to insure complete sampling of the entire range of activities over the entire time frame represented. The prehistoric sites are sorted into assumed functional types, i.e., camps and procurement sites, then subdivided into smaller units based on projected age associations (Table 29). Accordingly, the following recommendations are offered as a realistic plan for treatment of the prehistoric resources at Justiceburg Reservoir.

TABLE 29
SUMMARY OF PREHISTORIC SITE TYPES, FREQUENCY,
AND AGE REPRESENTATION

Site Type	Number	Age
Lithic procurement	56	Undefined
Campsites	105	Undefined (n = 86) Archaic (n = 7) Late Prehistoric (n = 10) Mixed (n = 2)
Lithic procurement/campsites	62	Undefined (n = 44) Archaic (n = 6) Late Prehistoric (n = 4) Mixed (n = 8)
Rockshelters	5	Undefined (n = 4) Late Prehistoric (n = 1)
Faunal localities	9	Undefined
Lithic scatters	6	Undefined
Isolated finds	<u>45</u>	Undefined
Total:	288	

Lithic Procurement Sites

Of the 56 lithic procurement sites, 25 are considered to be potentially eligible for listing on the National Register. As a separate category, these sites represent an

important aboriginal activity. They exist here because of local natural Quaternary gravel outcrops. Basic tasks include sampling the materials for comparative purposes, mapping the sites, quantifying the lithic materials available, and, if possible, quantifying the extent of use. To meet these objectives, a sample of lithic procurement sites should be investigated. The investigation strategy should be comparable to that used by Hood (1978:382) and Hood and Wright (1979:384). The depth of the gravel deposits should be determined by hand excavation of 1x1-m units or by backhoe trenching in conjunction with geoarcheological investigations. A surface sample might be expected to be different, in both materials present and lithic reduction represented, from a sample from the subsurface. It is appropriate to select units for excavation to address this problem. The lithics should be studied not only to determine their composition but also to determine the nature of the reduction represented and the kinds of materials being selected.

The 56 lithic procurement sites have been ranked according to perceived density of debris noted during site survey. Twenty-five sites are identified as containing denser quantities of lithics (Table 30). It is recommended that a 10% sample (n = 6) of the 56 lithic procurement sites be selected from the 25 highest ranked sites for investigation. Within-site sampling should consist of no less than three 1x1-m collection units. One unit should be placed in an area of heavy lithic concentration; the others could be in areas of lesser concentrations or in areas of intensive lithic reduction. After the units are collected, one or more should be excavated to determine the thickness of the gravel deposits and to obtain samples of subsurface materials comparable to the surface sample.

TABLE 30
LITHIC PROCUREMENT SITES WITH HIGHEST DENSITY OF DEBRIS

41GR251 (S)*	41GR267 (S)	41GR334 (S)	41GR381 (P)	41GR538 (P)
41GR255 (S)	41GR280 (S)	41GR345 (S)	41GR408 (S)	41GR540 (S)
41GR261 (S)	41GR320 (S)	41GR348 (P)	41GR417 (S)	41GR542 (S)
41GR262 (P)	41GR327 (S)	41GR362 (S)	41GR480 (P)	41KT43 (P)
41GR265 (S)	41GR329 (P)	41GR367 (S)	41GR505 (S)	41KT45 (P)

*Impact zone: P = primary; S = secondary

Campsites and Combination Lithic Procurement/Campsites

The most problematic of the prehistoric resources, in terms of a realistic testing program, are the campsites and combination lithic procurement/campsites. The difficulties stem from both the quantity and type of data available from a survey. A total of 105 campsites and 62 combination lithic procurement/campsites were recorded; of these, 50 appear unworthy of further work. The remaining 117 sites are worthy of further work, much of it in the form of subsurface testing, representing a level of effort that is not practical.

Admittedly, prehistoric campsites are expected to provide the bulk of the data necessary to address the range of research questions relating to past human use of the area as

stated in the research design (see Chapters 5 and 12). In order to devise an efficient plan that reconciles the level of effort with the research design, sites were scored on the basis of specific criteria which directly relate to their research potential. This ranking was designed as a management tool to aid in sampling this large group of sites. It is not a statement of site significance and does not alter the assessments put forth in Chapter 12. The criteria and score considered for each site include: (1) reliability and discreteness of the temporal assignment (maximum 3 points); (2) presence, variety, and abundance of distinctive features (maximum 3 points); (3) abundance and variety of artifacts (maximum 9 points); and (4) evidence for buried and intact cultural deposits (maximum 7 points) with a heavy emphasis on the presence of discrete buried cultural strata. The presence of unusual features such as burned rock middenlike features or organic-rich midden deposits also added points (maximum of 5 points). Ten points were deducted for lack of integrity (such as extensive disturbances). Total scores based on a maximum of 27 points were calculated and used to sort the sites (Table 31) into four groups based on apparent research potential: (1) excellent; (2) good; (3) unknown or moderate; and (4) limited.

Site scores vary from negative at sites with poor integrity to 18 for sites which contain numerous features and artifacts, abundant evidence of buried remains, and temporally diagnostic artifacts in subsurface contexts. Assuming these scores reflect each site's potential to address regional and specific problem domains noted in the research design (see Chapter 5), the sites were divided as follows:

Group I	Excellent research potential (scores 10-18)	24 sites
Group II	Good research potential (scores 5-9)	33 sites
Group III	Unknown or moderate research potential (scores 0-4)	60 sites
Group IV	Limited research potential (negative scores)	50 sites

It is apparent that each group of sites represents different types of data which should be approached differently. Group I sites presently exhibit the greatest potential to address a variety of research questions and are considered potentially eligible for listing on the National Register. Relative to Group I sites, the most important data which should be sought during Phase II are those which will demonstrate relative potential so that specific sites can be identified as significant and targeted for further work.

The Group II sites exhibit substantial research potential but scored less than the Group I sites based on survey data. Group II sites are considered potentially eligible for listing on the National Register. The most appropriate sampling strategy for Group II sites is to select for data categories neglected in Group I. For example, Group I does not include sites from all topographic settings and is biased toward single-component or multiple-component stratified sites with suspected temporal affiliations. The Group II sites should be selected to alleviate deficiencies noted in Group I.

The majority of the Group III sites appear to represent moderate research potential due to the present undefinable cultural deposits, sparsity of cultural materials, and degree of disturbance. A few sites, however, received low scores because they are buried, lack exposed features, and failed to yield temporally or functionally diagnostic materials. All Group III sites are considered to be potentially eligible for listing on the National Register until subsequent evaluation. The strategy for this group should be to sample sites, particularly the buried ones, to obtain additional evidence for use in evaluation.

TABLE 31

SCORING OF CAMPSITES AND COMBINATION LITHIC
PROCUREMENT/CAMPSITES FOR CATEGORIZATION

Site No.	Temporal Affiliation	Features	Artifacts	Buried Deposits	Special Features	Integrity	Total Score
41GR13	1	2	6	4	0	0	13
41GR31	0	0	3	4	0	0	7
41GR33	1	3	5	4	0	0	13
41GR203	0	1	1	0	0	-10	-8
41GR204	1	1	3	7	0	0	12
41GR205	0	0	0	1	0	0	1
41GR206	1	1	3	6	0	0	11
41GR207	1	2	2	0	0	0	5
41GR239	0	1	1	0	0	0	2
41GR240	0	1	1	1	0	0	3
41GR243	0	3	3	0	0	0	6
41GR246	0	1	0	0	0	-10	-9
41GR250	0	1	2	6	0	0	9
41GR253	0	1	0	0	0	0	1
41GR254	0	0	1	0	0	0	1
41GR256	1	0	2	0	0	0	3
41GR258	0	1	1	4	0	0	6
41GR260	0	0	0	0	0	-10	-10
41GR263	3	3	6	6	0	0	18
41GR264	1	3	4	5	1	0	14
41GR268	0	2	0	1	0	0	3
41GR269	0	1	0	0	0	0	1
41GR271	1	1	1	1	1	0	5
41GR272	0	0	1	0	0	0	1
41GR273	0	1	0	0	0	-10	-9
41GR274	1	0	1	0	0	0	2
41GR275	0	1	0	0	0	0	1
41GR276	0	0	0	0	0	-10	-10
41GR277	0	3	4	6	0	0	13
41GR286	0	3	1	0	0	0	4
41GR287	0	1	0	0	0	0	1
41GR291	0	3	1	4	0	0	8
41GR300	0	0	0	0	1	-10	-9
41GR302	0	0	0	3	0	0	3
41GR303	0	1	1	1	0	0	3
41GR306	0	0	0	0	0	-10	-10
41GR309	0	0	3	1	0	0	4
41GR311	0	0	0	1	0	-10	-9
41GR312	0	1	2	0	0	0	3
41GR314	0	1	0	1	0	0	2

Table 31, continued

Site No.	Temporal Affiliation	Features	Artifacts	Buried Deposits	Special Features	Integrity	Total Score
41GR316	0	0	0	0	0	-10	-10
41GR323	0	3	1	6	0	0	10
41GR325	2	1	3	3	0	0	9
41GR328	0	1	1	0	0	0	2
41GR330	0	1	1	0	0	0	2
41GR332	0	3	2	0	0	0	5
41GR336	0	0	1	0	0	-10	-9
41GR337	0	1	3	1	0	0	5
41GR338	0	3	4	4	0	0	11
41GR339	0	0	1	0	0	0	1
41GR340	1	3	3	1	0	0	8
41GR342	0	1	0	0	0	0	1
41GR349	0	2	2	4	0	0	8
41GR350	0	1	1	4	0	0	6
41GR351	0	1	0	0	0	-10	-9
41GR356	0	1	0	0	0	-10	-9
41GR359	1	2	2	6	0	0	11
41GR363	0	3	1	0	0	0	4
41GR364	0	1	1	1	0	-10	-7
41GR368	0	0	0	0	0	-10	-10
41GR369	0	1	0	0	0	0	1
41GR372	0	0	0	4	0	-10	-6
41GR374	0	1	0	0	0	-10	-9
41GR376	1	0	3	6	0	0	10
41GR377	0	0	0	0	0	-10	-10
41GR378	0	3	0	4	0	0	7
41GR379	0	2	0	1	0	0	3
41GR383	1	3	5	0	1	0	10
41GR384	0	2	1	0	0	-10	-7
41GR385	0	0	1	0	0	0	1
41GR386	0	1	0	0	0	0	1
41GR388	1	3	5	1	0	0	10
41GR390	1	3	1	6	0	0	11
41GR393	1	2	3	0	0	0	6
41GR396	1	2	7	6	1	0	17
41GR403	0	0	0	0	0	-10	-10
41GR405	0	0	0	0	1	-10	-9
41GR406	0	0	0	1	0	0	1
41GR407	1	0	1	4	0	0	6
41GR422	0	3	2	4	1	0	10
41GR425	1	1	1	1	0	0	4
41GR427	0	2	2	0	0	0	4
41GR429	0	2	1	1	0	0	4
41GR430	0	1	0	0	0	0	1
41GR431	0	1	0	0	0	-10	-9

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Table 31, continued

Site No.	Temporal Affiliation	Features	Artifacts	Buried Deposits	Special Features	Integrity	Total Score
41GR432	1	0	1	0	1	0	3
41GR433	0	1	0	0	0	-10	-9
41GR434	0	0	0	0	0	-10	-10
41GR435	0	1	0	0	0	-10	-9
41GR438	2	1	1	0	0	0	4
41GR439	0	1	0	4	0	0	5
41GR440	0	1	0	0	0	-10	-9
41GR441	0	0	1	1	1	0	3
41GR442	0	1	1	0	0	0	2
41GR444	1	0	3	0	0	0	4
41GR446	0	1	1	0	0	0	2
41GR450	0	0	1	1	0	0	2
41GR451	1	0	1	0	0	0	2
41GR454	0	1	0	0	0	-10	-9
41GR456	0	3	3	4	0	0	10
41GR458	0	0	2	0	0	0	2
41GR459	0	0	0	0	0	0	0
41GR462	0	1	0	0	0	-10	-9
41GR467	0	1	0	7	0	0	8
41GR471	0	0	0	0	0	0	0
41GR474	1	1	2	5	0	0	9
41GR476	0	0	0	4	0	-10	-6
41GR477	0	0	0	1	0	-10	-9
41GR478	0	1	0	0	0	0	1
41GR479	0	0	1	0	0	-10	-9
41GR481	0	0	0	0	0	-10	-10
41GR483	0	1	0	3	0	0	4
41GR484	0	1	2	3	0	0	6
41GR485	0	1	0	3	0	0	4
41GR487	0	0	0	0	0	-10	-10
41GR493	0	2	2	3	0	0	7
41GR497	0	2	1	1	0	0	4
41GR504	1	1	1	7	0	0	10
41GR506	0	2	0	1	0	0	3
41GR509	0	0	0	0	0	-10	-10
41GR511	0	3	0	0	0	-10	-7
41GR514	0	2	0	0	0	0	2
41GR515	1	1	2	5	0	0	9
41GR518	0	0	1	0	0	-10	-9
41GR523	0	1	0	5	0	0	6
41GR527	0	0	0	0	0	0	0
41GR528	0	2	0	3	0	0	5
41GR529	0	1	1	0	0	0	2
41GR531	0	1	0	0	0	-10	-9
41GR533	0	1	1	0	0	-10	-8

Table 31, continued

Site No.	Temporal Affiliation	Features	Artifacts	Buried Deposits	Special Features	Integrity	Total Score
41GR541	1	2	3	0	0	0	6
41GR543	0	1	2	1	0	0	4
41GR544	0	1	1	0	0	-10	-8
41GR549	0	1	1	0	0	-10	-8
41GR551	0	3	2	0	0	0	5
41GR555	0	0	0	1	0	0	1
41GR560	0	3	2	0	0	0	5
41GR562	0	0	1	4	0	0	5
41GR563	1	0	1	0	0	-10	-8
41GR564	0	1	0	1	0	-10	-8
41GR566	0	1	0	0	0	0	1
41KT33	0	3	2	8	0	0	13
41KT34	0	3	0	8	0	0	11
41KT36	0	1	0	0	0	-10	-9
41KT37	0	2	1	4	0	0	7
41KT38	0	0	0	1	0	0	1
41KT40	0	1	0	0	0	-10	-9
41KT41	0	1	2	0	0	-10	-7
41KT42	1	0	3	0	0	-10	-6
41KT47	1	0	1	4	0	0	6
41KT49	1	3	2	4	0	0	10
41KT51	0	0	0	7	0	0	7
41KT52	0	2	3	5	0	0	10
41KT53	3	0	3	4	0	0	10
41KT56	0	1	0	0	0	-10	-9
41KT61	0	0	1	0	0	0	1
41KT66	0	3	1	1	0	0	5
41KT70	0	1	1	0	0	-10	-8
41KT75	0	0	0	0	0	-10	-10
41KT77	0	0	0	4	0	0	4
41KT78	0	3	1	4	0	0	8
41KT79	3	0	3	3	2	0	11
41KT80	0	1	0	0	0	-10	-9
41KT81	0	1	1	0	0	0	2
41KT82	0	0	0	0	0	-10	-10
41KT83	0	1	0	0	0	0	1
41KT84	-	-	-	-	-	-	4*

*Incomplete data available; an arbitrary 4 was assigned.

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All Group IV sites are considered to have limited potential for providing answers to research questions. Far from being unimportant, however, these sites have already provided useful information concerning settlement patterning. Relative to the first three groups, however, these sites are not considered to warrant further work and are not considered eligible for listing on the National Register.

Table 32 shows the temporal assignments and topographic settings of all 167 prehistoric campsites and combination lithic procurement/campsites as compared to Group I. It is evident that Group I constitutes a representative sample of the entire site category. The sample neglects sites in eolian dune floodplain settings, while it favors sites with recognized age assignments.

TABLE 32

GROUP I COMPARED TO ALL PREHISTORIC CAMPSITES
AND COMBINATION LITHIC PROCUREMENT/CAMPSITES

Topographic Setting	Temporal Assignment				Total	Percent Sample*
	Archaic	Archaic/Late Prehistoric	Late Prehistoric	Undefined		
Upland	3/4**	4/4	1/5	1/59	9/72	13%
Erosional remnant	0/5	1/2	1/6	3/18	5/31	16%
Isolated mesa	1/1	-	-	0/3	1/4	25%
Bedrock terrace	1/2	0/1	-	1/12	2/15	13%
Upper alluvial terrace	-	1/2	0/1	1/9	2/12	17%
Lower alluvial terrace	1/2	-	2/2	2/26	5/30	17%
Eolian dunes in floodplain	-	-	-	0/3	0/3	0%
Totals:	6/14	6/9	4/14	8/130	24/167	14%
Percent Sample*:	43%	67%	29%	6%	14%	

*Percent represented by Group I sites

**Number of Group I sites/total number of sites in Groups I through IV

The optimum field approach suggested for Phase II at each of the 24 Group I sites (Table 33) is as follows: mapping; controlled surface collection as appropriate; and a combination of controlled test excavations, mechanical testing, and sufficient shovel tests to adequately determine the character and content of the deposits. The information

TABLE 33
GROUP I SITES: EXCELLENT RESEARCH POTENTIAL

Site No.	Topographic Setting	Temporal Affiliation
41GR13 (S)*	Upland	Late Archaic/Late Prehistoric
41GR33 (S)	Upland	Archaic/Late Prehistoric
41GR204 (S)	Lower alluvial terrace	Undefined Archaic
41GR206 (P)	Upper alluvial terrace	Late Archaic/Late Prehistoric
41GR263 (S)	Upland	Late Archaic/Late Prehistoric
41GR264 (S)	Upland	Middle Archaic
41GR277 (S)	Lower alluvial terrace	Undefined Prehistoric
41GR323 (P)	Lower alluvial terrace	Undefined Prehistoric
41GR338 (P)	Erosional remnant	Undefined Prehistoric
41GR359 (P)	Upland	Middle Archaic
41GR376 (P)	Isolated mesa	Undefined Archaic
41GR383 (S)	Upland	Late Prehistoric
41GR388 (S)	Erosional remnant	Undefined Archaic/Late Prehistoric
41GR390 (S)	Erosional remnant	Late Prehistoric
41GR396 (P)	Upland	Undefined Archaic/Late Prehistoric
41GR422 (S)	Upland	Undefined Prehistoric
41GR456 (P)	Bedrock terrace	Undefined Prehistoric
41GR504 (S)	Bedrock terrace	Late Archaic
41KT33 (P)	Erosional remnant	Undefined Prehistoric
41KT34 (P)	Erosional remnant	Undefined Prehistoric
41KT49 (P)	Upland	Undefined Archaic
41KT52 (P)	Upper alluvial terrace	Undefined Prehistoric
41KT53 (P)	Lower alluvial terrace	Late Prehistoric
41KT79 (S)	Lower alluvial terrace	Late Prehistoric

*Impact zone: P = primary; S = secondary

obtained during testing should then be used to evaluate the extent and nature of the cultural remains and to formulate Phase III investigation recommendations.

Through the investigation of Group I campsites and combination lithic procurement/campsites, most of the categories for site age/setting will be sampled (see Table 33). The Group II sites are most appropriately sampled through the selection of site categories neglected in Group I. Following this logic, the categories not adequately sampled by Group I include sites in eolian dune settings, unknown-age sites in a variety of settings, and Late Prehistoric sites. Table 34 lists all Group II sites; 15 of these are marked with an asterisk, indicating that they may represent the best sites from which a sample should be chosen. It is recommended that at least four of these sites be selected for testing during Phase II. The methods of investigation should be the same as those suggested for Group I. The goal of testing these sites is to determine if they contain sufficient intact deposits and data yield potential to merit full-scale data recovery during Phase III.

TABLE 34

GROUP II SITES: GOOD RESEARCH POTENTIAL

Site No.	Topographic Setting	Temporal Affiliation
41GR31* (S)**	Bedrock terrace	Undefined Prehistoric
41GR207 (P)	Upland	Undefined Archaic
41GR243 (P)	Upland	Undefined Prehistoric
41GR250* (S)	Upper alluvial terrace	Undefined Prehistoric
41GR258 (S)	Bedrock terrace	Undefined Prehistoric
41GR271 (S)	Upland	Late Prehistoric
41GR291* (P)	Upland	Undefined Prehistoric
41GR325* (S)	Upland	Late Prehistoric
41GR332 (S)	Upland	Undefined Prehistoric
41GR337 (S)	Upland	Undefined Prehistoric
41GR340* (S)	Bedrock terrace	Late Archaic/Late Prehistoric
41GR349* (P)	Upland	Undefined Prehistoric
41GR350 (P)	Upland	Undefined Prehistoric
41GR378* (P)	Upland	Undefined Prehistoric
41GR393 (P)	Erosional remnant	Undefined Archaic
41GR407 (S)	Erosional remnant	Late Prehistoric
41GR439 (S)	Upland	Undefined Prehistoric
41GR467* (S)	Eolian dunes	Undefined Prehistoric
41GR474* (S)	Erosional remnant	Late Prehistoric
41GR484* (P)	Lower alluvial terrace	Undefined Prehistoric
41GR493* (S)	Upland	Undefined Prehistoric
41GR515* (P)	Erosional remnant	Late Prehistoric
41GR523 (S)	Upland	Undefined Prehistoric
41GR528 (S)	Erosional remnant	Undefined Prehistoric
41GR541* (S)	Erosional remnant	Undefined Archaic
41GR551 (S)	Upland	Undefined Prehistoric
41GR560 (S)	Upland	Undefined Prehistoric
41GR562 (S)	Upper alluvial terrace	Undefined Prehistoric
41KT37* (P)	Upland	Undefined Prehistoric
41KT47 (P)	Upland	Late Prehistoric
41KT51* (P)	Lower alluvial terrace	Undefined Prehistoric
41KT66 (P)	Lower alluvial terrace	Undefined Prehistoric
41KT78 (S)	Lower alluvial terrace	Undefined Prehistoric

*Best sites from which a sample for further investigation should be chosen.

**Impact zone: P = primary; S = secondary

The Group III sites (Table 35) should be investigated in a manner similar to Group II. A sample of at least four sites should be selected for testing to assess their information yield potential.

Rockshelters

Rockshelters are considered to be special resources. While numerous sheltered areas were encountered, very few contain soil accumulations, and fewer yet yielded evidence of human habitation. Rockshelters may potentially yield perishable cultural materials which are not preserved at other types of sites. Because of this potential, the four shelters (41GR326, 41GR546, 41GR559, and 41KT57) which contain cultural evidence are recommended for testing. All four rockshelters are considered to be potentially eligible for listing on the National Register and occur in secondary impact zones. A fifth rockshelter site in the reservoir area, 41GR54 (Reed Shelter), was previously investigated and the shelter was completely excavated (Riggs 1966). A reexamination of the Reed Shelter materials for comparison is possibly warranted, but no additional testing is needed.

Faunal Localities

Nine sites are classified as faunal localities (Table 36). None are conclusively cultural in origin, but all are considered potentially eligible for listing on the National Register as there is potential association with human activities. All are in floodplain settings. While each could represent a natural occurrence, their potential cultural association cannot be overlooked and warrants limited testing at each locality. Testing shall consist of a minimum of one 1x2-m hand-excavated unit at each locality.

The importance of these sites lies not only in their potential to reveal subsistence and hunting practices or butchering techniques but also to reveal data regarding past faunal populations. Important research questions in the Southern Plains relate to the abundance or scarcity of bison. It is essential that faunal material, geomorphological data, and radiocarbon samples be collected from these sites in order to establish their temporal and environmental contexts.

It is recommended that testing be conducted at all nine faunal locality sites. Recommendations for subsequent data recovery should be based on those results.

Lithic Scatters

The six sites categorized as lithic scatters of unknown age are not considered to be eligible for listing on the National Register. None warrant further work because of their expected low research potential.

TABLE 35
GROUP III SITES: MODERATE OR UNKNOWN RESEARCH POTENTIAL

Site No.	Topographic Setting	Temporal Affiliation
41GR205 (S)**	Upland	Undefined Prehistoric
41GR239 (P)	Upland	Undefined Prehistoric
41GR240* (S)	Erosional remnant	Undefined Prehistoric
41GR253 (S)	Lower alluvial terrace	Undefined Prehistoric
41GR254 (S)	Lower alluvial terrace	Undefined Prehistoric
41GR256* (S)	Erosional remnant	Late Archaic/Late Prehistoric
41GR268 (S)	Upland	Undefined Prehistoric
41GR269 (S)	Upland	Undefined Prehistoric
41GR272 (P)	Upland	Undefined Prehistoric
41GR274* (S)	Erosional remnant	Late Archaic
41GR275 (S)	Upland	Undefined Prehistoric
41GR286 (P)	Upland	Undefined Prehistoric
41GR287 (P)	Upland	Undefined Prehistoric
41GR302* (P)	Upland	Undefined Prehistoric
41GR303* (P)	Upland	Undefined Prehistoric
41GR309* (S)	Upland	Undefined Prehistoric
41GR312* (P)	Lower alluvial terrace	Undefined Prehistoric
41GR314* (P)	Bedrock terrace	Undefined Prehistoric
41GR328 (P)	Upland	Undefined Prehistoric
41GR330 (P)	Upland	Undefined Prehistoric
41GR339 (S)	Upland	Undefined Prehistoric
41GR342 (S)	Upland	Undefined Prehistoric
41GR363* (S)	Upland	Undefined Prehistoric
41GR369 (S)	Upland	Undefined Prehistoric
41GR379 (P)	Upland	Undefined Prehistoric
41GR385 (S)	Upland	Undefined Prehistoric
41GR386 (S)	Erosional remnant	Undefined Prehistoric
41GR406 (S)	Erosional remnant	Undefined Prehistoric
41GR425* (P)	Bedrock terrace	Late Archaic
41GR427 (P)	Erosional remnant	Undefined Prehistoric
41GR429* (S)	Erosional remnant	Middle Archaic
41GR430 (P)	Bedrock terrace	Undefined Prehistoric
41GR432* (S)	Upland	Late Prehistoric
41GR438 (S)	Erosional remnant	Late Prehistoric
41GR441* (S)	Lower alluvial terrace	Undefined Prehistoric
41GR442 (S)	Erosional remnant	Middle Archaic
41GR444* (S)	Erosional remnant	Late Prehistoric
41GR446 (S)	Bedrock terrace	Undefined Prehistoric

*Indicates sites which are considered as the best from which to obtain a sample.

**Impact zone: P = primary; S = secondary; N = none.

Table 35, continued

Site No.	Topographic Setting	Temporal Affiliation
41GR450 (S)	Erosional remnant	Undefined Prehistoric
41GR451 (S)	Lower alluvial terrace	Late Archaic
41GR458 (S)	Erosional remnant	Undefined Prehistoric
41GR459 (P)	Upland	Undefined Prehistoric
41GR471* (S)	Eolian dunes	Undefined Prehistoric
41GR478* (S)	Lower alluvial terrace	Undefined Prehistoric
41GR483* (P)	Upper alluvial terrace	Undefined Prehistoric
41GR485* (P)	Eolian dunes	Undefined Prehistoric
41GR497* (S)	Upland	Undefined Prehistoric
41GR506* (S)	Isolated mesa	Undefined Prehistoric
41GR514 (S)	Upland	Undefined Prehistoric
41GR527* (S)	Bedrock terrace	Undefined Prehistoric
41GR529* (S)	Lower alluvial terrace	Undefined Prehistoric
41GR543* (S)	Erosional remnant	Undefined Prehistoric
41GR555* (S)	Erosional remnant	Undefined Prehistoric
41GR566 (P)	Upland	Undefined Prehistoric
41KT38 (P)	Upland	Undefined Prehistoric
41KT61* (P)	Upper alluvial terrace	Undefined Prehistoric
41KT77 (S)	Lower alluvial terrace	Undefined Prehistoric
41KT81 (S)	Lower alluvial terrace	Undefined Prehistoric
41KT83 (S)	Upper alluvial terrace	Undefined Prehistoric
41KT84 (N)	Lower alluvial terrace	Undefined Prehistoric

TABLE 36
FAUNAL LOCALITY SITES

Site No.	Description	Location
41GR249 (P)*	Disarticulated bison bones	65-90 cm deep in cutbank
41GR270 (P)	Disarticulated bison bones	200 cm deep in cutbank
41GR310 (P)	Articulated bison bones	120 cm deep in cutbank
41GR488 (S)	Disarticulated bison bones	120 cm deep in cutbank
41GR512 (P)	Disarticulated bison bones	60 cm deep in cutbank
41GR539 (P)	Articulated bison bones	120-160 cm deep in cutbank
41GR568 (P)	Deer bones, possibly articulated	175 cm deep in backhoe trench
41KT44 (P)	Disarticulated bison bones	65 cm deep in cutbank
41KT69 (P)	Disarticulated bison bones	60-80 cm deep in cutbank

*Impact zone: P = primary; S = secondary

Isolated Finds

The 45 sites categorized as isolated finds are not considered to be eligible for listing on the National Register of Historic Places. None warrant further attention, and no work is recommended.

Summary of Prehistoric Site Recommendations

To summarize the recommendations for the prehistoric resources, the following work is suggested: (1) sample 6 of the 56 lithic procurement sites; (2) test all 4 of the newly discovered rockshelters; (3) test all 9 faunal locality sites; (4) test all 24 Group I prehistoric campsites; (5) test a sample of 4 Group II sites selected from certain age groups and topographic settings; and (6) investigate a sample of 4 unknown potential sites from Group III.

Rock Art Sites

As an aspect of culture, art is uniquely human; no other animal produces it. . . . Art is not independent of other aspects of a culture but is closely and intimately related to them. It cannot be otherwise of course; how could the art of any people be anything but a reflection of the physical and cultural world in which they are immersed. [Newcomb 1967:14]

Aboriginal Rock Art

The importance of the aboriginal rock art sites at Justiceburg cannot be overstated. Most archeological research, because of the nature of the surviving evidence, examines only the most basic of activities. Rock art is one of the few surviving expressions which can provide glimpses of the ideology of vanished peoples -- a brief look at their perspective on the world.

Thirty-three sites in the project area contain aboriginal rock art, and all are considered to be potentially eligible for listing on the National Register. Rock art studies involve two discrete tasks: (1) accurate recording; and (2) interpretation. Rock art sites in the Southern Plains of Texas are scarce. Most of the previous study efforts have been directed toward recording the few known sites, and scholarly interpretive research is almost nonexistent. The opportunities to properly document and interpret these expressions are diminishing rapidly as rock art sites deteriorate through natural processes or are destroyed by vandals. Turpin (1982:191-201) defines the six primary destructive forces on rock art as vandalism, chemical reactions, normal exposure to the elements, catastrophic events, internal and structural weaknesses, and biological growths. Vandalism is by far the most rapidly destructive force to easily accessible sites. All of the known rock art sites in the project area will be easily accessible when the reservoir is

constructed, if they are not destroyed in the process. Unless appropriate measures are taken, a valuable resource and a great deal of information will be lost to future generations.

Depending on the nature and condition of the site and the rock art, different treatment options are suggested: (1) no further work; (2) detailed recording of the setting and of the individual artistic elements; (3) special analyses; (4) in-situ preservation and protection; and (5) removal of the art panels for permanent curation. These options are not necessarily mutually exclusive. For example, panels which are to be preserved in situ or removed for curation require detailed recording prior to initiating stabilization or preservation measures. Table 37 lists the recommendations for work at the aboriginal rock art sites.

The option of no further work must be carefully applied because it limits the record of the site to the reconnaissance-level survey data which already exist. This option is applicable only to those sites which meet one or more of the following criteria: (1) the rock art is of dubious origin; (2) the rock art is in very poor condition resulting in questionable integrity; or (3) the rock art is so simple that current records are adequate and further work would be redundant. No further work is recommended at six aboriginal rock art sites which meet one or more of the above criteria: 41GR315, 41GR333, 41GR352, 41GR354, 41GR445, and 41GR517.

Detailed recording of the motifs at the remaining 27 sites is recommended. This includes thorough documentation of the geographical, geological, environmental, and cultural setting of the sites. This information should be gathered on an individual site basis following the methods described by Turpin (1982).

Two techniques -- graphic reproduction by hand and photographic documentation -- are appropriate to record the motifs as accurately and nondestructively as possible. Graphic reproduction techniques include scaled drawings, paintings, rubbings, tracings, and a variety of casting methods. Photographic methods include black-and-white and color photography using a range of specialized films, cameras, filters, lighting, and developing techniques that enhance varying characteristics of the motifs. Graphic and photographic techniques have distinct advantages and disadvantages; chief among these is that graphic methods introduce bias on the part of the recording artist or can potentially damage the artwork, while photography may not be sensitive enough to record subtleties which the human eye can detect. Both techniques are useful, and it is generally accepted that to fully document a rock art site of any importance, combinations of methods should be used (Kirkland and Newcomb 1967:19; Grieder 1986:176). Accordingly, it is recommended that graphic reproductions be made of the art at all 27 of the sites listed in Table 37 which require further work.

Another effective recording method is stereophotogrammetry. This technique, briefly described by Turpin et al. (1979), uses overlapping photographs to geometrically construct a three-dimensional optical model. This is the only method currently available which has the capability to document "the context as well as the precise dimensions" of the rock art (Turpin et al. 1979:335). At the same time that the rock art is recorded, a vertical contour map and cross sections of rock art faces are also documented. This technique has been used successfully to record large and elaborate pictograph sites and shelters in the Lower Pecos region (Turpin et al. 1979; Turpin 1982). The main advantages of stereophotogrammetric recording include its speed, accuracy, and the relatively unbiased permanent

TABLE 37
RECOMMENDATIONS FOR WORK AT ABORIGINAL ROCK ART SITES

Site	Record Elements and Setting*	Stereo- photo- grammetry	Special Analyses**	Impact Zone	Potential for in situ Preservation	Potential for Removal
41GR51	Yes	Yes	No	primary	No	No
41GR54	Yes	Yes	No	secondary	No	No
41GR238	Yes	No	No	secondary	No	No
41GR282	Yes	Yes	No	primary	No	No
41GR315	No	No	No	primary	No	No
41GR317	Yes	Yes	No	primary	No	No
41GR333	No	No	No	secondary	No	No
41GR344	Yes	Yes	PA + C14	secondary	Yes	Yes
41GR352	No	No	No	primary	No	No
41GR353	Yes	No	No	primary	No	No
41GR354	No	No	No	primary	No	No
41GR390	Yes	Yes	PA + C14	secondary	Yes	No
41GR409	Yes	Yes	No	secondary	No	No
41GR410	Yes	No	No	secondary	No	No
41GR420	Yes	No	No	primary	No	No
41GR423	Yes	Yes	PA + C14	primary	No	No
41GR424	Yes	No	No	primary	No	No
41GR426	Yes	Yes	PA + C14	primary	No	Possibly
41GR437	Yes	Yes	PA + C14	secondary	No	No
41GR445	No	No	No	secondary	No	No
41GR457	Yes	Yes	No	secondary	No	No
41GR472	Yes	Yes	No	secondary	No	No
41GR490	Yes	No	No	primary	No	No
41GR491	Yes	No	No	primary	No	No
41GR494	Yes	Yes	No	secondary	No	No
41GR517	No	No	No	secondary	No	No
41GR545	Yes	Yes	No	secondary	No	No
41GR567	Yes	Yes	No	secondary	No	No
41KT50	Yes	Yes	No	primary	No	No
41KT55	Yes	Yes	No	secondary	No	No
41KT57	Yes	Yes	No	secondary	No	No
41KT65	Yes	Yes	No	secondary	Yes	Possibly
41KT68	Yes	Yes	No	secondary	No	No

*Recording should include a combination of the most appropriate graphic and photographic techniques and documenting of condition of rock art (i.e., deterioration variables).

**PA = pigment analysis should be done; C14 = potential for radiocarbon dating of pigment should be investigated.

record which it produces (Turpin et al. 1979:337). It is recommended that the feasibility of this technique be investigated at the 20 sites indicated in Table 37.

Special analyses are also an integral part of thoroughly documenting rock art sites. The most basic is the definition of the variables of deterioration and the nature of the rock art surfaces. This type of study proved useful in understanding the rock art in Seminole Canyon (Turpin 1982:191-201). Other special analyses are related to dating. Turpin (1982:201) states that dating rock art is one of the most important research tasks "and should rank as a foremost objective of further studies." Relative dating can sometimes be done by careful observation of such details as overlapping elements, old soil horizon lines or buried rock art, differential weathering, or patination. Recent advances in radiocarbon dating render it feasible to date organic pigments used in pictographs, smoke blackening overlying art elements, and possibly even relict organic growths (such as lichens) on rock art (Turpin 1982:201). It is recommended that these techniques of dating the art at Justiceburg should be pursued.

A specialized analysis utilizes X-ray diffraction to identify the mineral contents of pictograph pigments. This technique was successfully used on Seminole Canyon pictographs (Zolensky 1982). Certain minerals were identified as used very consistently to produce certain colors of pigments. It is recommended that this technique should be used at all five of the pictograph sites (see Table 37).

Upon completion of all recording and special analyses, options for protection or preservation of sites as indicated in Table 37 should be reviewed. Based on each site's location, relative importance, and potential impacts of reservoir construction, the necessity and feasibility of preserving in place or removing the artwork should be assessed. In situ preservation efforts may include such measures as: (1) impregnation of the art-bearing surfaces with polyethylene-based chemical preservatives; (2) posting signs warning of cultural resource laws protecting sites; and/or (3) fencing or otherwise limiting access to sites. Removal of rock art is the most effective long-term preservation measure, although it is costly; the primary factors of removal are logistics and the practical execution of the method.

The three largest and most elaborate rock art sites present special problems. The Dorward Ranch Site (41GR51) contains significant aboriginal and nonaboriginal petroglyphs and is below the normal floodpool elevation. The petroglyphs have already been severely damaged by vandalism, and there may be no feasible way to remove any of the artwork. The aboriginal petroglyphs at 41GR282 are similarly situated. They are at or near the conservation pool elevation but have not yet been damaged by vandalism. The images are spaced along a soft, easily eroded sandstone bluff, and preserving or protecting the site in place may be difficult because of its visibility, accessibility, and friable matrix.

The third site which warrants special consideration is 41GR344. This small shelter contains well-preserved aboriginal pictographs and petroglyphs on a small panel. The site is slightly above or near the maximum floodpool elevation and will be easily visible and accessible by boat after the reservoir is completed. It may be protected in place, but its remote location will render it impossible to continually monitor the site. Even if protective measures are taken, a single act of vandalism could destroy the artwork. Of all the rock art sites in the area, this is one of the few at which it is most feasible to physically remove the entire art panel. It is recommended that this option be considered for Phase III. Although no cultural materials were recovered from shovel tests at this shelter, additional subsurface testing is warranted.

To summarize the recommendations for the aboriginal rock art sites, 27 of the 33 sites require additional work. Conventional photographic and graphic recording methods are recommended at all 27 sites. Stereophotogrammetric recording should be considered for 20 of the sites. Special analyses and preservation measures are warranted at many of the sites. Determining the feasibility of removing the rock art at several sites, especially 41GR344, is recommended. Rock art specialists who have worked with traditional recording and photogrammetric techniques should be consulted in order to formulate the final work plans at each site.

Nonaboriginal Rock Art

The nonaboriginal rock art consists predominantly of names and dates, ranging from 1849 at site 41GR333 to inscriptions from the 1930s and 1940s. Occasional historic cattle brands or ear tag symbols, place names, simple pictures, or graffiti messages are also present. As with the aboriginal rock art, the nonaboriginal rock art has great value as a record of historic activity which is explicit or implied in the data.

The value of the nonaboriginal rock art derives from several factors. First, few written records exist for the Garza County area prior to 1900, and almost none exist for the project area specifically. The earliest census, for example, is 1880, and it may be incomplete. Tax records, which date to the early 1880s, provide information about property owners but not about nonproperty-owning individuals who may have been employed at ranches in the area. Deed records generally provide information about residents only after property has actually changed hands. Finally, while primary documents deal with events in the area, it frequently is impossible to determine exactly where the author was located within a broad, unmapped landscape. No two historians, after all, have agreed on the exact routes followed by a number of important West Texas explorers.

Rock art, then, is a different kind of document which is just as important and may have as much validity as any other kind of written text. At Justiceburg, inscriptions from the 1880s and 1890s provide evidence of the presence of certain individuals who do not appear in other documents consulted or who were in the area earlier than had been commonly believed. They provide evidence of the use of the area by cattlemen prior to the time leases were recorded in the General Land Office or with the county, and they suggest the range covered by certain herds outside of the geographical area with which they traditionally have been associated.

Finally, information in rock art inscriptions may suggest topics for research and may aid in the reconstruction of specific landscapes. The inscription dated June 6, 1849, at site 41GR333, for example, may or may not be a legitimate record. It does, however, raise the intriguing possibility of an historic Euro-American presence in the project area which has not been noted by scholars to date, and it suggests the need for further research in military documents. Similarly, the existence of a relatively large number of early dates at site 41GR445, combined with the presence of an apparently early historic site, 41GR443, suggests that Rocky Creek may have been an historically important freshwater source along the Double Mountain Fork and alerts the archeologist and historian to employ greater-than-usual care in studying the area.

Fifty-four nonaboriginal rock art components were recorded, 13 of which are associated with aboriginal rock art. All of these components are considered to be potentially eligible for listing on the National Register of Historic Places under Criteria A, B, or D and/or as State Archeological Landmarks for those located on lands purchased by the City of Lubbock. In cases where eligibility is based on Criterion D, however, the initial recording of the inscription and its location was so thorough that all available data were collected during the initial survey effort. For that reason, it appears that the survey work has constituted mitigation at 51 of the 54 nonaboriginal rock art sites. In the remaining cases (41GR51, 41GR333, and 41GR445), it is possible that more information can be extracted because: (1) the inscriptions or artwork were not fully recorded or interpreted; or (2) because questions still exist concerning the content of the inscriptions. These sites warrant revisiting, and it is recommended that they be recorded more thoroughly utilizing the techniques described for aboriginal rock art sites.

Historic Sites

As with the prehistoric and rock art sites, the six groups of historic sites require differing approaches in order to extract maximum information from them. The recommended sampling plan varies accordingly. Table 38 summarizes the recommendations and assessments for all historic sites.

Housesites/Dugouts

Habitation sites of various types represent the most numerous historic site type recorded. They are also among the most diverse. Of the 14 sites which are identified as having been the location of more-than-temporary occupation, 8 are the present or former locations of standing buildings and/or building complexes, 2 are the likely locations of buildings, and 4 are the locations of dugouts and associated features. The chronological range of these sites also is broad, with the earliest dating from the early 1880s and the most recent to the post-World War II era. Therefore, they represent the total range of historic habitation site types known in rural Garza County.

For the most part, the sites possess a high degree of integrity, even though a number of the dugouts were occupied only briefly at the turn of the century. Finally, most of the sites were determined to have been constructed and/or occupied by individuals and families who were locally significant because they were among the earliest permanent settlers in the county and were associated with the economic and/or political development of the region.

Sufficient information was gathered in 1987 to determine that of the 14 homestead/dugout sites recorded, 13 are potentially eligible for listing on the National Register of Historic Places and 1 is ineligible (41GR565). Sites 41GR392 and 41KT84 fall outside the project area, and no archeological work is recommended but additional archival work is needed. It is also recommended that sufficient documentary research, oral history interviews, and architectural investigation of standing structures be done for the 13 potentially eligible historic sites to determine the identity, age, function, and associations of each site, and that sufficient archeological work be done in the form of test pits and/or limited shovel testing to determine the integrity of each site. Testing, whether

TABLE 38
SUMMARY OF HISTORIC SITES RECOMMENDATIONS

Site	National Register Eligibility	Impact Zone	Further Work Recommended
HOUSESITES/DUGOUTS			
41GR13	potentially eligible	secondary	National Register assessment
41GR203	potentially eligible	secondary	National Register assessment
41GR250	potentially eligible	secondary	National Register assessment
41GR263	potentially eligible	secondary	National Register assessment
41GR392	potentially eligible	none*	none
41GR412	potentially eligible	secondary	National Register assessment
41GR443	potentially eligible	secondary	National Register assessment
41GR449	potentially eligible	secondary	National Register assessment
41GR474	potentially eligible	secondary	National Register assessment
41GR530	potentially eligible	secondary	National Register assessment
41GR565	not eligible	none*	none
41KT42	potentially eligible	primary	National Register assessment
41KT58	potentially eligible	secondary	National Register assessment
41KT84	potentially eligible	none*	none
TRASH DUMPS			
41GR33	not eligible	secondary	none
41GR273	not eligible	secondary	none
41GR287	not eligible	primary	none
41GR288	not eligible	primary	none
41GR289	not eligible	primary	none
41GR290	not eligible	primary	none
41GR292	not eligible	primary	none
41GR304	not eligible	primary	none
41GR350	potentially eligible	primary	National Register assessment
41GR370	not eligible	primary	none
41GR375	not eligible	primary	none
CEMETERY			
41GR522	potentially eligible	secondary	detailed site recording
RAILROAD/RESORT			
41GR470	potentially eligible	secondary	National Register assessment

*Site is outside project area.

Table 38, continued

Site	National Register Eligibility	Impact Zone	Further Work Recommended
CAMPSITE/GRAVE			
41GR528	potentially eligible	secondary	National Register assessment
UNIDENTIFIED			
41GR331	potentially eligible	secondary	National Register assessment
41GR460	potentially eligible	secondary	National Register assessment

research or archeological, should be aimed at deciding which of the potentially eligible historic sites are, in fact, eligible and the steps which might be required for mitigation.

As with the prehistoric sites, constraints of time and money may not permit the archeological and research investigation of all historic sites which eventually are determined to be eligible for listing on the National Register. It is further recommended, therefore, that all of the historic habitational sites be considered as a unit and that subsequent to testing the individual sites within the unit be prioritized in the light of their integrity, the extent to which they are good examples of a particular habitational type, their associations with significant individuals or families, and the degree to which adequate documentary sources which can provide supplementary data to the archeological effort are available. Recommendations should then be made for Phase III data recovery.

Trash Dumps

The second most numerous historic site type at Justiceburg is trash dumps. These 11 dumps consist of: (1) an isolated find of a single bottle (41GR292); (2) isolated dumps comprised of numerous artifacts which cannot be associated with a specific dumping event or historic habitation, or are associated with historic habitations outside of the project area that are of no special significance (41GR33, 41GR273, 41GR287 through 41GR290, 41GR304, 41GR370, and 41GR375); and (3) a dump comprised of numerous artifacts which are associated with a specific habitation site (41GR350). It is felt that the first two categories of dumps have only limited research potential because they cannot be related to a specific event or habitation site within or near the project area. The third category is comprised of one site which appears to date from the post-World War I era and is associated with Walter V. Roy, a well-known historic figure in the project area. This site, 41GR350, is considered to have research potential because of the age of the artifacts associated with it and because the artifacts can be compared with those at site 41GR263, a dugout site occupied during the prerailroad era. It is recommended that site 41GR350 be tested during Phase II and that any recommendations for further work be based on the results of the testing.

Cemeteries

The third site type recorded in 1987 consists of a cemetery (41GR522) near the town-site of Justiceburg. The cemetery is considered to be potentially eligible for listing on the National Register of Historic Places because it is associated with a number of significant historic figures in southeastern Garza County. The cemetery includes numerous graves with noteworthy surface treatments and an architecturally significant stone mausoleum. The site will not be inundated following construction of the reservoir. However, the increased potential for surface and subsurface vandalism which will occur after construction suggests that protection of the site should be given high priority. It is recommended that this site be thoroughly documented, including headstone data, surface treatment, and architectural elements.

Railroad/Resort Complex

The fourth type of site recorded is a multiuse locality (41GR470). Initial improvements to the site consist of a lake, pumping station, and dam which were constructed by the Santa Fe Railroad after 1910. Later improvements consist of frame and stone cabins which were built by private individuals and used irregularly as fishing or resort camps.

The site is considered to be potentially eligible for listing on the National Register because it is the most visible and intact site associated with the construction of the railroad through Justiceburg, an event which had a significant impact on the project area. Because of the complexity of the site and the fact that little site-specific research has been done, it is recommended that a more thorough search of the historic records be completed and that sufficient archeological testing be done to devise a mitigation plan for the complex.

Campsite/Grave

One historic site (41GR528) includes two features: a single grave and a campsite which is believed to have been occupied by buffalo hunters. The two features may be functionally related; they both are believed to date from the late 1870s.

Site 41GR528 is considered to be potentially eligible for listing on the National Register of Historic Places because of the age of the grave and the possibility that the site is associated with buffalo hunting, an important early economic activity on the South Plains. However, at this point, insufficient research and testing have been completed to absolutely identify the burial (thought possibly to be A. W. McCormick) or the function of the associated campsite. It is recommended, therefore, that documentary research be done to identify the interred remains and that surface reconnaissance and shovel testing be done at the campsite to determine the extent and integrity of the site. Artifacts remaining at the site and those collected by Emmett Shedd should be analyzed to aid in determining the function of the site. Recommendations for data recovery should be based on the findings made during Phase II.

Unidentified Sites

Two functionally and chronologically unidentified historic sites were recorded in 1987. The first of these (41GR331) is located in the historic townsite of Burnham and may date to the post-1910 era when the town flourished. The second site (41GR460) appears to be a rock wall. However, no age or function is ascribed to either site, and they are not readily relatable to other sites or activities in the immediate area.

It is recommended that sufficient documentary research and oral history interviews be done for these two potentially eligible historic sites to identify their age, function, and associations, and that archeological work may be warranted in the form of test pits and/or limited shovel testing to determine the integrity of each site. Testing, whether archival or archeological in nature, should be aimed at deciding whether these two sites are, in fact, eligible for listing on the National Register, the extent to which they duplicate or extend the range of the historic sites already considered eligible, and the steps which might be involved in site mitigation.

Summary of Assessments and Recommendations

The 375 recorded sites constitute a unique set of cultural resources that embody the residue of several millenia of human use of and interaction with the natural resources along a short segment of the Double Mountain Fork of the Brazos River. Assessments of the individual site characteristics and research potential revealed that 137 sites retain little interpretive value beyond that recovered during this Phase I survey; these are judged to be not eligible for listing on the National Register of Historic Places. The remaining 238 sites are imbued with one or more characteristics which suggest they retain data relevant to understanding the history and prehistory of the project area and the region; these are judged to be potentially eligible for listing on the National Register.

Three major site categories are comprised of 300 prehistoric components at 288 sites (excluding isolated find), 30 historic components at 30 sites, and 87 rock art components (33 aboriginal and 54 nonaboriginal) at 74 sites. Two hundred and sixty-two components worthy of additional work are distributed among the 238 sites potentially eligible for listing on the National Register.

Because of the large quantity of potentially significant sites and the desire to exercise fiscal restraint, a sampling strategy is recommended as the most efficient and effective approach to treatment of the resources. This allows a judicious selection of sites to be investigated from large groups of similar sites, yet provides for investigating the full range of sites represented, including sites which fall within unique categories. Table 39 summarizes the quantities of sites in each category that are eligible for additional work contrasted to the quantities recommended for investigation.

The sampling strategy recommended herein is based on the assumption that the research design presented in Chapter 5 will continue to guide the work at Justiceburg. Continuing this assumption, it is recommended that two additional phases of work follow the present Phase I survey: Phase II testing, assessment, and mitigation plan preparation; and Phase III data recovery.

TABLE 39
SUMMARY OF NATIONAL REGISTER ASSESSMENTS AND RECOMMENDATIONS

Site Type	Requires	No Further Work		Total Sites
	Further Work	Potentially	Not	
	Potentially Eligible	Eligible	Eligible	
PREHISTORIC				
Isolated find	-	-	45	45
Lithic scatter	-	-	6	6
Faunal locality	9	-	-	9
Rockshelter	4	-	1	5
Lithic procurement	6	20	30	56
Campsite and lithic procurement/campsite	<u>32</u>	<u>85</u>	<u>50</u>	<u>167</u>
Totals:	51	105	132	288
HISTORIC				
Trash dump	1	-	10	11
Housesite/dugout	13	-	1	14
Cemeteries	1	-	-	1
Railroad/resort complex	1	-	-	1
Campsite/grave	1	-	-	1
Unidentified	<u>2</u>	<u>-</u>	<u>-</u>	<u>2</u>
Totals:	19	0	11	30
ROCK ART				
Aboriginal	18	2	-	20
Nonaboriginal	-	41	-	41
Mixed	<u>11</u>	<u>2</u>	<u>-</u>	<u>13</u>
Totals:	29	45	0	74

Phase II should include the following activities:

(1) Initiate special studies, including geoarcheology, faunal and floral studies, radiocarbon dating, human remains treatment, crevice burial survey, lithic artifact studies, and prehistoric feature studies;

(2) Test 51 prehistoric sites, including 6 lithic procurement sites, 4 rockshelters, 9 faunal localities, and 32 campsites and combination campsite/lithic procurement sites (24 in Group I, 4 in Group II, and 4 in Group III);

(3) Conduct detailed recording of 29 rock art sites (18 with aboriginal components and 11 with mixed aboriginal and nonaboriginal components); determine the feasibility of stereophotogrammetric recording, special analyses, and preservation/removal potential of selected rock art panels/sites; and limited testing of 41GR344;

(4) Archeological testing and continued archival documentation of 6 historic sites; detailed site recording and archival documentation of 1 historic site; and continued archival/informant research and limited archeological testing at 10 historic sites;

(5) Analysis of the data obtained and preparation of a series of technical reports describing the work accomplished, the methods used, the results, and presenting interpretations and conclusions as appropriate; and

(6) Preparation of a Phase III mitigation plan that refines the research design and presents a logical cost-effective program of work to accomplish the objectives of the research design.

Phase III should consist of those activities identified in Phase II as necessary to adequately mitigate the expected loss of irreplaceable cultural resources. It is premature to attempt construction of such a plan until Phase II is completed. It is appropriate, however, to state that Phase III should be envisioned as consisting of: (1) full-scale data recovery at a limited number of carefully selected prehistoric sites; (2) mitigative recording, special analyses, and stabilization, preservation, or removal of selected rock art panels; (3) data recovery at a limited number of historic sites; (4) continuation of the special studies program; and (5) analysis of the data recovered followed by the preparation of a series of technical reports describing the work, the findings, the interpretations, and the conclusions. It is also appropriate to suggest that a short popular account of the cultural resources at Justiceburg be prepared for distribution to the general public.

If these recommendations are followed, the cultural resources contained in Justiceburg Reservoir will be treated fairly in a cost-effective manner. The public will gain first in expanding the body of knowledge relating to the history and prehistory of the region in which they live, and second in a dependable water supply that has been the quest of local residents for untold millennia.

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APPENDIX A: Artifact Analysis

by Douglas K. Boyd

INTRODUCTION

The research design for the Justiceburg Reservoir survey called for a selective collection policy in which only potential temporally or functionally diagnostic artifacts or exotic lithic materials were surface collected. In view of the extensive amount of relic collecting in the project area, the surface collection of diagnostic artifacts was considered to be an important preservation measure. In some cases, artifacts (such as manos and metates) were too numerous or bulky to be systematically collected, and thus only representative samples and unusual specimens were obtained. The research design also called for the collection of all cultural materials found in backhoe trenches or in shovel tests (with the exception of burned rock debris, a sample of which was occasionally but not always collected). All other subsurface materials which were potentially of cultural origin were collected.

This kind of subjective surface collection policy provides data necessary to evaluate sites, but it limits the degree of comparability between artifact assemblages. The objective of this level of survey, however, is directed to site evaluation and not to comprehensive artifact studies. The collection of all subsurface materials is very useful for evaluating sites, but the nature of subsurface testing does not provide comparable data between all sites. For these reasons, a descriptive analysis is provided rather than detailed comparisons between sites.

This appendix contains descriptions of all cultural and potentially cultural materials collected during the Phase I survey. The descriptions are divided into prehistoric and historic artifacts. Within the prehistoric group, artifact classes are arranged by method of manufacture or parent material, including ground stones, chipped stones, lithic debitage, ceramics, and organic materials. The stone artifact classes are further subdivided on the basis of form and/or assumed function. These are again divided into small descriptive groups, and, where appropriate or possible, recognized formal type names are assigned. The artifacts are described individually.

Historic artifacts are so few in number that they are described by site rather than class. All are described individually.

PREHISTORIC ARTIFACTS

A total of 740 prehistoric artifacts and nonartifact debitage were collected from 141 sites at Justiceburg Reservoir. The items collected are classified as follows: ground stone artifacts (N = 27), chipped stone artifacts (N = 196), lithic debitage (N = 348), ceramics (N = 34), and organic materials (N = 135). Table 40 provides a more-detailed classification of the artifacts. Appendix B consists of a site-by-site inventory of the prehistoric materials collected, so provenience tables are not included in the descriptions. Individual specimens within each category are, however, described in numerical order of the site of origin.

TABLE 40
CLASSIFICATION OF COLLECTED PREHISTORIC ARTIFACTS

Classification	Description	Number
GROUND STONE ARTIFACTS		
Manos	Quartzite	7
	Sandstone	17
Metates		<u>3</u>
		27
CHIPPED STONE ARTIFACTS		
Bifacial Tools	Arrow points	17
	Dart points	20
	Drills	6
	Reamers	3
	Alternately beveled (retouched) bifaces	7
	Biface fragments	
	Triangular	6
	Squared	2
	Probable dart points	3
	Small ovate bifaces	3
	Small subtriangular bifaces	2
	Bifacial gouges	4
	Bifacial gouge preforms	2
	Ovate bifacial scrapers	3
	Bifacial end scrapers	2
	Miscellaneous bifaces	<u>5</u>
		85
Unifacial Tools	Gouges	
	Triangular	18
	Rectangular	7
	Preforms	2
	Rectangular planar tools	9
	End scrapers	
	Snub-nosed	4
	Miscellaneous	14
	Preforms	2
	Unilateral scrapers	5
	Bilateral scrapers	8
	Miscellaneous ovate scrapers	5
	Miscellaneous rectangular scrapers	5
	Denticulate	1
	Concave retouched/utilized flakes	2
	Unifacially edge-trimmed flakes	<u>10</u>
		92

Table 40, continued

Classification	Description	Number
Core Tools	Expendable pebble cores	2
	Tested cores	5
	Oval bifacial core tools	4
	Round chopper core tools	4
	Irregular core tools	<u>4</u>
		19
LITHIC DEBITAGE*		348
CERAMICS		34
ORGANIC MATERIALS*		<u>135</u>
GRAND TOTAL:		740

*See Table 36 for a detailed classification of the lithic debitage; see Table 37 for a detailed classification of the organic materials.

Ground Stone Artifacts

Ground stone artifacts consist of 24 manos or hand-held grinding stones and 3 metate, or grinding slab, fragments (Table 41). The manos consist of 17 sandstone (4 of which are fragmentary) and 7 stream-worn quartzite cobbles. All the manos are oval to round and worked either bifacially or unifacially, although one has three grinding facets.

Quartzite Manos

The seven quartzite manos are all made from stream-worn quartzite nodules which are probably from the local Quaternary gravels. Five are bifacially ground, one is unifacially ground, and one is ground on three faces. All exhibit some evidence of battering, varying from very minor to extensive. One specimen has considerable battering on its ground faces, suggesting that its primary function may have been as a hammerstone. All others are battered along the lateral edges and ends, suggesting they were used secondarily as hammerstones. These tools are most likely combination grinding/pounding stones, presumably used in processing foods.

Specimen 1 from 41GR240 is an oval, stream-worn nodule of brownish green quartzite which is ground on three faces (Fig. 47a). One edge and one end are battered, indicating secondary use as a hammerstone. The three grinding facets seem to have been utilized to varying degrees; one face is well worn, and the other two exhibit much less wear.

Specimen 2 from 41GR250 is an elongated, oval, stream-worn nodule of brown to reddish coarse-grained quartzite which is bifacially smoothed (Fig. 47b). It is well worn on both faces, and the edges are shaped and/or battered from use as a hammerstone.

TABLE 41
METRIC DATA FOR MANOS

Site No.	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
41GR13	129	86	29	511
41GR239	153	139	54	1301
41GR240	119	64	53	606
41GR243	147	110	36	883
41GR250	116	84	35	571
41GR258	122	99	23	419
41GR263	113	99	47	769
41GR264	111	83	33	389
41GR291	-	120	41	584
41GR332	111	-	40	392
41GR339	150	114	47	1181
41GR349	129	114	28	621
41GR373	93	78	50	589
41GR388	168	125	49	1607
41GR393	151	127	29	677
41GR396	-	-	34	243
41GR456	110	65	26	268
41GR502	133	121	34	850
41GR521	89	67	44	418
41GR544	123	107	31	528
41KT33	187	155	53	2511
41KT66	-	134	47	1223
41KT81	117	81	59	851

Specimen 3 from 41GR263 is an oval, stream-worn nodule of dark red-maroon, fine-grained quartzite which is well worn on one face and only slightly ground on the other. The ends and one edge are battered; it probably was used secondarily as a hammerstone.

Specimen 4 from 41GR339 is an irregular, oval, stream-worn nodule of reddish brown, coarse-grained quartzite which is bifacially ground. Neither face is extensively smoothed, and one end is battered.

Specimen 5 from 41GR373 is bifacially ground and oval in shape but has almost squared corners. The mano is made from a coarse-grained, light brown quartzite and is thick relative to its size. Battered edges and battering on the ground faces suggest that it may have been used primarily as a hammerstone before being discarded.

Specimen 6 from 41GR521 is a stream-worn bifacial mano made from a very coarse grained, reddish brown quartzite (Fig. 48a). It is oval, almost rectangular, in shape. The smoothed faces are well worn, the ends are heavily battered, and it is relatively thick

Figure 47. Manos. (a) quartzite mano from 41GR240; (b) quartzite mano from 41GR250, note pitting and striations.

and small. The specimen was probably primarily a grinding stone but also was used extensively as a hammerstone.

Specimen 7 from 41KT81 is an oval, stream-worn, unifacial mano made of a tan-brown, coarse-grained quartzite with black banding. The ground face is flat and slightly pitted, possibly from pecking to roughen the grinding surface; the opposite side is rounded. This mano is relatively thick and is battered along all edges and on the rounded face.

Figure 48. Manos. (a) quartzite mano from 41GR521; (b) sandstone mano from 41GR13, note pitting in center.

Sandstone Manos

These manos all are made of fine-grained, brownish to light greenish sandstones containing flecks of mica in varying abundance and size. Apparently they represent detritus from Triassic sandstones which crop out throughout the project area. These manos exhibit a wide range of variability. They are oval to round in shape, and some are well worn while others are not. Some are discarded fragments, but most are whole. They also exhibit varying degrees of weathering as well as considerable variability in grinding surface morphology. Some are unifacial, but most are bifacially ground. Some have two

opposite grinding surfaces which are flat, while others have beveled grinding faces which taper toward the edges. Beveled faces result from holding the mano in different positions during use. They also vary considerably in size. The smallest, a bifacial elongated oval sandstone mano, weighs only 268 g (0.59 lbs), while the largest, a bifacial oval sandstone mano, weighs 2511 g (5.54 lbs) and was probably used with both hands. Manos are one of the more common artifacts noted in the project area, and the 17 specimens collected illustrate their range of variability (i.e., size, shape, material, and orientation of the grinding facets) which may or may not be functional attributes.

Specimen 1 from 41GR13 is an oval bifacial mano made of fine-grained sandstone containing sparse mica flecks (Fig. 48b). The edges were shaped by pecking and/or battering. Both faces are well ground, although one face is slightly pitted, possibly intended to roughen the grinding surface. The opposite face has a roughly circular pit (23 mm diameter, 2-3 mm deep) in the center. This specimen is similar to pitted manos found in central and southwest Texas which may have been used for cracking nuts or, less likely, as anvils for bipolar flaking. A slight red stain on the edge of the pitted face may be residue from grinding some type of mineral pigment.

Specimen 2 from 41GR239 is an oval bifacial mano made of a very fine grained sandstone containing a few tiny flecks of mica; one side is cracked from weathering. The grinding facets are flat, but the mano is wedge shaped in cross section. Maximum thickness is 54 mm along one edge, thinning to 10 mm on the opposite edge.

Specimen 3 from 41GR243 is an oval bifacial mano of fine-grained sandstone with abundant mica flecks. The smoothed faces are well worn and are beveled slightly toward the edges, forming a longitudinal ridge on both faces. One face is weathered more than the other. The edges are shaped by pecking and possibly are battered.

Specimen 4 from 41GR258 is an oval unifacial mano of fine-grained sandstone with sparse mica flecks. The ground face is beveled toward both lateral edges, forming a thick longitudinal ridge along the center. The thickness varies from 23 mm on the ridge to 14 and 8 mm on the edges. The opposite face is flat but is not smoothed; it appears to be formed by a natural bedding plane of the raw material. The edges of the mano are deliberately shaped by pecking.

Specimen 5 from 41GR264 is an oval bifacial mano of medium-grained sandstone containing sparse large flecks of mica. It is wedge shaped in cross section and relatively small, varying from ca. 33 mm on the thicker edge to ca. 7 mm on the thinner edge. The smoothed surfaces are flat and well worn; one face is badly weathered.

Specimen 6 from 41GR291 is approximately one-third to one-half of an oval bifacial mano of very fine grained sandstone containing small flecks of mica. The ground faces are well worn, and the edges have been shaped by pecking and grinding.

Specimen 7 from 41GR312 is a thin, roughly circular, bifacial mano of very fine grained sandstone with very tiny flecks of mica. The smoothed faces are well worn; one is weathered, and the other is pitted by what appears to be intentional pecking to roughen the grinding surface. The edges are shaped by pecking and grinding.

Specimen 8 from 41GR332 is a bifacial mano fragment of fine-grained sandstone with small flecks of mica. It is wedge shaped and varies from 40 mm thick on one edge to ca. 15

mm on the opposite edge; a portion of the thinner edge is missing. It was not used as a grinding stone subsequent to breakage. One face is badly weathered; the other is not. The edges (except the broken edge) are shaped by pecking and grinding.

Specimen 9 from 41GR349 is an oval bifacial mano of fine-grained sandstone with small flecks of mica. It is relatively thin, and both faces are well worn. One face is very flat; the other is only slightly beveled toward the opposite edges. It is somewhat more weathered on the flat face than on the beveled face. The edges were intentionally shaped by pecking and grinding.

Specimen 10 from 41GR388 is a very symmetrical oval mano of fine-grained sandstone with abundant mica flecks (Fig. 49a). It is unifacially worked and well worn on its single grinding face. The opposite side and the edges are intentionally shaped by pecking and grinding. It is possible that the edges are also battered slightly. The smoothed face is slightly beveled toward the edges, and the thickest part forms a longitudinal ridge.

Specimen 11 from 41GR393 is an oval bifacial mano of fine-grained sandstone with small mica flecks (Fig. 49b). It is very thin for its size. The smoothed faces are ground nearly flat and are well worn but somewhat weathered.

Specimen 12 from 41GR396 is approximately one-fourth of a bifacial mano of fine-grained sandstone with sparse mica flecks. It appears to have been oval shaped, with the ground faces beveled toward well-shaped edges. The smoothed faces are well worn and only slightly weathered. Sharp edges along the break indicate that it was probably discarded at the time it was broken.

Specimen 13 from 41GR456 is a very small, elongated oval, bifacial mano of fine-grained sandstone with sparse mica flecks (Fig. 50a). The ground faces are convex. One lateral edge is flattened and probably was shaped by grinding; the other edges are carefully shaped by pecking and grinding. One side is weathered.

Specimen 14 from 41GR502 is a circular unifacial mano of fine-grained sandstone containing abundant mica flecks, some of which are relatively large (Fig. 50b). The edges are well shaped by pecking and grinding. The smoothed face is well worn and beveled slightly from a center ridge toward the opposite edges. The opposite face is very rough, irregular, and does not appear to be modified. A slight red stain in the center of the smoothed face may be residue from grinding some type of mineral pigment.

Specimen 15 from 41GR544 is a bifacial mano of fine-grained sandstone containing a very few tiny mica flecks (Fig. 51a). It is roughly rectangular in shape; however, it may originally have been oval but has worn down so that the two opposing grinding faces intersect along one edge. One face is prominently beveled; the thickness varies from 31 mm along the center ridge to about 12 mm on one edge and 4-5 mm on the opposite edge. The other face is slightly convex, but the slight central ridge on this face is transverse to the prominent beveled ridge on the opposite face. It is difficult to tell if the edges were shaped by pecking because it is worn so thin.

Specimen 16 from 41KT33 is a very large, fairly symmetrical, oval, bifacial mano of fine-grained sandstone containing abundant mica flecks (Fig. 51b). The two faces are nearly flat and are not extensively worn. The lateral edges are deliberately trimmed through pecking and grinding. This mano is in the early stages of use and clearly reflects the effort put into its preparation.

Figure 49. Manos. (a) sandstone mano from 41GR388, note ridge along center and striations; (b) sandstone mano from 41GR393.

Figure 50. Manos. (a) sandstone mano from 41GR456; (b) sandstone mano from 41GR502.

Specimen 17 from 41KT66 is approximately two-thirds of an irregular, oval, bifacial mano of fine-grained sandstone which contains very fine flecks of mica. Both ground faces are slightly beveled and exhibit longitudinal ridges. The thickness varies from ca. 47 mm in the center to ca. 35 mm on one lateral edge and ca. 17 mm on the opposite edge. The edges are shaped by pecking and grinding.

Metates

Metates were not numerous in the project area; all observed were fragmentary and made of local Triassic sandstone. These metates were collected from an actively eroding cutbank at 41KT52 because they were likely to be lost through erosion. These specimens are not representative of all the forms observed.

Specimen 1 is an irregularly shaped, flat metate fragment, probably about one-fifth of its original size. It is unifacially ground, badly weathered, and probably had an oval

Figure 51. Manos. (a) sandstone mano from 41GR544; (b) sandstone mano from 41KT33.

grinding basin. It varies from a maximum thickness of 42 to 20 mm in the grinding basin. It is made from a fine- to medium-grained sandstone containing no visible mica flecks. The specimen is too fragmentary to measure the length and width; the thickness is 42 mm, and it weighs 2650 g.

Specimen 2 is approximately one-half of a well-shaped rectangular metate (Fig. 52). It is a flat slab which is unifacially ground with a rough flat face on the opposite side. The grinding basin is very shallow but extends over the entire face of the fragment. It is made of very fine grained, dense sandstone containing abundant tiny flecks of mica. It is too fragmentary for a length measurement; the width is 135 mm, the thickness 50 mm, and it weighs 1785 g.

Figure 52. Sandstone metate fragment from 41KT52.

Specimen 3 is an irregularly shaped, flat metate fragment. One face is well worn; the other is flat and may be either shaped or slightly smoothed. The unbroken lateral edges appear to have been shaped by pecking and grinding. The grinding basin is oval. The fragment has a maximum thickness of 25 mm near the edge and decreases to a minimum thickness of

18 mm in the grinding basin. It is made of a fine-grained sandstone containing very sparse tiny mica flecks. It is too fragmentary to measure the length and width; the thickness is 25 mm, and it weighs 1714 g.

Chipped Stone Artifacts

One hundred and ninety-six chipped stone tools were collected. Of these, 85 are bifacial tools, 92 are unifacial tools, and 19 are core tools. A number of distinctive types of tools were recognized within these categories. Each of the categories, tool types, and collected specimens are described in this section. Table 42 provides a listing of chipped stone artifacts by material type.

Bifacial Tools

Bifacial chipped stone tools include all tools with flakes intentionally removed from both faces. Bifaces collected include arrow points, dart points, drills, reamers, alternately beveled bifaces, biface fragments, small ovate bifaces, small subtriangular bifaces, bifacial gouges and gouge preforms, ovate bifacial scrapers, bifacial end scrapers, and miscellaneous bifaces. Some core tools are also bifacially worked; these are described in the Core Tool category. Recognizable bifacial tools were selectively collected whenever they were found, so the 85 tools collected probably represent much of the range in variability.

ARROW POINTS

Seventeen Late Prehistoric arrow points or arrow point fragments were identified in the collection (Table 43). Three are early corner-notched arrow points not assignable to any defined type in the region. One is a small triangular corner-notched arrow point of an unrecognized type. Three fragments (a serrated-edge midsection and two distal tips) are recognizable as arrow points but are not assignable to types. Ten specimens are identified as specific types. Of these, four are Deadman's, three are Fresno, one is a Harrell, one is a fragment of a Harrell or Washita, and one resembles the Livermore type.

Deadman's

Four arrow points are identified as Deadman's (Willey and Hughes 1978:187). Specimen 1 from 41GR256 is basally notched, the stem expands, the base is convex or rounded, and the blade edges are serrated (Fig. 53a). The prominent barbs are lacking. The distal tip is broken laterally, probably an impact fracture which occurred during use, after which the point was discarded. It is made of gray Edwards chert.

Specimen 2 from 41GR325 is basally notched, the stem expands, and the base is convex or rounded (Fig. 53b). The prominent barbs are broken, and the distal tip is lacking. It is made of a distinctive fine-grained quartzite which is reddish brown in color and may have been heat treated.

TABLE 42

COLLECTED CHIPPED STONE ARTIFACTS BY MATERIAL TYPE*

Artifacts	LOCAL ORIGIN							EXOTIC			UNIDENTIFIED				Total
	EdCh	PoCh	MROQ	OOQu	Chal	MoAg	SiWo	AlAg	TeJa	Obsi	B1Ba	RBQu	UnCh	UnQu	
Arrow points	10	1	-	-	1	1	-	1	-	-	-	1	2	-	17
Dart points	18	1	-	-	-	-	-	-	-	-	-	-	1	-	20
Drills	5	1	-	-	-	-	-	-	-	-	-	-	-	-	6
Reamers	3	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Alternately beveled bifaces	3	-	-	-	-	-	-	2	-	-	1	-	1	-	7
Biface fragments	9	1	-	-	-	-	-	1	-	-	-	-	-	-	11
Small ovate bifaces	3	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Small subtriangular bifaces	1	-	-	-	-	-	-	-	-	-	-	-	1	-	2
Bifacial gouges and preforms	1	2	-	-	-	-	-	-	-	-	-	2	1	-	6
Ovate bifacial scrapers	-	-	-	-	-	-	-	-	-	-	1	-	2	-	3
Bifacial end scrapers	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Miscellaneous bifaces	1	1	2	-	-	-	-	-	1	-	-	-	-	-	5
Triangular gouges	1	11	1	4	-	-	-	-	-	-	1	-	-	-	18
Rectangular gouges	-	3	-	-	-	-	-	-	-	-	-	-	3	1	7
Preform gouges	-	1	-	-	-	-	1	-	-	-	-	-	-	-	2
Planar tools	2	6	-	1	-	-	-	-	-	-	-	-	-	-	9
Snub-nosed end scrapers	4	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Misc. end scrapers	11	-	1	1	-	-	-	-	-	-	-	-	1	-	14
End scraper preforms	1	1	-	-	-	-	-	-	-	-	-	-	-	-	2
Unilateral scrapers	4	1	-	-	-	-	-	-	-	-	-	-	-	-	5

Table 42, continued

Artifacts	LOCAL ORIGIN							EXOTIC			UNIDENTIFIED				Total
	EdCh*	PoCh	MROQ	OOQu	Chal	MoAg	SiWo	AlAg	TeJa	Obsi	BlBa	RBQu	UnCh	UnQu	
Bilateral scrapers	4	-	1	-	-	-	-	1	-	-	-	-	2	-	8
Miscellaneous ovate scrapers	4	1	-	-	-	-	-	-	-	-	-	-	-	-	5
Miscellaneous rectangular scrapers	2	-	1	-	-	-	-	-	-	-	-	-	2	-	5
Denticulate	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1
Concave retouched flakes	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Unifacially edge-trimmed flakes	2	1	3	2	-	-	-	-	-	-	-	-	1	1	10
Expended cores	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Tested cores	-	-	-	-	-	-	1	-	2	1	-	-	1	-	5
Oval bifacial core tools	-	1	-	1	-	-	-	-	-	-	1	-	1	-	4
Round chopper core tools	-	4	-	-	-	-	-	-	-	-	-	-	-	-	4
Irregular core tools	-	1	1	1	-	-	-	-	-	-	-	-	-	1	4
Totals:	95	38	11	10	1	1	2	5	3	1	4	3	20	2	196

*Local Origin

EdCh = Edwards chert

PoCh = Potter chert

MROQ = maroon (red) Ogallala quartzite

OOQu = other Ogallala quartzites

Chal = chalcedony

MoAg = moss agate

SiWo = silicified wood

Exotic Origin

AlAg = Alibates agate

TeJa = Tecovas jasper

Obsi = obsidian

Unidentified Origin

BlBa = black basalt

RBQu = reddish brown quartzite (or basalt)

UnCh = unidentified chert

UnQu = unidentified quartzite

TABLE 43
METRIC DATA FOR ARROW POINTS*

Type	Site No.	Thickness	Total Length	Maximum Blade Width	Base Width	Haft Length	Neck Width	Base Depth
<u>Deadman's</u>								
Specimen 1	41GR256	3	29	20*	7	7	6	-2
Specimen 2	41GR325	3	31	15*	5	7	4	-1
Specimen 3	41GR438	4	33	18	7	9	7	-1
Specimen 4	41GR438	4	31*	16	7	8	6	-2
<u>Fresno</u>								
Specimen 1	41GR396	5	29*	18	18	x	18	0
Specimen 2	41GR432	3	37*	16	16	1	16	+1
Specimen 3	41KT42	5	25	16	16	1	16	+1
<u>Harrell</u>	41GR515	4	19	9	13	10	6	+4
<u>Harrell/ Washita</u>	41GR325	3	18	11	11*	8	5	x
<u>Livermore</u>	41GR33	4	28	14*	7	7	5	-1
<u>Untyped</u>								
Specimen 1	41GR263	2	16	13*	9	5	5	x
Specimen 2	41GR271	4	x	13	x	x	x	x
Specimen 3	41GR325	2	x	x	x	x	x	x
Specimen 4	41GR407	4	42*	17*	11*	5*	8	x
Specimen 5	41GR444	5	40	20	13	6	10	0
Specimen 6	41GR474	4	31*	22	x	x	10	x
Specimen 7	41KT79	7	3	x	x	x	x	x

*All measurements are in millimeters; base depth (+ = concave; - = convex; 0 = straight);
An asterisk (*) indicates an estimated measurement based on reconstruction of a
fragmentary specimen. An x indicates no measurement was possible.

Figure 53. Arrow Points. (a) Deadman's, 41GR256; (b) Deadman's, 41GR325; (c-d) Deadman's, 41GR438; (e) Fresno, 41KT42; (f) Harrell, 41GR515; (g) Harrell/Washita, 41GR325; (h) Livermore, 41GR33; (i) untyped, 41GR271; (j) untyped, 41GR407; (k) untyped, 41GR444; (l) untyped, 41GR474.

Specimen 3 from 41GR438 is basally notched; the long stem contracts slightly, and the convex base lacks one corner (Fig. 53c). The serrated blade edges are slightly concave. One barb is very prominent; the other is broken and probably has been reworked. This specimen is made of an unidentified light-cream-colored chert.

Specimen 4, also from 41GR438, is the proximal portion of a basal-notched, expanding-stem arrow point (Fig. 53d). Part of the convex base is broken; the barbs are not prominent and may have been reworked. The serrated blade edges are not symmetrical, suggesting that they possibly are reworked. This specimen is made of light gray Edwards chert.

Fresno

Three arrow points are identified as Fresno (Suhm and Jelks 1962:273-274). Specimen 1 from 41GR396 is the proximal two-thirds of a small, unnotched, triangular arrow point with a straight base. It is made of gray Edwards chert which possibly has been heat treated.

Specimen 2 from 41GR432 is also the proximal half of a small, unnotched, triangular arrow point. The base is slightly concave, and one ear is broken. It is made of light gray Edwards chert.

Specimen 3 from 41KT42 is a small, unnotched, triangular arrow point with a slightly concave base and slightly convex lateral edges (Fig. 53e). It is made from a light-colored red and white banded material which is probably Alibates agate. The point is complete except for a tiny fragment broken off the distal tip.

Harrell

One Harrell arrow point (Suhm and Jelks 1962:275-276) was recovered from 41GR515. This small, side-notched, triangular point has a single basal notch (Fig. 53f). The point appears to be complete, but the distal tip was probably broken and reworked. It is made of a light gray Edwards chert.

Harrell/Washita

One Washita or Harrell arrow point fragment (Suhm and Jelks 1962:275-276) was recovered from 41GR325. It is small, triangular, and side-notched (Fig. 53g). Part of the base is broken. It is made of an unidentified white chert.

Livermore

Identified as a possible Livermore arrow point (Suhm and Jelks 1962:279-280), one specimen from 41GR33 is long, slender, and has a gently expanding bulbous stem (Fig. 53h). Flake scars on the shoulders indicate where laterally projecting barbs approximately one-third of the way up the body from the base were broken and possibly reworked. It is made of light gray Edwards chert with red and white speckles; it may have been heat treated.

Untyped

Specimen 1 from 41GR263 is a small corner-notched arrow point. Part of the stem and one barb are missing. The distal tip is also broken, possibly the result of an impact fracture. This point was found in a shovel test at approximately 20 cm depth; numerous burned sandstone fragments and thinning flakes are associated. It is made from light gray Edwards chert.

Specimen 2 from 41GR271 is a midsection only (Fig. 53i). The distal tip and base are broken laterally. The blade edges are serrated, the stem expands, and the point is corner-notched. It is made of gray Edwards chert.

Specimen 3 from 41GR325 is identified as a distal arrow point tip on the basis of its small size. It is very finely flaked and is made of Potter chert which appears to have been heat treated.

Specimen 4 from 41GR407 is the midsection of a corner-notched, expanding-stem arrow point (Fig. 53j). The distal tip, most of the base, and one barb are broken. It is made of clear, translucent chalcedony with black mottling and streaking that is commonly called moss agate.

Specimen 5 from 41GR444 is an almost complete, large corner-notched arrow point (Fig. 53k). The extreme distal tip and one barb are broken. The blade edges are straight, the stem expands, and the base is straight. It does not fit well into any existing type but could be a variant of Scallorn (Suhm and Jelks 1962:285-286). It is made of white chalcedony (possibly opalized caliche).

Specimen 6 from 41GR474 is also corner-notched (Fig. 53l). The blade edges are gently convex (nearly straight), and the barbs are well defined but weak. The expanding stem lacks both ears. While the point cannot be typed, it appears to be an early style similar to Specimen 5 from 41GR444 (see Fig. 53k). It is made from cream-colored Edwards chert.

Specimen 7 from 41KT79 is the distal tip of an arrow point. It is made of dark gray Edwards chert and is broken laterally, possibly the result of an impact. The material may have been heat-altered after being discarded. The specimen was found in a natural cutbank exposure and rested in a midden layer approximately 40 cm below the ground surface.

DART POINTS

Twenty specimens collected are identified as Archaic dart points and dart point fragments (Table 44). Those identifiable to type include two Nolans, one Castroville, two Ensors, and one Mahomet. The 14 untyped dart points include corner-notched and stemmed varieties and unidentifiable fragments.

Nolan

Two dart points are identified as Nolan on the basis of their beveled stems (Suhm and Jelks 1962:225-226). They are middle Archaic in age. Specimen 1 from 41GR442 is shouldered but not barbed, and the blade edges are straight to gently convex. The stem is rectangular and is steeply and alternately beveled along the edges (Fig. 54a). The blade is also alternately beveled, although the beveling is gentle compared to the stem. The blade is right beveled while the stem is left beveled. The point is made of gray Edwards chert.

Specimen 2 from 41KT59 is asymmetrical and poorly chipped. The rectangular stem is alternately beveled to the right (Fig. 54b). The shoulders are weak. The blade edges are straight to gently concave; they are not beveled. The point is made from white chert with a waxy lustre (probably opalized caliche).

Castroville

One dart point fragment from 41GR504 is a Castroville (Suhm and Jelks 1962:173-174) that is late Archaic in age. This specimen is a proximal fragment of a large corner-notched, expanding-stem point with a slightly convex base (Fig. 54c). It is severely impact fractured with a very irregular lateral break; it may have been slightly damaged again after being discarded. The barbs and most of the blade are broken. It is made of gray Edwards chert.

Ensor

Two dart points are identified as Ensor (Suhm and Jelks 1962:189-190) and are late Archaic in age. Specimen 1 from 41GR461 is corner-notched, the stem expands, and the blade

TABLE 44
METRIC DATA FOR DART POINTS*

Type	Site No.	Thickness	Total Length	Maximum Blade Width	Base Width	Haft Length	Neck Width	Base Depth
<u>Nolan</u>								
Specimen 1	41GR442	7	40	20	14	14	13	-1
Specimen 2	41KT59	7	46	20	10	10	9	-1
<u>Castroville</u>	41GR504	8	x	x	27	15	20	-4
<u>Ensor</u>								
Specimen 1	41GR461	7	61*	30	31*	12	20	+2
Specimen 2	41KT42	7	40	26	21	10	15	-2
<u>Mahomet</u>	41GR256	6	34*	20	15	14	15	+2
<u>Untyped</u>								
Specimen 1	41GR13	6	36*	21	21*	7	14	0
Specimen 2	41GR263	8	35	19	19	13	14	+1
Specimen 3	41GR264	7	48	30	20	11	19	+1
Specimen 4	41GR274	5	34*	23	18	9	13	x
Specimen 5	41GR340	7	x	20	x	x	12	x
Specimen 6	41GR359	8	54	29	14	16	14	-4
Specimen 7	41GR359	x	x	x	x	x	x	x
Specimen 8	41GR376	5	x	32	x	x	x	x
Specimen 9	41GR393	6	x	x	18	8	17	-4
Specimen 10	41GR425	x	x	x	x	x	x	x
Specimen 11	41GR429	7	49*	33*	16	12	13	+2
Specimen 12	41GR451	5	31*	20	20*	6	13	-1
Specimen 13	41GR541	7	50*	26	20	12	17	+1
Specimen 14	41KT49	8	58*	31*	9	11	9	+1

All measurements are in millimeters; base depth (+ = concave; - = convex; 0 = straight); An asterisk () indicates an estimated measurement based on reconstruction of a fragmentary specimen. An x indicates no measurement was possible.

Figure 54. Dart Points. (a) Nolan, 41GR442; (b) Nolan, 41KT59; (c) Castroville, 41GR504; (d) Ensor, 41GR461; (e) Ensor, 41KT42; (f) Mahomet, 41GR256; (g) untyped, 41GR13; (h) untyped, 41GR263; (i) untyped, 41GR264.

edges and base are gently concave. The tip, one barb, and part of the stem are missing (Fig. 54d). The blade is slightly beveled on alternate faces. This point is quite large for an Ensor. It is made from gray Edwards chert and is very slightly patinated on one face.

Specimen 2 from 41KT42 is almost complete; it is corner-notched, the stem expands, the blade edges are gently convex to straight, and the base is straight (Fig. 54e). One ear of the stem is broken. The slightly barbed shoulders are well defined. It is made of light gray Edwards chert.

Mahomet

One Mahomet dart point was collected. Mahomet is a very late Archaic Central Texas point type (Prewitt 1981:82), formerly considered to be a variety of Darl (Suhm and Jelks 1962:179-180; Turner and Hester 1985:84). This specimen from 41GR256 has a squared shoulder, and the rectangular stem has a moderately concave base (Fig. 54f). The distal tip and one shoulder are broken, possibly the result of an impact fracture. The blade edges are straight and gently beveled to the right. One edge of the stem is beveled to the left. The point is made of dark gray Edwards chert and is slightly patinated.

Untyped

Specimen 1 from 41GR13 is a small side-to-corner-notched dart point (Fig. 54g). It lacks the distal tip, part of the stem, and one shoulder. The remaining shoulder is squared, the stem expands strongly, the base is straight, and the remaining blade edge is straight. It is made of gray Edwards chert. This specimen possibly is a fragmentary late Archaic Ensor point (Suhm and Jelks 1962:189-190).

Specimen 2 from 41GR263 is corner notched; the stem expands, and the base is slightly concave (Fig. 54h). Reworking of the blade has removed any barbs which may have existed; the shoulders are weakly squared. It is made of gray Edwards chert. The base is similar to points found in the Jornada-Mogollan area of southeastern New Mexico and western Texas and resembles specimens known locally as "Carlsbad" points (Leslie 1978:133, type 18-D).

Specimen 3 from 41GR264 is a broad, thin, stemmed and shouldered dart point (Fig. 54i). The blade edges are gently convex, and each has been reworked on alternate faces. The distal tip and one shoulder are missing; the remaining shoulder is squared. The edges of the rectangular stem are alternately beveled to the right and ground smooth. The slightly concave base results from a broad thinning flake removed from one face; the base is heavily smoothed. It is made of light gray Edwards chert and may be middle Archaic or earlier in age.

Specimen 4 from 41GR274 is a small corner-notched, expanding-stem dart point (Fig. 55a). The distal tip, one barb, and one ear of the base are broken. The blade edges appear to have been straight, and the base is concave. The point is made of dark gray Edwards chert.

Specimen 5 from 41GR340 is long, slender, and stemmed (Fig. 55b). The distal tip and most of the base are lacking. The stem may have been rectangular or slightly expanding. The blade edges are straight to gently convex, and the remaining shoulder is squared. The point is made from dark gray Edwards chert.

Figure 55. Dart Points and Drills. (a) untyped dart point, 41GR274; (b) untyped dart point, 41GR340; (c) untyped dart point, 41GR359; (d) untyped dart point, 41GR429; (e-f) untyped dart points, 41GR451; (g) untyped dart point, 41KT49; (h) drill fragment, 41GR325; (i) drill fragment, 41GR497; (j) drill made on reworked dart point, 41KT78; (k) drill, 41KT81.

Specimen 6 from 41GR359 is weakly shouldered, and the stem is roughly rectangular (Fig. 55c). The blade edges are gently convex and beveled to the right on each face. Edge wear is visible. The stem is damaged, and the straight base is formed by a striking platform. The extensive edge wear suggests that it may have functioned as a knife or drill. The specimen is made of cream-colored to tan chert which resembles some varieties of Edwards chert. This point may be middle Archaic in age.

Specimen 7, also from 41GR359, is the distal portion of an expanding-stem dart point. It appears to have been square-shouldered and corner-notched, but it is severely heat fractured. The blade edges are gently concave. One shoulder, the base, and most of the stem are lacking. It is made of fine-grained gray Edwards chert which is heat-discolored red.

Specimen 8 from 41GR376 is a midsection of a large corner-notched dart point. The barbs appear to have been prominent, and the remaining blade edge is gently convex. It lacks the distal half of the blade, both barbs, and most of the stem. It is made of dark gray Edwards chert.

Specimen 9 from 41GR393 is a proximal fragment of a stemmed dart point that probably was corner notched and had an expanding stem. Most of the blade, both barbs, and both corners of the stem are broken. It is made of lustrous gray Edwards chert.

Specimen 10 from 41GR425 is a small fragment consisting of one barb and part of the stem of a corner-notched, expanding-stem dart point. It is made of cream-colored Edwards chert. This fragment is very similar to Specimen 4 from 41GR274 (see Fig. 55a).

Specimen 11 from 41GR429 is a fragmentary large corner-notched dart point (Fig. 55d). The distal end, both barbs, and one ear of the base are broken. The blade edges are gently convex, and the barbs were prominent. The stem expands slightly, and the base is concave. It is made from gray Edwards chert but appears to be heat discolored, probably after being discarded. It may be middle Archaic in age.

Specimen 12 from 41GR451 is a small corner-notched, strongly expanding stem dart point (Fig. 55e). The distal tip and one ear of the base are broken. The blade edges are moderately convex, and the almost straight base is slightly concave. The point is made from fine-grained Potter chert which may have been heat treated.

Specimen 13 from 41GR451 is a square-shouldered, corner-notched, expanding-stem dart point with a slightly concave (nearly straight) base (Fig. 55f). The distal tip is lacking. The blade edges are moderately convex and are gently beveled to the left. It is made of dark gray Edwards chert and is very slightly patinated.

Specimen 14 from 41KT49 is a square-shouldered dart point with a slightly expanding stem and a concave base (Fig. 55g). The distal tip is lacking, the straight blade edges are battered and fractured, one shoulder is broken, and one ear of the base is missing. It is made of fine-grained tan Edwards chert and is moderately patinated on one side.

DRILLS

Drills (or perforators) are bifacially chipped tools with a long tapering bit, a diamond-shaped or rhomboid cross section, and a pointed tip. Drills are used for

puncturing and boring small holes. Six artifacts classified as drills or drill fragments were collected. One is fashioned from a reworked dart point; all are broken. All are made of Edwards chert except for one which is made of Potter chert.

Specimen 1 from 41GR325 is a finely flaked, stemmed drill fragment (Fig. 55h). It has an expanding stem with one corner broken and a long slender shank and bit that lacks the distal tip. The specimen is 34 mm in length, with the shank and drill bit comprising about 25 mm of the total length. The stem (or hafting element) is estimated to have been 18 mm in width, and the shank is 5 mm thick. It is made of light gray Edwards chert. This type of stemmed drill is a fairly common Late Prehistoric artifact type.

Specimen 2 from 41GR338 is a key-shaped drill fragment with an ovate, bifacially worked proximal stem. The distal tip (bit) is broken, probably as a result of use. The drill is 11 mm thick, 30 mm wide at the stem, and the shank is estimated to have been 50-60 mm in length. It is made of light gray Edwards chert; some flake surfaces have a very glossy appearance, and the material may have been heat treated.

Specimen 3 from 41GR497 is a drill fragment representing part of the shank and an expanding bifacially worked stem (Fig. 55i). The fragment is 7 mm thick and is irregularly fractured due to intensive heating. The specimen is too fragmentary to determine the form of the base or to estimate the original size of the tool. It is made of Edwards chert that is darkened due to heating.

Specimen 4 from 41KT78 is a relatively short drill shank reworked from the blade of a corner-notched dart point (Fig. 55j). The point has a rectangular stem, both barbs are broken, and it cannot be typed because it has been reworked extensively. The specimen is 7 mm thick, 31 mm wide, and 35 mm long. The stem is 19 mm wide at the neck and the base. It is made of dark gray Edwards chert.

Specimen 5 from 41KT81 is a drill fragment, probably a midsection consisting of part of the shank and the base (Fig. 55k). It probably is reworked from a bifacial tool, possibly a dart point. The drill is too fragmentary to determine the shape of the base or estimate its size. The fragment is 7 mm thick. It is made of gray Edwards chert.

Specimen 6 from 41KT81 is a flake drill fragment. It consists of a midsection that lacks the bit and part of the base. The base is formed by a unifacially worked flake, and the drill shank is alternately beveled. The specimen is too fragmentary to reconstruct its original size and shape. It is 8 mm thick and is made of Potter chert.

REAMERS

Reamers are functionally similar to drills and are a form of perforator. They differ from drills in that they are blunter, larger, and their primary function is enlarging existing openings. Reamers have wider bits and shanks than do drills. Three specimens are classified as reamers; all are made of Edwards chert.

Specimen 1 from 41GR275 is an elongated, triangular, pointed biface which is finely flaked (Fig. 56a). The distal end is missing, but it appears to have had a broad bit. The base is convex with rounded corners, and the lateral edges are possibly worn. The shank is diamond-shaped in cross section and is slightly beveled toward the distal end. The

Figure 56. Reamers and Bifaces. (a) reamer, 41GR275; (b) reamer, 41GR363; (c) alternately beveled biface, 41GR33; (d) alternately beveled biface, 41GR263; (e) alternately beveled biface, 41GR339; (f) alternately beveled biface, 41GR444.

specimen is 10 mm thick, 22 mm wide, and is estimated to have been 54 mm in length. It is made of gray Edwards chert; one side is moderately patinated, and the other is slightly patinated.

Specimen 2 from 41GR363 is a long, pointed oval biface which has a wide bit which exhibits considerable use-wear or polish (Fig. 56b). The shank is a flat oval in cross section and is slightly beveled to the right. The specimen is 12 mm thick, 20 mm wide, and 57 mm in length and is complete. The body of the biface is relatively thick and crudely flaked. It is made of Edwards chert that may have been heat treated.

Specimen 3 from 41GR427 is a long, oval biface with use-wear on the distal end. The bit is wide, but a small flake scar indicates it is broken. The reamer is not finely flaked, and the irregular lateral edges are possibly worn. The specimen is 7 mm thick, 15 mm wide, and is estimated to have been 43 mm in length, only slightly longer than the remaining portion. It is made of light gray Edwards chert.

ALTERNATELY BEVELED BIFACES

Alternately beveled bifaces are generally oval bifaces that have been resharpened on alternate faces. They vary considerably in appearance because they are found in different stages of use. Beveled bifaces are not necessarily diagnostic except in the case of two- and four-beveled knives, which are recognizable in later stages of use and are diagnostic Late Prehistoric bison-butcher knives. They are found in the artifact assemblages of many cultures and are relatively common in the Southern Plains. These have also been called "diamond-shaped" or "diamond-beveled" knives, "Harahey knives," or "Plains knives." A technological study of these tools (Sollberger 1971) strongly suggests that the alternate beveling is the result of repeated resharpening.

Seven alternately beveled bifaces were collected; all but one were surface finds. One was found in situ in a natural cutbank profile along with other cultural materials. Of the seven specimens, four are recognizable as Late Prehistoric two-beveled knives or fragments of two- or four-beveled knives in various stages of wear. The other specimens cannot definitely be assigned to the Late Prehistoric period.

These specimens are manufactured from a variety of materials. Of the Late Prehistoric beveled knives, two are Alibates agate, one is a distinctive but unidentified black basalt, and one is Edwards chert. Two of the other beveled bifaces are Edwards chert, and the third is of an unidentified chert.

Specimen 1 from 41GR33 is approximately one-half of an oval biface which is in the early stages of use; it is slightly beveled to the right and is retouched on alternate faces (Fig. 56c). It is broken in half laterally, possibly the result of having snapped during use or while being resharpened. The biface fragment is 14 mm thick, 55 mm wide, and 57 mm long. The total length of the complete specimen was probably about 10 mm. This artifact is characteristic of Late Prehistoric beveled knives in the early stages of use. It is made of a dark black unidentified basalt.

Specimen 2 from 41GR263 is a long oval biface which lacks its pointed distal tip (Fig. 56d). The distal end is slightly left beveled on alternate sides. The proximal end is oval in shape, and no beveling is apparent. This biface is not characteristic of the

Plains beveled knives but may have functioned as a similar tool. It is made of light gray Edwards chert with large inclusions of limestone. The distal break is on a limestone inclusion and probably was snapped during use.

Specimen 3 from 41GR325 is a complete irregular oval biface which is retouched and worn on left alternate edges. The edges are only slightly beveled, and the biface appears to be in early stages of use. The proximal end of the specimen is probably a striking platform, indicating the biface was manufactured on a large flake. The material is a very grainy unidentified chert, and the biface is rather crude. It is not characteristic of Plains beveled knives, but the alternate wear suggests that it could have served a similar function. It measures 95 mm in length, 48 mm in width, and is 23 mm thick.

Specimen 4 from 41GR339 is approximately one-half of a slightly pointed, oval, right-beveled biface (Fig. 56e). The fragment is broken laterally in half and was probably snapped during use. It is 10 mm thick, 47 mm wide, and 57 mm long. The complete specimen probably was about 100 mm in length. It is a Late Prehistoric Plains beveled knife in an early stage of use. The beveling is not steep, but the worked edges have a distinctive twisted appearance when viewed end-on. It is made of gray Edwards chert.

Specimen 5 from 41GR359 is a rectangular midsection of an alternately beveled biface. The distal end is lacking, and the proximal end has been broken and reworked. The fragment is alternately beveled to the right; the bevels are steep, and the lateral edges are well worn. This fragment measures 48 mm in length, 31 mm in width, and 8 mm in thickness. It is not typical of Late Prehistoric beveled knives, although it may be a fragment of one or it may have served a similar function. It is made of light tan Edwards chert.

Specimen 6 from 41GR444 is the distal half of a pointed alternately beveled biface (Fig. 56f). The lateral snap probably occurred during use. The fragment is steeply beveled to the left, and the edges exhibit considerable use-wear. One lateral edge is more extensively worn, has a steep bevel, and the edge is straight; the other lateral edge is less steeply beveled and is convex. It is 9 mm thick, 39 mm wide, and 65 mm long. The complete specimen is estimated to have been over 100 mm in length. The fragment is a Late Prehistoric Plains beveled knife manufactured from dark maroon, red, and white mottled and banded Alibates agate.

Specimen 7 from 41KT79 is an almost complete Late Prehistoric two-beveled knife (Fig. 57a). It is oval on the proximal end and is resharpened with a prominent left bevel. The distal tip is broken, probably during use. The specimen is 7 mm thick, 31 mm wide, and is estimated to have been 82 mm long when complete. It is made of mottled and banded brown, red, and white Alibates agate.

BIFACE FRAGMENTS

Eleven fragments of thin, secondary-trimmed bifaces were collected. These biface fragments are pieces of finished tools or preforms but are not complete enough to identify beyond general groupings. Six are triangular distal fragments, probably from bifacial knives, scraping tools, or preforms. Two specimens are squared proximal fragments, probably from biface preforms. Three specimens are very symmetrical, finely flaked distal or medial fragments which are probably parts of dart points. Of the 11 biface fragments, 9 are made of Edwards chert, 1 is of Potter chert, and 1 is of Alibates agate.

Figure 57. Bifaces. (a) alternately beveled biface, 41KT79; (b) triangular biface fragment, 41GR262; (c) biface (probable dart point) fragment, 41GR303; (d) small ovate biface, 41GR250; (e) small subtriangular biface, 41GR325; (f) small subtriangular biface, 41GR560.

Triangular Fragments

Specimen 1 from 41GR13 is the distal fragment of a pointed biface. It is triangular in shape and is 8 mm thick, 32 mm wide, and 34 mm long. There is no evidence of use-wear, and the blade edges are not completely trimmed. The fragment probably represents a manufacturing failure which is fractured laterally. The specimen is made of banded brown, white, and red Alibates agate.

Specimen 2 from 41GR262 is the proximal half of a large, thin oval biface which is fractured laterally (Fig. 57b). It is roughly triangular in shape; one edge is straight and the other is convex. The fragment is 58 mm long, 60 mm wide, and 10 mm thick. It is made of dark gray Edwards chert which is very heavily patinated on both sides. Limestone inclusions are visible in the fractured edge. The lateral edges are retouched or worn, and the fragment may have resulted either from use or from manufacturing failure.

Specimen 3 from 41GR332 is a distal fragment of a small biface. It is 8 mm thick and is roughly triangular in shape, but two fracture planes of the broken edge meet at an unusual angle. The lateral edges are crudely retouched, with no apparent use-wear. The fragment may be from a preform or some unrecognized tool. It is made of Edwards chert.

Specimen 4 from 41GR388 is a triangular-shaped distal fragment of a biface. It has a lateral fracture on the proximal end, and the distal end has a small impact fracture on the tip. The lateral edges are irregular and show some apparent damage. The fragment is probably a tip of some type of scraping or cutting tool. It is 8 mm thick and is made of dark gray Edwards chert which is heavily patinated on one side only.

Specimen 5 from 41GR427 is a triangular-shaped distal tip of a finely flaked biface. It is 48 mm long, 40 mm wide, and very thin (5 mm) for its size. The proximal break is a smooth lateral fracture. The lateral edges show use-wear which is most obvious near the distal tip. This fragment is from a finished tool which probably was broken during use. It is of a fine-quality tan Edwards chert.

Specimen 6 from 41GR458 is a triangular-shaped distal tip of a biface. It is similar in shape and morphology Specimen 5. It is 39 mm long, 42 mm wide, and 7 mm thick. The proximal end is a smooth lateral fracture. The tip is worn, but the edges are retouched and probably resharpened, indicating it is from a finished tool. It is made of light gray Edwards chert.

Squared Fragments

Specimen 1 from 41GR13 is a squared proximal biface fragment. It is fractured laterally and shows no obvious use-wear. The fragment is 28 mm long, 28 mm wide, and 11 mm thick. It is relatively thick, only the straight base is secondarily trimmed, and it probably represents a manufacturing failure. It is made of light gray Edwards chert.

Specimen 2 from 41GR325 is a proximal biface fragment. It is 7 mm thick with a rectangular base. The exact morphology of this small fragment cannot be determined. The retouched edges suggest that it is part of a finished tool. It may be a dart point stem fragment, or it could be a preform or some other type of tool. It is made of cream-colored Edwards chert.

Probable Dart Point Fragments

Specimen 1 from 41GR303 is a midsection of a finely flaked biface (Fig. 57c). It is 6 mm thick and is very long (49 mm) for its width (20 mm). The blade edges are well worked, and one face has very fine parallel flaking. The distal and proximal ends are fractured laterally, probably a result of impact. A notched flake off one edge may be an impact fracture or may be postdepositional damage. It is probably a midsection of a dart point. It is made of a very fine quality, light gray Edwards chert.

Specimen 2 from 41GR325 is a triangular distal biface fragment. It is 29 mm long, 22 mm wide, and 6 mm thick. The lateral edges are slightly convex and finely flaked. The fragment is probably a dart point tip. The longitudinal fracture may have been caused by impact. The material is mottled Potter chert.

Specimen 3 from 41KT42 is a triangular-shaped distal biface fragment. It is symmetrical and well worked. The lateral edges are very slightly convex, and the proximal end terminates in a smooth lateral fracture, probably an impact snap fracture. The fragment is 46 mm long, 29 mm wide, and 7 mm thick. It is probably a dart point distal fragment. It is made of dark gray Edwards chert which is very heavily patinated on one side and moderately patinated on the other.

SMALL OVATE BIFACES

Three small ovate bifaces were collected. These specimens are small ovals or slightly pointed ovals which are most likely manufacturing preforms. They are all secondary trimmed, and one is unquestionably a manufacturing failure that broke during the later stages of reduction.

Specimen 1 from 41GR250 lacks the distal tip (Fig. 57d); it probably was broken during manufacture. The biface is roughly oval in shape, 31 mm in extant length, and 21 mm in width. It is 8 mm thick, except for a large knot along one edge where it is about 11 mm thick. The biface was probably discarded when attempts to remove the knot were unsuccessful or when the distal tip snapped. It is made of gray Edwards chert.

Specimen 2 from 41GR277 is an small, asymmetrical, oval biface; it is 32 mm long, 22 mm wide, and 9 mm thick. All edges are bifacially worked, and one edge may exhibit slight use-wear. It could have been used as a small scraper or it may be a preform. It is made of light gray and white Edwards chert.

Specimen 3 from 41GR334 is a small oval biface, slightly pointed at one end. It is 33 mm long, 22 mm wide, and 8 mm thick. The thickest part of the biface is along one edge and, like Specimen 1, it appears to be a manufacturing failure in which the knapper failed to thin a knot along the edge. There is no evidence of use-wear, and the biface was probably discarded. It is made from a small stream-worn pebble of Edwards chert. Cortex is present in the center of one face.

SMALL SUBTRIANGULAR BIFACES

Two small tear drop-shaped subtriangular bifaces were collected. These may be small specialized tool forms, or they may be preforms. They may also be exaggerated barbs broken

from large early Archaic dart points (i.e., Andice barbs). Slight use-wear on the distal tip of one specimen suggests that they may be specialized tools.

Specimen 1 from 41GR325 is a small subtriangular biface broken at the distal end (Fig. 57e). It measures 28 mm in length, 15 mm in width, and 5 mm in thickness. One edge is convex, the other edge is straight, and the base is rounded. No use-wear is evident. It is made of an unidentified, possibly patinated white chert.

Specimen 2 from 41GR560 is a small subtriangular biface which has a rounded distal tip showing slight use-wear (Fig. 57f). One edge is concave, the other edge is convex, and the base is rounded. The specimen is 31 mm long, 14 mm wide, and 6 mm thick. It is made of light pink and white heat-treated Edwards chert.

BIFACIAL GOUGES

Bifacial gouges are similar in most respects to unifacial gouges. They are chisel-like planing tools, triangular to rectangular in outline with straight or slightly convex bit edges, and are planoconvex in longitudinal outline with steeply beveled bit edges. The primary difference between bifacial and unifacial gouges is that unifacial gouges utilize a smooth ventral flake surface and are planoconvex in lateral cross section, while bifacial gouges are worked to a relatively smooth planar surface on the ventral face. The planar surface of bifacial gouges is strongly convex, while the dorsal surface is moderately convex; the lateral cross section is lenticular.

Four bifacial gouges were collected. All are very similar in morphology and apparent use-wear. Wear on the butt end and lateral edges of two of the specimens represents possible evidence of hafting.

Specimen 1 from 41GR263 is roughly triangular in outline; the bit is steep (ca. 80°) and is lightly worn. It is 70 mm long, 40 mm wide, and 24 mm thick. The edges are retouched and shaped. It is made of an unidentified reddish brown quartzite (or basalt). No cortex is present. The material is fairly grainy and does not show use-wear well.

Specimen 2 from 41GR456 is triangular in shape, relatively short, and extensively worn. It is 54 mm long, 44 mm wide, and 19 mm thick. The bit is very steep (ca. 75°), and the lateral edges are retouched and shaped. The longitudinal cross section is planoconvex, but the ventral face has a thick longitudinal ridge. The lateral cross section is strongly lenticular in shape. The specimen is made of light gray, banded Edwards chert, and no cortex is present. The bit is fractured and undercut. Light polish on the butt represents possible haft-wear.

Specimen 3 from 41KT49 is a long subtriangular bifacial gouge (Fig. 58a). It is 84 mm long, 42 mm wide, and 23 mm thick. The lateral edges are battered and irregular, but the bit is well worn. The bit angle is ca. 60-65°. The gouge was discarded or lost after being used extensively but before the bit was resharpened. The butt and several projecting points along the proximal portion of the lateral edges are worn, suggesting the possibility of haft-wear. Cortex extends all along the thick longitudinal ridge on the ventral side. It is made of an unidentified yellow chert, probably obtained from local Quaternary gravels.

Figure 58. Gouges. (a-b) bifacial gouges, 41KT49; (c-d) unifacial triangular gouges, 41GR263.

Specimen 4, also from 41KT49, is very similar in morphology to Specimen 3. This gouge is somewhat irregular in shape but is roughly triangular (Fig. 58b). It is 70 mm long and 42 mm wide. This specimen is different in that it is thickest (21 mm) near the butt and is only about 15 mm thick near the bit. The ventral face retains a small amount of cortex; the material is an unidentified reddish brown quartzite (or basalt). It is grainy and does not show use-wear well, but some use-wear is evident along the bit. The bit angle is ca. 65°.

BIFACIAL GOUGE PREFORMS

Two specimens are similar in morphology to the bifacial gouges but have little or no use-wear on the bit. Both exhibit some flaw which suggests that they are manufacturing failures.

Specimen 1 from 41GR309 is roughly triangular in shape, 88 mm long by 44 mm wide. The steep bit (ca. 75°) is only primarily trimmed. The entire biface is very thick (33 mm), and one edge is battered from striking platform preparation. A large flake removed near the distal end appears to have destroyed part of the bit edge. The tool was probably discarded in this preform stage. It is made of Potter chert, and it retains some cortex on the ventral face.

Specimen 2 from 41GR332 is similar to but smaller than Specimen 1. It is 60 mm long, 35 mm wide, and 24 mm thick. The butt consists of a flat cortex striking platform, and there is a remnant of either patina or cortex on both faces. The tool is only primary trimmed, and a large flake removed from one side near the distal end probably represents a manufacturing failure, at which point the biface was probably discarded. It is made of Potter chert. The bit angle is ca. 80-90°.

OVATE BIFACIAL SCRAPERS

Three specimens are functionally oval unifacial scrapers, but the ventral faces of the tools are also worked. They are ovate in shape, planoconvex in both longitudinal and lateral cross section, and have unifacial secondary trimming on one or more lateral edge.

Specimen 1 from 41GR13 is oval, measures 64 mm long, 37 mm wide, and 16 mm thick, and retains a remnant of a cortex striking platform on the proximal end. It is made from a secondary flake which has been primary trimmed on the ventral surface; its dorsal surface is secondary trimmed and utilized and retains some cortex. The distal end (bit) and one convex edge are well trimmed or utilized, and the opposite edge is battered or damaged and irregular. It is made of an unidentified white chert which may be a variety of Edwards chert.

Specimen 2 from 41GR263 is oval and measures 50 mm long, 36 mm wide, and 15 mm thick. The proximal butt end consists of a prepared striking platform. This tool is fashioned from a tertiary flake which has been primary trimmed on its ventral face and secondary trimmed on the dorsal face. It is made of unidentified, medium-grained black basalt; use-wear is not apparent. The butt is slightly pointed, and all edges have been worked and/or utilized.

Specimen 3, also from 41GR263, is an oval scraper measuring 56 mm long, 34 mm wide, and 15 mm thick. The butt is formed by a cortex striking platform, and the ventral flake surface has been primary trimmed. The dorsal face is secondary trimmed or utilized on both lateral edges. The distal tip is broken. The specimen is made of an unidentified chert which has been intensively heat fractured and discolored. A small amount of cortex is present on the dorsal face.

BIFACIAL END SCRAPERS

Two items are bifacial tools which have retouch and use-wear concentrated on the distal end. Specimen 1 from 41GR340 is a circular secondary flake that retains a cortex striking platform along one edge. It has been primary trimmed on the ventral flake surface; the dorsal face has been trimmed, worked, and utilized on the convex distal edge. The specimen is 46 mm long, 44 mm wide, and 11 mm thick. It is made of gray and brown mottled Edwards chert.

Specimen 2 from 41GR376 is an irregularly shaped (roughly square) scraping tool which is secondary trimmed on both faces. The convex distal edge is steeply beveled, unifacially flaked, and utilized; the opposite edge is fractured and damaged. The fragment is 32 mm long, 33 mm wide, and 10 mm thick. It is made of a fine quality, dark gray Edwards chert.

MISCELLANEOUS BIFACES

Five specimens are bifacial tools which do not fit any category well. They are all roughly triangular or ovate in shape and are probably either preforms or manufacturing failures.

Specimen 1 from 41GR263 is a pear-shaped biface. It is 52 mm long, 35 mm wide, and 18 mm thick. It is primary trimmed, and the edges are battered and step-fractured as if to prepare striking platforms. The edges are steeply beveled, and the biface is very thick in relation to its size. It may have been discarded because the knapper could not reduce the thickness of the piece effectively. It is made of Potter chert.

Specimen 2 from 41GR350 is a secondary flake of maroon Ogallala quartzite which is primary trimmed on the ventral flake face and along one edge of the dorsal face. Cortex covers more than half of the dorsal face. It is triangular in shape, 62 mm long, 44 mm wide, and 16 mm thick. The bifacial edge is battered and could have resulted either from use-wear or platform preparation. There is no obvious use-wear on the specimen, and it probably represents the early stages of biface reduction.

Specimen 3 from 41GR441 is a triangular biface of brown, tan, and white banded Edwards chert. Several flake facets exhibit a glossy sheen, indicating that the material was probably heat treated. It is 51 mm long, 27 mm wide, and 12 mm thick. The thickest portion is along one lateral edge. It appears that several unsuccessful attempts were made to remove a thick knot along the thick edge. The biface was probably discarded as a manufacturing failure.

Specimen 4 from 41GR446 is a pointed oval biface of maroon Ogallala quartzite. It retains a prepared striking platform on the proximal end and is probably in the later

stages of secondary trimming. The edges are well shaped, and the biface is 49 mm long, 29 mm wide, and 10 mm thick. There is, however, a thick knot along one edge near the proximal end. It is possible that this biface was a finished tool, but fracturing along the edge of the knot suggests it was still in the manufacturing stages. It may be a discarded projectile point preform.

Specimen 5 from 41GR456 is a pointed oval biface of red and white mottled Tecovas jasper; it is 43 mm long, 31 mm wide, and 14 mm thick. This biface may have been a preform, but thick knots and inclusions on the proximal end rendered further reduction impractical. The distal tip is somewhat worn and polished. The biface was probably utilized, at least temporarily, as a tool of undetermined function.

Unifacial Tools

Unifacial tools are artifacts with flakes removed from one face only. A total of 92 unifacial tools were collected (see Table 40). Of these, many are recognized as general types of tools, such as gouges, and are classified by tool type. Others are considered to be scrapers because of intentional shaping and are classified by the nature of the worked edge(s). Still others are less formal types of tools which are not intentionally shaped and can only be considered as retouched and/or utilized or edge-trimmed flakes. The categories into which the unifacial tools are classified include gouges (triangular, rectangular, and preform), rectangular planar tools, end scrapers (snub-nosed, miscellaneous, and preform), unilateral scrapers, bilateral scrapers, miscellaneous ovate scrapers, miscellaneous rectangular scrapers, denticulate, concave retouched/utilized flakes, and unifacially edge-trimmed flakes.

The terms gouge and scraper as used in this classification do not necessarily imply a specific function or method of using the tool. They are used here because they are the terms most commonly employed to refer to particular recognizable types of tools. No detailed use-wear analysis was performed, and precise functional assessments are beyond the scope of this study.

GOUGES

Triangular

Triangular gouges, also commonly called Clear Fork gouges (Ray 1941; Turner and Hester 1985:205-208), are triangular to subtriangular in outline, planoconvex in longitudinal cross section, and have a steep bit (Table 45). The edge of the bit is usually straight but varies from slightly convex to concave. The bit may exhibit visual use-wear and may be undercut relative to the bit angle. The thickest portion of the tool is generally toward the distal end, just behind the bit edge. A thick ridge usually runs longitudinally across the dorsal surface from the proximal end (butt) to the distal end (bit). The ventral surface is moderately to very flat. The lateral edges are usually only primary trimmed.

The tools range widely in size, stage of reduction, and quantity of use-wear. The edge angles of the bits cluster from 60° to 75° but may vary considerably. Limited use-wear analysis and replicative experiments have indicated that Clear Fork gouges were used

TABLE 45
METRIC DATA FOR UNIFACIAL GOUGES*

Type	Site	Thickness	Maximum Length	Maximum Width	Approximate Bit Angle
<u>Triangular</u>					
Specimen 1	41GR207	62	44	20	75°
Specimen 2	41GR263	14	49	31	60°
Specimen 3	41GR263	12	41	44	65°
Specimen 4	41GR303	20	58	39	80-85°
Specimen 5	41GR309	14	51	41	55-70°
Specimen 6	41GR338	20	60	38	78°
Specimen 7	41GR338	21	60	42	75°
Specimen 8	41GR345	16	61	44	73°
Specimen 9	41GR350	33	86	48	60°
Specimen 10	41GR376	18	45	40	68°
Specimen 11	41GR376	16	52*	43	60°
Specimen 12	41GR381	24	75	54	75-90°
Specimen 13	41GR384	24	67	49	70°
Specimen 14	41GR388	14	53	47	70°
Specimen 15	41GR393	23	55*	41	68°
Specimen 16	41GR393	21	42	37	75°
Specimen 17	41GR408	20	67	46	65°
Specimen 18	41KT37	19	50	40	60°
<u>Rectangular</u>					
Specimen 1	41GR350	18	54	41	75°
Specimen 2	41GR364	16	60	49	65°
Specimen 3	41GR381	17	55	50	68°
Specimen 4	41GR383	18	55	43	55-65°
Specimen 5	41GR393	19	45	50	70°
Specimen 6	41KT39	27	62	46	70-90°
Specimen 7	41KT80	17	59	42	60°
<u>Preforms</u>					
Specimen 1	41GR302	24	65	47	70°
Specimen 2	41GR393	24	62	48	60-70°

All measurements are in millimeters; an asterisk () indicates a measurement of an incomplete specimen.

primarily as woodworking tools (Howard 1975; Turner and Hester 1985:205). They are thought to have been hafted for most planing tasks (Howard 1975). Gouges are diagnostic of the Archaic, especially the early and middle Archaic periods.

Eighteen triangular gouges were collected. They range in size from an exhausted specimen (41 mm long, 44 mm wide, and 12 mm thick) from 41GR263 to an extremely large example (86 mm long, 48 mm wide, and 33 mm thick) in the early stages of use from 41GR350. The materials from which the gouges are made also vary, but there is a definite preference for coarse-grained materials, including Potter chert, Ogallala quartzites, and black basalt. Potter chert was decidedly favored, possibly because of its abundance but also because it is an extremely hard and durable material. Only one specimen is made of Edwards chert. Specimen 17 from 41GR408 illustrates the stereotypical morphology of a unifacial Clear Fork gouge. Characteristic use-wear on these specimens is similar to that found on gouges from southern Texas (Hester et al. 1973; Chandler 1974). The diagnostic use-wear is nibbling and smoothing of the worked edges. The lateral edges are smoothed, either to facilitate hafting or as a result of having been hafted during use. Longitudinal use-polish striations on the bits indicate that the tools were probably used in a planar gouging fashion (Howard 1975). No use-wear studies of the Justiceburg specimens have been attempted, but a cursory examination suggests that the wear is very similar to previously reported examples. Variations among the gouges include specimens which retain cortex over the ventral surfaces (e.g., Specimen 13 from 41GR384); morphologically, these resemble southern Texas specimens reported by Chandler (1974) and the Gossett gouges of northeastern Texas (Story 1965).

Specimen 1 from 41GR207 has a very flat ventral flake surface with a slight bulb of percussion on the butt end. All edges of the dorsal face are trimmed and shaped. The bit is straight and worn. There is cortex remnant on the dorsal face. The material is Potter chert.

Specimen 2 from 41GR263 is made of dark gray Potter chert which appears to have been heat treated and retains no cortex. This small gouge has a straight bit (Fig. 58c). The butt retains a striking platform, and the ventral flake surface is very flat.

Specimen 3, also from 41GR263, is short and has been reworked until it is exhausted (Fig. 58d). The butt retains a striking platform, and the ventral flake face is convex. The dorsal side is primary trimmed on all edges and retains cortex in the central area. This gouge is made from a primary flake of Potter chert.

Specimen 4 from 41GR303 is made of Potter chert with no cortex present. The butt retains a striking platform; the ventral face is irregular and damaged along the distal end. The bit is irregular and slightly concave. One lateral edge is trimmed; the other is not.

Specimen 5 from 41GR309 is made on a tertiary flake of Potter chert. The flat ventral surface has a slight bulb of percussion on one lateral edge. The bit is nearly straight or very slightly convex. The lateral edges are trimmed, and there is a notch on one side near the bit. The notch does not appear to have been intentional.

Specimen 6 from 41GR338 is made from a stream-worn nodule of an unidentified black basalt. The nodule is naturally planoconvex in shape, and the gouge is worked unifacially only on the bit and distal three-quarters of both lateral edges. The ventral face is flat

and entirely covered with cortex; the butt and longitudinal ridge on the dorsal face are also covered with cortex.

Specimen 7, also from 41GR338, is made from a primary flake of maroon Ogallala quartzite. The butt retains a prepared striking platform, and the ventral flake surface is convex. The dorsal face is trimmed along the lateral edges. The straight bit is worn and damaged. The thick longitudinal ridge on the dorsal side is covered with cortex.

Specimen 8 from 41GR345 is made on a primary flake of Potter chert (Fig. 59a). The ventral surface of the gouge is flat and completely covered with cortex. The dorsal face is trimmed on both lateral edges, and the bit is straight.

Specimen 9 from 41GR350 is the largest gouge collected. It is made of a greenish Ogallala quartzite. The flat ventral surface is covered with either cortex or patina on an old flake surface. The dorsal face retains some thick cortex and patina; it is trimmed on the distal lateral edges and bit. The thick dorsal ridge is battered as if the knapper attempted to reduce the thickness. The bit is straight and exhibits minimal wear. The gouge was probably in the early stages of use.

Specimen 10 from 41GR376 is made from a primary flake of Potter chert (Fig. 59b). The ventral flake surface is slightly convex. The butt consists of a cortex striking platform, and cortex covers the thick dorsal longitudinal ridge to near the bit. The lateral edges are primary trimmed and possibly worn (haft wear?). The bit is slightly convex and shows wear and damage.

Specimen 11, also from 41GR376, is made from a primary flake of light gray Ogallala quartzite. The ventral surface of the gouge is covered with cortex on the distal end and exhibits a flake scar on the proximal end; these combine to produce a recurved ventral surface. The dorsal face is primary trimmed and worn along the bit; a permanent dorsal ridge is lacking. This specimen differs in that the striking platform has been trimmed from the butt.

Specimen 12 from 41GR381 is made on a secondary Potter chert flake with a small amount of cortex on the dorsal face. The ventral surface is a flat patinated flake surface. The dorsal face is trimmed on both lateral edges, and the bit is straight. Wear has resulted in a steep right angle in the center of the bit.

Specimen 13 from 41GR384 is made on a primary flake of pink Ogallala quartzite. The ventral surface is slightly convex and is completely covered with stream-worn cortex. The dorsal face is primary trimmed, and there may be some wear on the proximal lateral edges (haft-wear?). The bit is straight and shows use-wear.

Specimen 14 from 41GR388 is made from a primary flake of Edwards chert. The butt consists of a prepared striking platform. The ventral surface exhibits a bulb of percussion and an erailure. The flat ventral surface is slightly patinated; a few flakes removed from the distal end probably represent damage to the bit. The dorsal face retains remnant cortex on the longitudinal ridge and on portions of the lateral edges, which are primary trimmed. The slightly convex bit is irregular from wear and/or damage.

Specimen 15 from 41GR393 is made from light gray Ogallala quartzite. The gouge is damaged and part of the butt is missing. The ventral face consists of a flat flake

Figure 59. Unifacial Gouges. (a) triangular, 41GR345; (b) triangular, 41GR376; (c) triangular, 41GR408; (d) triangular, 41KT37; (e) rectangular, 41GR364; (f) rectangular, 41KT80.

surface; the dorsal face is trimmed on the lateral edges and has a straight bit. The bit is extensively damaged and exhibits use-wear.

Specimen 16, also from 41GR393, is made from a secondary flake of Potter chert. The butt retains a cortex platform, and there is cortex on much of the dorsal longitudinal ridge. The ventral surface is formed by a convex flake surface with a later intentional flake scar and primary trimming along much of one proximal edge. The dorsal face is trimmed on one edge, and the straight bit edge exhibits damage and use-wear.

Specimen 17 from 41GR408 (Fig. 59c) is probably the most stereotypical example of the form of a Clear Fork gouge collected but is atypical in its method of manufacture. It is made from a primary Potter chert flake; the point of impact is the distal bit end as opposed to the usual butt end. The ventral flake surface is the planar face of the gouge and is very flat with a slight convex area toward the butt. The bulb of percussion is not visible; it was removed to fashion the bit. Approximately one-third of the dorsal face retains cortex along the longitudinal ridge extending from the butt to the thickest part of the gouge at the top of the bit. Unifacial primary trimming extends along both lateral edges, and slight secondary trimming occurs on the proximal end. The concave bit is shaped from resharpening or use. Use-wear along the lateral edges may have resulted from hafting; it is more apparent than that on the bit, probably because of resharpening.

Specimen 18 from 41KT37 is made from a primary flake of Potter chert (Fig. 59d). The ventral face retains a bulb of percussion at the butt; the planar surface is twisted but relatively smooth. The dorsal face is trimmed along one lateral edge, while the opposite edge is trimmed only toward the distal end. Cortex is present on part of the longitudinal ridge. Use-wear is very evident on the slightly concave bit.

Rectangular

Rectangular gouges are similar in most respects to, and probably represent variations of, triangular gouges except that they have a relatively wide proximal end or butt creating a more rectangular shape. Seven complete and fragmentary specimens collected are classified into this category (see Table 45). Like the triangular gouges, these are made from a variety of materials, but coarse-grained materials seem to have been preferred. Four are of Potter chert, two are of unidentified quartzites, and two are of unidentified cherts. All retain some cortex and are stream gravels. Only the Potter chert is known to be of local origin.

Specimen 1 from 41GR350 has a relatively flat ventral surface but no apparent associated flake features. The steep bit on the dorsal face is obviously worn and damaged, and one lateral edge which is less steeply beveled also exhibits apparent use-wear. The opposite edge is not trimmed and is formed by a single flake surface. This tool is most likely complete, and the steep bit represents the primary working edge. Cortex covers most of the center of the dorsal face. It is made of an unidentified fine-grained quartzite.

Specimen 2 from 41GR364 is made from a primary flake of Potter chert (Fig. 59e). The butt retains a cortex platform, and the ventral flake surface is slightly convex with minor damage or secondary trimming near the cortex platform. The dorsal surface retains cortex near the butt. The lateral edges are primary trimmed, and the trimmed bit exhibits evident use-wear.

Specimen 3 from 41GR381 is fragmentary; it is made from a primary flake of an unidentified chert. Viewed from the dorsal face, the left corner of the butt is broken. The ventral face is stream-worn cortex. The dorsal face is trimmed on the lateral edges; the bit exhibits obvious use-wear. The right lateral edge is more steeply beveled than the bit, but this may have resulted from the shaping process. The bit is slightly convex.

Specimen 4 from 41GR383 is made from a primary flake of an unidentified yellow chert. The ventral face is an irregular flake surface. The dorsal face is almost completely covered by cortex except for the trimmed left lateral edge, the bit, and the distal half of the right lateral edge. Some use-wear is evident on the slightly convex bit and on the trimmed lateral edges. The butt is neither squared nor pointed, but the specimen is more rectangular than triangular in outline.

Specimen 5 from 41GR393 is a secondary Potter chert flake with an irregular ventral flake surface. The dorsal face retains cortex near the distal end. The gouge is an irregular rectangular shape; it is narrower at the butt and is wider than it is long. The lateral edges are trimmed, and the convex bit edge exhibits apparent use-wear.

Specimen 6 from 41KT39 is a secondary flake of Potter chert with limited cortex remaining on the dorsal face and a cortex striking platform on the butt. The ventral face is a flat flake surface, and there is a prominent thick longitudinal ridge on the dorsal face. The lateral edges are primary trimmed. The bit is extremely worn, and there is a prominent concave notch in its center. The worn notch undercuts the thick dorsal ridge, resulting in a very steep bit angle.

Specimen 7 from 41KT80 is made from an unidentified gray chert with quartz vugs (Fig. 59f). Some cortex is present on the dorsal face. The ventral face is a smooth undulating flake surface. The dorsal face is well trimmed on all edges. The bit is straight.

Preforms

Two specimens are morphologically similar to the gouges, but no apparent use-wear or damage is visible on the steep bits. These are most likely unfinished gouge preforms (see Table 45).

Specimen 1 from 41GR302 is a rectangular primary flake of coarse-grained Potter chert. The ventral face is a rough, flat flake surface. The dorsal face is entirely covered with cortex except for limited trimming along one lateral edge and a single flake removed across the distal end. The bit exhibits no apparent use-wear or trimming.

Specimen 2 from 41GR393 is a very grainy, rectangular piece of silicified wood which is flat and unworked on its ventral face and is primary trimmed on all four edges of the dorsal face. The longitudinal ridge is very thick but retains no cortex. Use-wear may be present along some edges, but the coarse-grained material does not show this well.

RECTANGULAR PLANAR TOOLS

Nine specimens are rectangular-shaped unifacial tools which have steep worked/utilized edges but differ from rectangular gouges in that they have more than one preferred bit edge. Functionally, these tools are probably very similar to gouges, but there is less

pattern in their morphology, they have two or more utilized edges, and it is not apparent which edge represents the primary working edge. Like the gouges, these planar tools are made of various materials, but coarse-grained materials were preferred. Six are made of Potter chert, one of dark green Ogallala quartzite, and two of Edwards chert.

Specimen 1 from 41GR33 is a secondary flake of mottled Potter chert. The ventral surface is an irregular flake surface. A bulb of percussion originates from a lateral edge rather than the butt, and the striking platform has been trimmed away. The dorsal face retains cortex along a central longitudinal ridge. It is roughly pointed on the butt and is worked or worn on the bit and both lateral edges. This specimen is 26 mm thick, 54 mm long, and 44 mm wide.

Specimen 2 from 41GR240 is a tertiary flake of Potter chert; it exhibits a smooth convex surface that lacks obvious flake features on the ventral face. The dorsal face is thick and irregular, but the tool is worked or utilized on all edges except for a large knot along one lateral edge. It is 26 mm thick, 44 mm long, and 37 mm wide.

Specimen 3 from 41GR332 is a secondary flake of Potter chert with a smooth convex ventral flake surface that exhibits a bulb of percussion originating from a prepared striking platform at the butt. The dorsal face is partially covered with cortex; the distal end and one lateral edge are worked or utilized. It is 27 mm thick, 50 mm long, and 44 mm wide.

Specimen 4 from 41GR335 is a secondary flake of Potter chert that lacks the proximal end. The ventral surface is flat, and the dorsal surface is partially covered with cortex. The tool is worked and utilized primarily on the distal end and one lateral edge. It is 21 mm thick, 52 mm long, and 47 mm wide.

Specimen 5 from 41GR366 is a tertiary flake of dark green Ogallala quartzite. The ventral surface is flat, but there are no obvious flake features. The dorsal face is thick and worked or utilized on three edges. The unworked edge, the proximal end of the tool, is probably a striking platform. It is 25 mm thick, 52 mm long, and 40 mm wide.

Specimen 6 from 41GR373 is a very large rectangular tool worked and utilized uniaxially on four edges. It is made of Potter chert, and the proximal edge retains some cortex. The tool is wider than it is long. Its ventral surface is a smooth convex flake surface with no apparent flake features. Use-polish is present on all the edges but is most pronounced on the proximal edge. This specimen is 38 mm thick, 65 mm long, and 74 mm wide.

Specimen 7 from 41GR383 is a secondary flake of Edwards chert with only a small cortex remnant near the striking platform. The ventral surface is convex with a bulb of percussion originating from the proximal end. The dorsal surface is worked or utilized on the distal end and both lateral edges. The primary use-wear seems to be on the lateral edges. This specimen is 19 mm thick, 48 mm long, and 42 mm wide.

Specimen 8 from 41GR393 is a secondary flake of Edwards chert. The ventral surface is convex, but the proximal end (striking platform) of the flake is not present. The dorsal face is partially covered with cortex remnants, and the tool is worked or utilized on all edges; none seem to be worn to a greater extent than the others. It is 18 mm thick, 37 mm long, and 35 mm wide.

Specimen 9, also from 41GR393, is a secondary flake of Potter chert which is pinkish in color and probably is heat treated. The proximal end of the tool is a large cortex platform, and the ventral flake surface is slightly convex with a shattered bulb of percussion. The tool is worked or utilized on the distal end and both lateral edges, but none seem to be worn more than the others. It is 24 mm thick, 53 mm long, and 48 mm wide.

END SCRAPERS

Twenty specimens are classified as end scrapers or end scraper preforms. These tools are unifacially trimmed flakes with steep convex bits generally positioned on the distal end of the flake opposite the bulb of percussion. Unlike gouges, finer grained materials seem to be preferred for these tools; 16 specimens are made of Edwards chert, 1 of Potter chert, 1 of unidentified chert, and 2 of coarse-grained Ogallala quartzite.

Snub-nosed

Specimens 1 through 3 are typical of the "keeled" or "snub-nosed" end scrapers widely considered to be Late Prehistoric hafted bison-hide-scraping tools (Wedel 1970). These specimens are planoconvex in longitudinal cross section but have a slight concavity to the ventral flake surface. They are pointed oval (or teardrop) in outline and have well-defined, steep convex bits on the distal end.

Specimen 1 from 41GR368 has a concave ventral flake surface. Contrary to most similar tools, the striking platform was trimmed away to form the distal end, or bit. The direction of flake removal is indicated by undulating stress ripples along the planar ventral face. The dorsal surface is convex and is primary trimmed on the proximal end and lateral edges. The bit on the convex distal end is well worn and is slightly undercut (a result of resharpening) along the edge. It is made of Edwards chert; no cortex is present. This specimen is 14 mm thick, 58 mm long, 39 mm wide, and has a bit angle of 80°.

Specimen 2 from 41KT53 is a tertiary flake of Edwards chert (Fig. 60a). The proximal end is a striking platform, and the concave ventral flake surface retains a well-defined bulb of percussion, erailure, and concentric ripple marks. The dorsal face is primary trimmed on the lateral edges, and some slight use-wear or haft-polish is evident. The bit on the convex distal end is worn and resharpened. This specimen is 14 mm thick, 59 mm long, 38 mm wide, and has a bit angle of 70-80°.

Specimen 3 from 41KT75 has a concave ventral flake surface; the proximal end is formed by a prepared striking platform (Fig. 60b). There is a very prominent scar where an erailure flake removed the bulb of percussion. The proximal end of the dorsal surface is covered with cortex. The lateral edges are primary trimmed, and some use-wear or possible haft polish are evident. The convex distal bit is very steep, is worn, and appears to have been resharpened repeatedly. Made of Edwards chert, this specimen is 17 mm thick, 49 mm long, 44 mm wide, and has a bit angle of 75°.

Specimen 4 from 41KT83 is a very small triangular-shaped end scraper with a convex bit which forms a sharp angle (about 70°) with either lateral edge (Fig. 60c). Indeed, one corner of the bit is probably a spur, a feature common to various scraper groups associated with Paleoindian assemblages (Judge 1973:92-96). The proximal end is formed by a cortex platform. The ventral flake surface is slightly concave (almost flat) and exhibits a

Figure 60. Unifacial End Scrapers. (a) snub-nosed, 41KT53; (b) snub-nosed, 41KT75; (c) snub-nosed, 41KT83; (d) miscellaneous, 41GR303; (e) miscellaneous, 41GR393; (f) miscellaneous, 41GR566.

poorly defined bulb of percussion. The dorsal face retains a small amount of cortex near the center. The lateral edges are primary trimmed, and much use-polish (probably haft-polish) is evident. The bit is well shaped and very symmetrical. The undercut bit edge exhibits much less use-polish than the lateral edges, indicating resharpener. Made of Edwards chert, it is 9 mm thick, 26 mm long, 20 mm wide, and has a bit angle of 75°.

Miscellaneous

These 14 specimens are complete or fragmentary end scrapers which are morphologically less distinctive but functionally similar to snub-nosed end scrapers. A few of these share some of the same attributes as the snub-nosed end scrapers.

Specimen 1 from 41GR264 is a flake fragment with a steep concave unifacial bit. The bit is on the proximal end of the flake, with concentric ripples extending outward along the ventral surface. The proximal end is broken, and an attempt may have been made to rework it. This tool probably is the distal end fragment of an oval end scraper. It is 33 mm wide and 9 mm thick, but its original length is unknown. It is made of Edwards chert.

Specimen 2 from 41GR269 is an irregular oval-shaped fragment worked on all edges. The ventral surface is slightly concave. The dorsal face is partially covered with cortex. The primary working edge is a steep, convex, beveled edge on the distal end. The tool is 39 mm long, 35 mm wide, and 12 mm thick and is made of Edwards chert.

Specimen 3 from 41GR277 is a very small triangular scraper of Edwards chert. The pointed proximal end is formed by a striking platform. The ventral flake surface is almost flat but has fresh retouching on part of the distal end. The dorsal face also has fresh retouching or resharpener on the distal end and part of one lateral edge. Both lateral edges are well polished (probably haft-polish) toward the proximal end. Both faces exhibit patina which is lacking on the resharpened distal end. The specimen is made of Edwards chert. This tool is similar to snub-nosed end scraper Specimen 4 except it is cruder and much less symmetrical. It is 37 mm long, 24 mm wide, and 10 mm thick.

Specimen 4 from 41GR279 is a thin secondary cortex flake of Edwards chert which is about twice as wide (62 mm) as it is long (32 mm) and 11 mm thick. The ventral flake surface has an erillure scar but no bulb of percussion. Cortex covers the distal half of the dorsal face. The proximal and distal edges are trimmed, but the two lateral edges are worked into steep, concave bits.

Specimen 5 from 41GR303 is a tertiary flake of banded white and red unidentified chert (Fig. 60d). It possibly is Alibates agate, but it is not typical of the material and is heavily patinated on the dorsal face. The proximal end is a striking platform, and the ventral flake surface exhibits a bulb of percussion and erillure scar. The dorsal face is extensively worked and utilized on the convex distal end, but the lateral edges are poorly trimmed. The tool is an irregular oval shape which tapers to the proximal end. The distal end has use-polish along the working edge; probable use-polish (or haft-wear) occurs on the proximal lateral edges. The specimen is 37 mm long, 34 mm wide, and 12 mm thick.

Specimen 6 from 41GR309 consists of a distal bit fragment of an oval end scraper. It is made of Edwards chert and is broken in a very irregular fracture that is probably due to rejuvenation failure. The thickness and length of the tool are unknown. It is approximately 39 mm in width. The ventral flake surface is smooth, slightly concave, and moderately patinated.

Specimen 7 from 41GR329 is a thick, pointed oval end scraper of Edwards chert. The proximal end consists of a cortex striking platform, and a poorly defined bulb of percussion is visible on the smooth, concave, ventral flake surface. A thick longitudinal ridge extends from the proximal end to near the bit edge on the dorsal face. The ridge has been battered in order to dull the edge or to reduce the thickness. The primary wear and damage is on the steep, convex bit edge, but the straight lateral edges are also primary trimmed and/or worn. This rather large specimen is 70 mm long, 42 mm wide, and 22 mm thick.

Specimen 8 from 41GR336 is a small tertiary flake fragment of Edwards chert. It appears to represent a large flake or small core used during an earlier period. The flake or core was later used to manufacture a tool after it had weathered on one or more faces. The concave ventral surface is moderately patinated and unifacially trimmed along both lateral edges. The dorsal surface is sparsely trimmed on the proximal end, and the distal end consists of a steep convex bit that exhibits resharpening scars and use-wear. An off-center, moderately pronounced dorsal ridge extends from the proximal end to the bit. The tool is subrectangular in shape and measures 30 mm long, 20 mm wide, and 7 mm thick.

Specimen 9 from 41GR339 is a secondary flake of pinkish gray Ogallala quartzite. The flake is complete except for a diagonal truncation on the proximal end which removed the striking platform. The tool is oval in shape with a flat ventral surface. The dorsal surface retains cortex on more than half of the proximal end. All edges are trimmed except for the truncated edge. The convex distal end has obvious use-polish along the edge. The length is 51 mm, the width is 42 mm, and the thickness is 16 mm.

Specimen 10 from 41GR376 is an irregular oval-shaped, tertiary flake of Edwards chert. The proximal end is a striking platform, and the concave ventral surface has a pronounced bulb of percussion. The dorsal face is poorly worked except on the distal end. The lateral edges are minimally trimmed, and only the convex bit edge is retouched. Use-polish and step-fracturing are very pronounced along the bit. The tool is 37 mm long, 28 mm wide, and 7 mm thick.

Specimen 11 from 41GR393 is an oval end scraper (Fig. 60e) made of maroon Ogallala quartzite. The ventral surface is flat, and no flake attributes are visible. The proximal end is formed by a diagonal flake scar that resulted from removal of the striking platform. The dorsal face has a cortex remnant near the center. The lateral edges and the convex distal end are worked and possibly worn, although use-wear does not show well on this quartzite. The specimen is 53 mm long, 49 mm wide, and 23 mm thick.

Specimen 12 from 41GR406 is an end scraper with the convex bit located on the side opposite the striking platform. It is much wider (51 mm) than it is long (38 mm) and was probably hand-held rather than hafted. The 16-mm-thick specimen is made from a primary flake of Edwards chert. The proximal end consists of a cortex striking platform; a corresponding bulb of percussion and concentric ripples extend along the ventral surface. The dorsal face is completely covered with cortex except for the steep bit, which is worn and undercut.

Specimen 13 from 41GR456 is a split pebble core of tan Edwards chert. The unprepared striking platform on the proximal end is covered with cortex. The ventral flake surface is gently concave; a small hard-hammer percussion cone is visible on the proximal end. The dorsal face has a thick, battered, longitudinal ridge which appears to represent a former prepared striking platform before the pebble was split. The distal bit edge is irregularly

convex. The lateral edges are minimally trimmed, and the scraper may not necessarily have been a hafted tool. It is 51 mm long, 36 mm wide, and 24 mm thick.

Specimen 14 from 41GR566 is a tapered, oval-shaped end scraper with the working bit on the largest concave edge (Fig. 60f). The ventral surface is a flat flake surface with a possible erailure scar on one lateral edge. The dorsal face is partially covered with cortex. One lateral edge is trimmed into a shallow, concave scraping edge that terminates in a reworked spur at the juncture with the primary bit. The proximal end is trimmed. The distal (primary) bit is steep, resharpened, and undercut. The bit edge is gently convex, and the angle relative to the lateral edges suggests that the specimen was repeatedly resharpened. This specimen is 42 mm long, 32 mm wide, and 14 mm thick, and is made of Edwards chert. Two attributes of this specimen -- the reworked spur and the shallow concavity (spokeshave) along one lateral edge -- strongly suggest it is of Paleoindian affiliation (Judge 1973:92-96).

Preforms

Two specimens are preforms in the early stages of manufacture. They are primary trimmed, roughly ovate unifaces with slightly greater edge preparation on the convex distal end.

Specimen 1 from 41GR309 is a long oval flake of Potter chert. The proximal end of the flake is snapped off, possibly the result of a manufacturing failure. Roughly 75% of the dorsal surface is covered with cortex. Only portions of one lateral edge and the convex distal end are trimmed. The distal end (bit) exhibits either secondary trimming or possible use-wear. The specimen is 86 mm long, 46 mm wide, and 26 mm thick. It may have been utilized slightly and discarded, or it may be a manufacturing failure.

Specimen 2 from 41KT83 is a large, irregular tertiary flake. It is made of a poor grade of Edwards chert with many small inclusions and impurities and may have been discarded for that reason. The ventral surface is trimmed in some places, and no definite flake attributes are present. It is worked primarily along the large convex edge on the dorsal side. This edge is primary trimmed, jagged, and battered. Battering could be due to use of the flake as a chopping tool or to edge preparation for reducing the preform. The specimen is 78 mm long, 69 mm wide, and 25 mm thick.

UNILATERAL SCRAPERS

Five specimens are elongated flake scrapers which are unifacially worked, primarily along only one lateral edge. Four are made of Edwards chert, and one is of Potter chert.

Specimen 1 from 41GR303 is a secondary elongated flake of Edwards chert; a cortex platform remains on the proximal end (Fig. 61a). A pronounced bulb of percussion and erailure scars are visible on the ventral surface. The lateral edges are parallel, but one is longer than the other. The longer, slightly convex lateral edge is worked into a scraping bit on the dorsal face. The distal edge joins the longer lateral edge at about a 75° angle, forming a point. The distal edge is worked near the distal tip, forming what could be considered convergent scraping edges (Turner and Hester 1985:233). The worked edges are primary trimmed and retouched, but no use-polish is evident. The specimen is 52 mm long, 36 mm wide, and 13 mm thick.

Figure 61. Unifacial Scrapers. (a) unilateral, 41GR303; (b) bilateral, 41GR263; (c) bilateral, 41GR325; (d) bilateral, 41GR456; (e) ovate, 41KT47.

Specimen 2 from 41GR314 is an elongated secondary flake of Potter chert with limited cortex remaining on the dorsal surface and the distal end. The proximal end of the flake is a striking platform, and a bulb of percussion and erailure scar are visible on the ventral face. Only one lateral edge of the dorsal face is worked, while the other lateral edge consists of a smooth fracture. The bit or worked edge is gently convex except on the proximal end where one segment is shallowly concave. Use-polish occurs along the edge. The specimen is 60 mm long, 33 mm wide, and 13 mm thick.

Specimen 3 from 41GR338 is an elongated secondary flake of Edwards chert. The proximal end has been trimmed, removing the bulb of percussion, but an erailure scar is obvious

on the planar ventral surface. The proximal end is snapped along a transverse fracture. The dorsal face retains cortex along one slightly trimmed lateral edge. The other lateral edge is worked into a steeply beveled, slightly convex scraping bit. Use-wear or extensive retouch is apparent along the bit. It is 60 mm long, 33 mm wide, and 13 mm thick.

Specimen 4 from 41GR393 is a secondary flake of Edwards chert. It retains a cortex platform on the proximal end, and cortex covers about 25% of the dorsal face. The ventral face is thinned, and only part of the original flake surface remains. The dorsal face is retouched and/or utilized along one convex lateral edge. The distal end and the other lateral edge are damaged, possibly by postdepositional trauma. A thick dorsal ridge extends the length of the tool. The specimen is 59 mm long, 33 mm wide, and 17 mm thick.

Specimen 5 from 41GR508 is a large, thin, oval secondary flake of Edwards chert. The proximal end is a cortex striking platform; a bulb of percussion and erailure scar are visible on the ventral surface. Over 50% of the dorsal face is covered with cortex which extends across the proximal and distal ends and along one lateral edge. The opposite lateral edge is primary trimmed and utilized. This worked edge is straight and forms a low angle cutting edge. The tool is 70 mm long, 39 mm wide, and 9 mm thick.

BILATERAL SCRAPERS

Eight specimens are complete or fragmentary bilateral scrapers. Bilateral scrapers are elongated tools worked and utilized along both lateral edges. The scraper bits are usually worked onto the dorsal face of the host flake. These artifacts commonly are called side scrapers.

Specimen 1 from 41GR256 is an elongated secondary flake of Edwards chert. The proximal end of the flake is broken transversely, and the bulb of percussion is removed. The ventral surface is gently concave. A longitudinal ridge extends along the length of the dorsal surface; cortex remains on most of one side of the ridge. Both lateral edges are trimmed, forming a concave right lateral working edge and a convex left lateral working edge. The distal end of the flake is pointed but is not worked or utilized. The tool is 28 mm wide, 17 mm thick, and the remaining length is 59 mm.

Specimen 2 from 41GR263 is a tapered oval scraper worked along both lateral edges and the distal end (Fig. 61b). The proximal end consists of a cortex platform with an erailure scar on the ventral surface. The ventral face has been thinned by the removal of two flat flakes extending transversely near the distal end. The dorsal surface retains a slight amount of cortex on the proximal end. The distal edge is convex, and the lateral edges are straight. The primary working and utilization seems to have been along the lateral edges, but some use-polish is evident on the distal end. The tool is 70 mm long, 40 mm wide, and 11 mm thick. It is made of gray and tan Edwards chert with patches of red; a glossy luster suggests the material was heat treated.

Specimen 3 from 41GR309 is a large tertiary flake of maroon Ogallala quartzite. The proximal end is a striking platform, and the ventral surface is very flat with a poorly defined bulb of percussion. A longitudinal ridge extends the length of the dorsal face. Both lateral edges are retouched and/or utilized. The distal end is shaped into a point which could have been used as a graving tool. A concave notch on one lateral edge near the distal tip may have functioned as a spokeshave. Both lateral edges are convex. The specimen is 78 mm long, 40 mm wide, and 19 mm thick.

Specimen 4 from 41GR309 is a long oval flake fragment worked unifacially on three edges. The ventral surface is convex, but trimming has removed the striking platform and the flake attributes. A longitudinal ridge extends the length of the dorsal surface. One end of the flake, nearest the proximal end of the flake, is not worked. Postdepositional trauma resulted in the removal of part of the scraping bit along one edge. A worked notch in the other lateral edge may have functioned as a spokeshave. The specimen is 45 mm long, 20 mm wide, and 9 mm thick. The material is an unidentified, bluish black chert.

Specimen 5 from 41GR325 is a long oval tertiary flake (or flake blade) of Alibates agate (Fig. 61c). The material is a dark red or maroon with banding of white and pink that is typical of the "bacon striped" banded Alibates. The proximal end is a prepared striking platform; the ventral surface exhibits a prominent bulb of percussion but no erailure scar. The ventral surface is gently concave; a few lateral flake scars resulting from use occur intermittently along the lateral edges. The dorsal face is edge trimmed, retouched, and/or use-worn along both lateral edges and the convex distal end. There appears to be greater use-damage and polish along the lateral edges than on the distal end. The specimen is 51 mm long, 22 mm wide, and 8 mm thick.

Specimen 6 from 41GR456 is a long, pointed, oval uniface (Fig. 61d). It is made of a heat-treated, unidentified white grainy chert (possibly silicified caliche). The ventral surface is relatively flat and has been thinned by the removal of at least one broad thin flake; no other flake attributes are present. The dorsal face is worked and/or utilized on all edges, but use-wear on this material does not show well. The distal end is convex and rounded, and the proximal end is pointed. The right lateral edge is straight, and the left lateral edge is convex. The specimen is 66 mm long, 27 mm wide, and 9 mm thick.

Specimen 7 from 41GR529 is a secondary flake of Edwards chert which is trimmed and worn into a square-based, pointed uniface. The smooth ventral surface retains no apparent flake features. The proximal end of the tool is squared, and the distal end is pointed. The dorsal face retains moderate cortex and patina along the thick longitudinal ridge. The proximal end is well trimmed, and both lateral edges are extensively step-fractured and worn. The pointed distal end may have been a graver tip, but the primary wear is on the lateral edges. The right lateral edge is convex, while the left lateral edge is concave and undercuts the thick dorsal ridge. The specimen is 64 mm long, 26 mm wide, and 21 mm thick.

Specimen 8 from 41KT83 is a tertiary flake fragment of Edwards chert which is worked or utilized only along the lateral edges. The proximal end is a prepared striking platform, accompanied by a bulb of percussion and an erailure scar on the ventral surface. The distal end of the fragment is a smooth lateral snap fracture. A longitudinal ridge extends along the dorsal face. Both lateral edges are retouched and exhibit use-polish. The right lateral edge appears to have been straight or gently concave, while the left edge is gently convex. Most of this specimen is missing, so its morphology cannot be fully described. It may be a fragmentary bilateral scraping tool or the proximal hafted end of a unifacial end scraper. The fragment is 9 mm thick, 27 mm long, and 24 mm wide.

MISCELLANEOUS OVATE SCRAPERS

Five complete specimens are generally ovate in shape and are worked unifacially on at least three edges. These tools are similar only in gross morphology and not necessarily in function.

Specimen 1 from 41GR303 is a thick (19 mm) oval uniface with a cortex striking platform, and cortex covers most of the dorsal surface. It is relatively small (39 mm long by 35 mm wide), and the ventral surface is flat except for incidental flake scars across much of the surface. The dorsal face is trimmed and either worn or damaged on all edges except the cortex platform. The specimen is of fine-quality, dark gray Edwards chert.

Specimen 2 from 41GR388 is a small oval uniface fashioned from a secondary flake of Potter chert. The proximal end is a prepared striking platform; a pronounced bulb and erailure scar are visible on the ventral face. The flake is wider (38 mm) than it is long (33 mm) and is 11 mm thick. The proximal end is straight, and the edge is prepared all along the striking platform. The dorsal side retains cortex all along the distal portion of the flake. The flake is edge trimmed along all dorsal edges except the platform. Minimal use-polish is evident.

Specimen 3 from 41GR521 is a small oval tertiary flake of Edwards chert. The proximal end is a striking platform, and the ventral surface exhibits a bulb of percussion and a large erailure scar. The distal portion of the ventral surface is damaged with irregular flake scars. The dorsal face is trimmed and utilized on all edges except along the striking platform. Postdepositional trauma has damaged the distal edge. The scraper is 35 mm long, 26 mm wide, and 9 mm thick.

Specimen 4 from 41KT33 is an oval tertiary flake of Edwards chert. The ventral surface is damaged and the bulb of percussion is removed, but concentric ripples indicate its location. The proximal end of the tool and part of one lateral edge are damaged. All other edges are retouched and/or utilized. Both lateral edges are gently to moderately convex. A concave notch or spokeshave on the distal end undercuts an overhanging lip. The specimen is 42 mm long, 36 mm wide, and 11 mm thick.

Specimen 5 from 41KT47 is an oval secondary flake of Edwards chert which is trimmed, utilized, or damaged on all edges (Fig. 61e). Trimming has removed the bulb of percussion, but the smooth ventral surface retains part of an erailure scar and radiating stress lines. One lateral edge has been damaged by the removal of a large flake scar. The dorsal face retains a small patch of cortex on the distal end. All edges are well trimmed and finely retouched. The distal edge, the proximal edge, and one lateral edge are convex. The other lateral edge is irregular. The scraper is 45 mm long, 31 mm wide, and 10 mm thick.

MISCELLANEOUS RECTANGULAR SCRAPERS

Five scrapers and scraper fragments are rectangular in shape and worked or utilized on two or more edges. These specimens are similar only in that they do not fit into any other category of unifacial tools, or they are too fragmentary to reconstruct their intended form.

Specimen 1 from 41GR207 is a tertiary flake of maroon Ogallala quartzite. The ventral surface is slightly concave with a poorly defined bulb of percussion. The distal end of the flake is snapped, the result of either a manufacturing failure or an impact fracture. The other three edges are trimmed on the dorsal face and are probably utilized, although no apparent use-wear is evident. The proximal edge and one lateral edge are very gently convex. The other lateral edge is more strongly convex. The specimen is 45 mm wide, 15 mm thick, and the remaining length is 47 mm.

Specimen 2 from 41GR240 is a secondary flake of Edwards chert. One edge consists of cortex, one is fractured, and the other two are steep trimmed or utilized edges. The ventral surface retains no apparent flake attributes. The dorsal surface is flat except for the worked edges. One worked edge exhibits a concave notch or spokeshave which has some apparent use-polish. This specimen is about 29 by 31 mm and is 29 mm thick.

Specimen 3 from 41GR263 is a fragment of a unifacial tool made of an unidentified mottled red and yellow chert. The fragment has a twisted manufacturing- or use-break forming one edge, and the other three trimmed or utilized edges are slightly convex. The ventral surface exhibits no apparent flake attributes but is slightly convex. One flake scar on the ventral surface probably resulted from postdepositional damage. The dorsal face is well trimmed, but there is no obvious use-wear. All cortex has been removed. The tool is 41 mm wide, 12 mm thick, and the partial length is 44 mm.

Specimen 4 from 41GR277 is a thick (12 mm) but small (34x24 mm) rectangular flake which is trimmed or utilized on all edges except the proximal striking platform. The material is an unidentified chert that is intensively heat-fractured and discolored. The ventral face is a slightly convex flake surface with a bulb of percussion and ejection scar. A thick longitudinal ridge extends across the well-trimmed dorsal face. A straight distal edge converges with a convex lateral edge. The other lateral edge is slightly convex and is probably damaged. This may have been a small end scraper.

Specimen 5 from 41GR388 is a large tertiary flake fragment of Edwards chert with two straight, convergent, steeply beveled, worked edges. The other two edges are fractured and are slightly retouched or damaged along the edges. Faint ripple marks occur on the ventral surface. The use-wear is most pronounced on the apparent distal end. It may be a fragment of a gougelike tool. The fragment is 47 mm long, 44 mm wide, and 12 mm thick.

DENTICULATE

One specimen, from 41KT33, is a tertiary flake of maroon Ogallala quartzite with the primary worked or utilized edge being unifacially worked, saw-toothed, and denticulate. The specimen is a distal fragment of a triangular-shaped tool that lacks the proximal end. The crude tool is bifacially trimmed, but one lateral edge has three intact notched teeth and a fourth tooth is broken off. This tool is 43 mm wide, 12 mm thick, and has a partial length of 45 mm.

CONCAVE RETOUCED/UTILIZED FLAKES

Two specimens are small retouched flakes. The primary working edge(s) are retouched/ utilized concave notches often called spokeshaves. These expediency tools are irregular in shape.

Specimen 1 from 41GR546 is a flake fragment of Edwards chert with cortex covering most of the dorsal face. One end is covered with cortex, and the opposite end is a broken edge. The fragment may be part of a larger tool or simply a flake used as an expedient tool. The opposite lateral edges exhibit slight retouch, but one edge has a shallow concave notch which is retouched and slightly use-polished. The fragment is 32 mm long, 25 mm wide, and 10 mm thick.

Specimen 2 from 41KT80 is a triangular secondary flake of Edwards chert with two worked or utilized edges. One edge has a slightly concave notch; the other edge has one slight and one prominent concave notch. The notches are undercut beneath overhanging lips or have nearly right-angle bit edges. Slight use-polish is apparent along the edges. Cortex covers the dorsal face except along the worked edges. The unworked edge is a terminal hinge fracture, and the tool seems to have been made on the distal end of a larger flake. It is 39 mm long, 29 mm wide, and 10 mm thick.

UNIFACIALLY EDGE-TRIMMED FLAKES

Ten specimens are categorized as edge-trimmed or retouched flakes. Seven of these are of coarse-grained materials (quartzites and Potter chert), two are of Edwards chert, and one is of an unidentified chert. These specimens most likely represent expedient tools that are minimally shaped.

Specimen 1 from 41GR277 is a stream-worn pebble of unidentified red quartzite. It is unifacially trimmed along one irregular edge. The specimen is 65 mm long, 35 mm wide, and 13 mm thick.

Specimen 2 from 41GR309 is a large (18 mm thick) secondary flake of maroon Ogallala quartzite which is wider (99 mm) than it is long (65 mm). The flake retains a large bulb of percussion on the ventral face and remnant cortex on the dorsal face. The straight distal edge is retouched.

Specimen 3, also from 41GR309, is a secondary flake fragment of gray Ogallala quartzite. No definite flake attributes are present. It is only minimally edge-trimmed along one convex edge. This specimen is 54 mm long, 48 mm wide, and 117 mm thick.

Specimen 4 from 41GR312 is a large oval (80 mm long, 59 mm wide, and 18 mm thick) primary flake of maroon Ogallala quartzite. It is unifacially edge trimmed on the dorsal face; cortex covers all areas which are not edge-trimmed. The ventral face is convex with a poorly defined bulb of percussion.

Specimen 5 from 41GR367 is a small oval (27 mm long, 20 mm wide, and 5 mm thick) biface thinning flake of Edwards chert. The ventral face is strongly convex with a prominent bulb of percussion. The dorsal face retains a prepared striking platform on the proximal end and many flake scars across its surface. One lateral edge is unifacially edge-trimmed on the dorsal face.

Specimen 6 from 41GR441 is a secondary flake fragment of maroon Ogallala quartzite. It is 85 mm long, 46 mm wide, and 15 mm thick. The ventral face exhibits no apparent flake attributes. The dorsal face has cortex remnant along one trimmed convex edge. All other edges are broken and are unmodified.

Specimen 7 from 41GR489 is an ovate-shaped (60 mm long, 49 mm wide, and 20 mm thick) secondary flake of Potter chert. The ventral surface retains a slight bulb of percussion. The dorsal face has a prepared striking platform and cortex remnant. The distal edge is minimally trimmed.

Specimen 8 from 41KT39 is a stream-worn flake of black Ogallala quartzite. It is 91 mm long, 52 mm wide, and 18 mm thick, and is an irregular half-moon in shape. The nodule is unifacially trimmed along the concave edge.

Specimen 9 from 41KT42 is a fragment of a tertiary biface thinning flake fragment or tool fragment of Edwards chert. It is very irregular in shape (42 mm long, 33 mm wide, and 15 mm thick) and is trimmed on two opposite edges. This fragment may represent a tool, a manufacturing failure, or an expedient tool on a flake fragment.

Specimen 10 from 41KT61 is a stream-worn, split-pebble flake of an unidentified light tan chert. The pebble has a large flake removed from both faces and is minimally edge-trimmed or utilized along the lateral edges formed by the two large flakes. The specimen is 104 mm long, 60 mm wide, and 20 mm thick; smooth stream-worn cortex remains on all but the retouched edges.

Core Tools

Nineteen specimens are cores or core tools in different stages of manufacture or use. The materials represented vary considerably as do the nature of the cores and their modifications. These specimens are classified as expended pebble cores (n = 2), tested cores (n = 5), bifacial core tools generally oval (n = 4) or round (n = 4) in shape, and irregularly shaped core tools (n = 4). These are not considered a representative sample of core tools in the project area because cores and core tools were selected if they were made of an unusual material or were characteristic of a tool type which was not systematically collected. Materials represented by these core tools include Edwards chert, Potter chert, quartzites derived from the Ogallala Formation, silicified wood, Tecovas jasper, black basalt, unidentified chert, unidentified conglomerate, and obsidian.

EXPENDED PEBBLE CORES

Specimen 1 from 41GR250 is a roughly circular fragment of Edwards chert with stream-worn cortex on both opposite faces. The pebble nodule is 14 mm thick, and several flakes have been removed from both faces. This fragment measures about 35x36 mm and may be part of a larger stream-worn nodule or it may be most of a small nodule. Many flakes have been removed, probably in an attempt to make a tool from the small core itself. One large flake scar seems to have removed much of the core, after which it was probably discarded.

Specimen 2 from 41GR376 is another core of Edwards chert which either was a tool or was being made into a tool. The piece is an oval (44x36 mm) stream-worn pebble remnant 14 mm thick. It has cortex on both faces and is bifacially flaked. A few large flake scars on both faces are evidence that the specimen was flaked and discarded.

TESTED CORES

Specimen 1 from 41GR13 is a small angular nodule of obsidian. Numerous small flakes have been removed from various facets of the nodule, and it seems to have been a small core. It may have been discarded because of its small size and because it contains several

large inclusions. The specimen is 40 mm long, 28 mm wide, 9 mm thick, and is translucent black. It was sent to Archaeological and Historical Consultants, Inc. (1987) for trace element analysis. The trace element concentrations (values in parts per million) for this specimen are as follows:

<u>Zn</u>	<u>Go</u>	<u>Rb</u>	<u>Sr</u>	<u>Y</u>	<u>Zr</u>	<u>Nb</u>	<u>Ba*</u>
76.9	21.6	166.1	8.2	44.8	169.3	55.0	0.0
±8.2	±4.3	±5.6	±3.1	±2.5	±4.8	±3.7	±27.1

*± = counting and fitting error uncertainty at 200 and 300 seconds livetime.

This specimen matches the Cerro del Medio geochemical type of the Jemez Mountains volcanic field in northern New Mexico. An obsidian flake collected from the same site was also identified as originating from the Jemez Mountains source area (see Lithic Debitage, this appendix).

Specimen 2 from 41GR264 is a large angular chunk (81 mm long, 51 mm wide, and 35 mm thick) of poor-quality Tecovas jasper. The core retains weathered cortex on one end. Several flakes have been removed, and battering on various facets probably represents platform preparation. The material is white with red splotches and contains many granular inclusions. The specimen is patinated and weathered and contains angular fracture lines. It probably was tested and determined to be unsuitable for further reduction.

Specimen 3 from 41GR338 is a rectangular (58 mm long, 44 mm wide, and 18 mm thick) core of red and yellow Tecovas jasper which is very mottled but is relatively free of inclusions. One end retains cortex, and several surfaces are weathered or patinated. Some flake surfaces are very glossy and suggest that the core was heat-fractured. Several flakes, all ending in hinge fractures, have been removed. Battering or edge-preparation is evident. The core was probably discarded.

Specimen 4 from 41GR471 is an irregular, broken, stream-worn pebble of an unidentified chert which contains a large quantity of tiny white fossils appearing as small rings and cylinders exposed in cross section which show up well in the greenish gray chert. The small stream nodule is 49 mm long, 40 mm wide, and 23 mm thick. The broken edges on the specimen are not sharp, indicating that the pebble was stream transported after being broken; it is possible that it is a natural break.

Specimen 5 from 41GR512 is a large (55 mm long, 47 mm wide, and 44 mm thick) angular chunk of very poor quality silicified wood which is marbled with inclusions and has a thick cortex rind on one side. A few flake scars are evidence that the material was tested. One surface is extremely glossy, indicating that the core may have been heat-treated. The removed flakes reveal that the piece has no large areas free of inclusions. The core was probably discarded after being tested.

OVAL BIFACIAL CORE TOOLS

Specimen 1 from 41GR264 is of a gray Ogallala quartzite which has been flaked into a thick crude biface that retains no cortex. There is no apparent use-wear, and many large flakes have been removed. The tool may have been either a biface preform or a bifacial core. The specimen is 80 mm long, 45 mm wide, and 31 mm thick.

Specimen 2 from 41GR291 is a large ovate core or biface preform of unidentified yellow chert. It is 86 mm long, 48 mm wide, and 22 mm thick. One face is mostly covered with cortex, but the other face has only a small cortex remnant. It is bifacially flaked, and one lateral edge has an irregular battered surface. There is some smoothing or polishing of this edge which may represent either use-wear or intentional platform preparation. Two large flake scars on the opposite edge suggest that the biface may have served as a core, possibly after having been used as a chopping tool.

Specimen 3 from 41GR377 is a stream-worn pebble of unidentified black basalt which has been bifacially worked on almost all edges (Fig. 62a). Cortex remnant is present on one face, across a small segment of one edge, and onto the opposite face. The edges are either trimmed or battered; this could be the result of use-wear or intentional edge preparation. Fairly extensive battering along one edge suggests that this was primarily a small core chopping tool. It is 58 mm long, 45 mm wide, and 25 mm thick.

Specimen 4 from 41KT80 is a large oval (99 mm long, 57 mm wide, and 30 mm thick) biface with cortex remnant in the central portion of both faces. One lateral edge is battered, and the opposite lateral edge from which large flakes were removed is smooth. This thick biface may have been either a core chopping tool or primarily a bifacial core. It is made of Potter chert.

ROUND CHOPPER CORE TOOLS

Four round chopper core tools are considered to be a recognizable tool type. These specimens are either unifacial or bifacial but are fairly consistent in that they are worked and battered along most edges. These specimens are all made of Potter chert and represent only a sample of similar artifacts noted in the field. They are a distinctive type of tool that is relatively common in the reservoir area. They are considered to be choppers, as opposed to hammerstones, because the battered edges have a low-angle working edge.

Specimen 1 from 41GR250 is a large round (ca. 110 mm in diameter and 50 mm thick) bifacial core chopper of Potter chert and has large cortex remnants in the central portion of both faces. The circumference is bifacially flaked, and extensive battering is evident along all edges.

Specimen 2 from 41GR374 is a large round (ca. 115 mm in diameter and 47 mm thick) bifacial core chopper made on a stream-worn Potter chert nodule; cortex covers the central portion of both faces and extends across one edge, joining the two faces. The flat cortex edge is approximately 50 mm in width and probably formed the proximal end (or butt) of the hand-held chopper. The remaining edges are bifacially trimmed and battered. The distal edge, opposite the cortex edge, is extensively battered.

Specimen 3 from 41GR377 is a round (ca. 90 mm in diameter and 36 mm thick) unifacial chopper core tool of Potter chert. The ventral surface is relatively flat and entirely covered with cortex which overlaps over a small segment of the edge onto the dorsal face, covering most of the central portion. The edges are unifacially trimmed on the dorsal face and are battered.

Figure 62. Core Tools. (a) oval bifacial core tool, 41GR377; (b) round chopper core tool, note extent of use-wear, 41GR393.

Specimen 4 from 41GR393 is a round (ca. 100 mm in diameter), flat (32 mm thick), bifacial core chopper made of a stream-worn Potter chert nodule (Fig. 62b). Cortex covers most of one face and laps over onto a segment of one edge. Cortex remains in the central portion of the opposite face. The nodule is extensively battered. Portions of the smoothed edge exhibit use-polish.

IRREGULAR CORE TOOLS

Specimen 1 from 41GR250 is an irregularly shaped, dark gray Potter chert nodule which retains cortex over all of the nodule except for some bifacial flakes removed on one end. The resulting edges are battered. The cortex is an unnatural reddish brown color, suggesting that it was probably heat-treated, and may have been overheated, as the removed flakes expose a very grainy, poor-quality material. The battering of the edge may be from edge preparation or from use as a chopping tool. The specimen is 113 mm long, 72 mm wide, and 35 mm thick.

Specimen 2 from 41GR337 is a stream-worn cobble of an unidentified conglomerate. One end of the nodule is flaked and battered, but this may simply be the result of testing the material. The material is unusual in the project area; it is composed of a brown fine-grained quartzite matrix with a large number of small quartzite pebbles which vary considerably in color and texture and vary in size from a few millimeters to over 15 mm. The core may have been tested but probably was used as a hammerstone. The specimen is 98 mm in length, 95 mm in width, and is 64 mm thick.

Specimen 3 from 41GR422 is a fragment of a maroon Ogallala quartzite mano which has been modified and used extensively as a hammerstone. The fragment has two flat edges which meet at a right angle and one bifacially worked convex edge, giving it a pointed oval shape. The specimen is 74 mm long, 72 mm wide, and 44 mm thick. One straight edge is formed by the shaped and slightly battered edge of the mano. Part of both faces of the fragment is formed by the well-smoothed surface of the mano. The other straight edge is a smooth break, possibly the original break on the mano. The convex bifacially worked edge was intentionally shaped onto the fragment and is extensively battered.

Specimen 4 from 41KT61 is an oval (90 mm long, 73 mm wide, and 43 mm thick) stream-worn cobble of pink Ogallala quartzite which is completely covered with cortex except for one bifacially worked lateral edge which is jagged, slightly battered, and fairly sharp. It is probably a chopper core tool which was used only minimally.

Lithic Debitage

Lithic debitage was routinely collected from subsurface shovel tests during the field investigations. This accounts for most of the lithic debitage collected, but occasional specimens of exotic or unusual materials were collected from the surface. From the shovel tests, all chipped lithic debris and all burned debris except for sandstone was collected. Samples of burned sandstone were usually collected, but large pieces were always returned to the bottom of the shovel test along with the aluminum markers.

PHASE I INVESTIGATIONS, JUSTICEBURG RESERVOIR

One flake of obsidian from site 41GR13 was sent to Archaeological and Historical Consultants, Inc. (1987) for trace element analysis. The trace element concentrations for this specimen (values in parts per million) are as follows:

<u>Zn</u>	<u>Go</u>	<u>Rb</u>	<u>Sr</u>	<u>Y</u>	<u>Zr</u>	<u>Nb</u>	<u>Ba*</u>
64.0	19.1	157.7	7.3	39.6	168.2	50.0	9.6
±7.7	±4.2	±5.4	±3.1	±2.4	±4.5	±3.5	±14.5

*± = counting and fitting error uncertainty at 200 and 300 seconds livetime.

This specimen, and a tested obsidian core from the same site, match the Cerro del Medio geochemical type of the Jemez Mountains volcanic field in northern New Mexico.

No detailed analysis of the 348 pieces of lithic debitage was made. The debitage was sorted by material and categorized by the type of modification -- primary, secondary, or tertiary flakes; angular debris; or burned (Table 46). Detailed provenience data are presented Appendix B.

TABLE 46
ATTRIBUTES OF THE COLLECTED LITHIC DEBITAGE
AND BURNED LITHIC DEBRIS

Material	Chipped Lithic Debitage				Heat-fractured or Burned Debris	Total
	Primary	Secondary	Tertiary	Angular		
Unidentified						
chert or						
quartzite	10	15	56	33	19	133
Edwards chert	3	8	46	5	3	65
Potter chert	3	9	28	6	42	88
Maroon Ogallala	2	2	1	7	-	12
quartzite						
Silicified wood	1	-	1	1	1	4
Alibates agate	-	-	1	-	-	1
Obsidian	-	-	1	-	-	1
Tecovas jasper	-	1	3	2	-	6
Sandstone	-	-	-	-	34	34
Limestone	-	-	-	-	4	4
Totals:	19	35	137	54	103	348

Ceramics

Thirty-four ceramic sherds were recovered from four sites in Justiceburg Reservoir. At two of these sites (41GR482 and 41KT47), ceramics were found on the surface in disturbed areas; the integrity of these two sites is dubious. The other two sites yielding ceramics (41GR396 and 41KT53), however, are likely to have in situ cultural deposits and have an excellent research potential. Since only four sites contained ceramics, these sherds are discussed by site rather than by sherd classification.

41GR396

One ceramic sherd (Fig. 63a) was found on the surface in association with exposed features and cultural debris. Shovel tests indicate that buried deposits exist at this site.

Description: This is a rectilinear body sherd with no parallel sides or sides of equal length; it has a maximum length of 59 mm, a maximum width of 39 mm, and varies in thickness from 5-6 mm. The broken edges are irregular except for one horizontal break that appears to be along a coil line.

Identification: This sherd is identified as El Paso Polychrome (Runyan and Hedrick 1973:27-28), a common trade ware in the Texas Southern Plains (Watts 1963:7; Collins 1969). El Paso Polychrome originates in the Jornada Mogollon area of southeastern New Mexico and western Texas and probably was made primarily in the El Paso region; it dates to A.D. 1200-1350 (Runyan and Hedrick 1973:27).

Construction: El Paso Polychrome is coil made. One broken edge parallel to the horizontal painted decoration appears to be a coil line. The break is unusually smooth and may indicate that this sherd was utilized as a tool.

Form: Common El Paso Polychrome vessel forms are bowls, ollas, and jars. The interior decoration suggests that this body sherd is from a bowl.

Paste: The clay paste is dark grayish brown to black with a faintly darker black interior core. The source and composition of the clay are unknown, but the dark color suggests that the clay is fairly high in carbon content.

Temper: The sherd is tempered with angular to subangular crushed stone particles which vary in size from under 1 mm to just over 2 mm. These particles are dominantly white granules, probably feldspar, with a lesser amount of colorless or clear grains that probably are quartz. A very small quantity of fine-grained dark gray to black grains (possibly crushed hornblende) is present. No mica is visible. The source of the temper has not been determined.

Finish and Decoration: The exterior is scraped smooth, and faint striations are visible. The exterior is coated with a thin brown slip (2.5YR 5/4) but the larger temper fragments show through. The interior is also scraped smooth; it is decorated with alternating, poorly executed horizontal bands of red (2.5YR 4/6) and black (10YR 4/1) paints

Figure 63. Ceramics. (a) interior surface of El Paso Polychrome body sherd, 41GR396; (b-c) interior (left) and exterior (right) surfaces of Rio Grande Glaze Polychrome V rim sherds, 41KT53.

which obscure any striations which may be present. There are three bands of red, only one of which has its complete width (6-7 mm) represented. Two black bands are present; one is 10-12 mm wide, and the other is 6-9 mm wide. The red appears to be a polished slip onto which the black bands are painted. Occasional temper fragments are visible through the paint.

41GR482

This ceramic sherd was found on the surface in a disturbed context. It is from an upland area which has been partially bladed and probably was cultivated in the past. No other cultural materials were associated, and shovel tests indicate no buried deposits.

Description: This small body sherd measures 17 mm in maximum length, 14 mm in maximum width, and 7 mm in thickness. All edges are irregular breaks.

Identification: This sherd is not recognizable as any specific type, but its curvature suggests that it may be a pipe fragment (Dee Ann Story, personal communication 1987).

Construction: There are no definite indications of the method of construction.

Form: The form of the vessel cannot be determined from this small fragment.

Paste: The clay source has not been identified but is dark gray (2.5YR 4/0) with no apparent core discoloration.

Temper: The sherd is probably tempered with very fine angular quartzite fragments and crushed bone. Sparse fine mica flecks are also present. The temper has not been identified as to source or composition.

Finish: The interior is smoothed but unfinished. The exterior is well burnished but is not slipped or otherwise decorated. The exterior color is 10YR 3/2.

41KT47

This sherd was surface collected from a disturbed upland site which has been cultivated and root-plowed in the past. Very little surface cultural materials were present, and shovel tests suggest that any buried remains are sparse.

Description: This is a rim sherd which is 32 mm tall and 30 mm wide. The rim profile is rounded and is thickest (11 mm) about 15 mm below the rim. The sherd thickness narrows considerably to 5 mm at 25 mm below the rim.

Identification: This sherd was identified by A. H. Warren (1987) as an undecorated rim sherd of Pecos Glaze Polychrome V made near Pecos Pueblo around the time of the Pueblo Revolt (A.D. 1680).

Construction: The sherd is of coiled construction; the horizontal break appears to be along a coil line.

Form: This rim sherd is from a bowl, probably with a vertical rim profile. This sherd is similar in form to the rim sherds from 41KT53.

Paste: Light gray with no apparent core discoloration. The exact source of the clay is unknown.

Temper: The temper was identified by A. H. Warren (1987) as Glorieta Sandstone found near Pecos Pueblo. This sandstone is composed of fine-grained quartz and feldspar, with minor amounts of silver and gold mica.

Finish: This smoothed sherd is slipped on the interior and exterior with a cream-colored (10YR 7/3), polished slip. No other decorations are apparent. The burnished exterior surface is in good condition, while the interior surface is eroded.

41KT53

SPECIMENS 1 THROUGH 27

Twenty-seven sherds were found in an animal backdirt pile on the surface of this site within an area of 1 m². These consist of 8 rim sherds (4 of which fit together) and 19 body sherds (4 of which fit together). All are thought to be from a single vessel. It is suspected that more of this vessel remains buried at the site as nearby shovel tests also produced ceramics. The rim sherds are decorated (Fig. 63b-c); 7 of the body sherds are decorated, while the remaining 12 are only slipped.

Description: The body sherds range in size from 12x17 to 34x44 mm and in thickness from 5-7 mm. The largest rim sherd is 43 mm tall and 58 mm wide and ranges in thickness from 10 mm just below the rim to 6 mm below the shoulder.

Identification: Two of these sherds were sent to A. H. Warren (1987) for identification. They are Pecos Glaze Polychrome V which dates from A.D. 1600-1700 and was made in the Pecos Pueblo area. This type of ware is found occasionally in sites on the Southern Plains (Watts 1963:11; Baugh 1986:178-180).

Construction: No definite evidence of coiled construction is apparent on these sherds.

Form: These sherds all are probably from a single carinated bowl estimated to be about 20-25 cm in diameter; in profile, the upturned shoulder expands in thickness toward the rim.

Paste: The clay paste is light gray with no apparent core discoloration.

Temper: The temper was identified by A. H. Warren (1987) as Glorieta Sandstone from the Pecos Pueblo area. It is composed of fine-grained clear glossy quartz, vitreous feldspar, and minor amounts of silver and gold mica.

Finish: Interior and exterior are smoothed, and a cream-colored (varies from 10YR 7/3 to 10YR 8/4), well-polished slip has been applied to both surfaces. The slip is eroded on some sherds but is present on both the interior and exterior of most. The interior painted design begins about 17 mm below the rim; it is a red matte (10R 4/8) horizontal line framed by horizontal lines of dark brown to black (7.5YR 2/10) glaze paint. The exterior painted decorations consist of a geometric design of angular and curved lines of black glaze paint which grades into light green (5Y 5/2) in some places. The interior and exterior painted decorations are quite poorly executed.

SPECIMENS 28, 29, AND 30

Three sherds were found in Shovel Test 2 at this site (Specimen 28 from 0-20 cm and Specimens 29 and 30 from 20-40 cm), indicating that buried cultural remains are present.

Description: Specimen 28 is 9x10 mm and 6 mm thick, Specimen 29 is very small (6x9 mm and 5 mm thick), and Specimen 30 is somewhat larger (14x18 mm and 6 mm thick).

Identification: The largest of these sherds was identified by A. H. Warren (1987) as an undecorated plainware body sherd of the type known as "Pecos Striated" or "Pecos Faint Striated". This type dates to the same period as, and is often found with, Pecos Glaze Polychrome V.

Construction: No definite evidence of construction method is found on these sherds.

Form: The vessel form cannot be determined from these small fragments.

Paste: The paste is grayish red clay with no core discoloration.

Temper: The temper, identified by A. H. Warren (1987), is Glorieta Sandstone from the Pecos Pueblo area. It consists of angular quartz fragments, white feldspar, and minor amounts of silver or gold mica.

Finish: The interior and exterior are smoothed with faint striations visible. No other decorations are present. Surface color is 5YR 4/2.

SPECIMEN 31

A single body sherd was found in Shovel Test 2 at 60-80 cm. It is of a different type than the other sherds found in this shovel test.

Description: This sherd is an irregularly shaped fragment that is 26 mm long, 12 mm wide, and 3 mm thick.

Identification: This sherd is too small to conclusively identify, but it is suggested that it may be a cordmarked sherd (i.e., Borger Cordmarked; Dee Ann Story, personal communication 1987), or it may be similar to plainware types thought to be indigenous to the Southern Plains (Robert J. Mallouf, personal communication 1987).

Construction: No evidence of the method of construction is visible.

Form: The vessel form cannot be determined from this small sherd.

Paste: The clay paste is dark gray to black (2.5YR 3/0) throughout.

Temper: The temper appears to be fine-grained sand or sandstone with very small rounded to subangular quartz fragments. The temper has not been identified as to source.

Finish: This sherd is smoothed on the interior but has a rough exterior surface. The irregular texture could indicate an unfinished exterior, or it could represent obliterated cordmarking or brushing. The exterior color is 7.5YR 5/2.

Organic Materials

The organic materials collected (Table 47) are not necessarily cultural in origin. In many cases, bones or charred wood were collected because of their potential for association with cultural materials. In other cases, organic materials were found in obvious cultural contexts.

TABLE 47
COLLECTED ORGANIC MATERIALS

Category	Identification	Number
BONES*	Unidentifiable	21
	Unidentified mammal	40
	Turtle	1
	Rodent	3
	Deer	13
	<u>Bison</u> or <u>Bos</u>	<u>3</u>
		81
SHELLS	Freshwater mussel shell fragments	25
	Snail shells	<u>5</u>
		30
CHARRED VEGETAL SAMPLES	Charred wood fragments/samples	18
	Charred seeds	2
	Unidentified charred organic materials	<u>1</u>
		21
ORGANIC SOIL MATRIX SAMPLES		2
FOSSIL FISH FRAGMENT		1
GRAND TOTAL:		135

*See Appendix C for analysis of faunal remains.

Bones

Eighty-one bones were collected. The greatest quantity (n = 35) was collected from Backhoe Trench 13 at 41GR568. These and other finds are potentially cultural, but further investigations will be necessary to confirm their origin. Other bones were found in shovel tests and in natural cutbank exposures, and some are obviously of cultural origin (e.g., at site 41KT79), while others are only potentially cultural. The results of the faunal analysis are presented in Appendix C.

Shells

Shell fragments were collected from shovel tests and from the surface when found in association with cultural features (i.e., hearthlike features). Twenty-five fragments of freshwater mussel shells (clams) and five small gastropod shells (snails) were collected. Raymond Neck (1987) examined the specimens and identified many of them. Most of the mussel shells could only be identified as belonging to the family Unionidae. Those which could be identified further include one fragment of Unio tetralasmus from 41GR441 and one fragment of cf. Anodonta and U. tetralasmus (burned) from 41KT57. The two specimens from 41KT57 are of special interest because they were found in a shovel test in a rockshelter.

The snail shells could all be identified at least to genus level. These include one Succinea sp. from 41GR302, one Helisoma anceps and one Polygyra texasiana from 41GR568, one H. anceps from 41KT51, and one Succinea sp. or Catinella sp. from 41KT52.

The one U. tetralasmus from the shovel test in rockshelter 41KT57 is the only obviously burned specimen recovered; however, fragments of mussel shells were found on the surface in association with an eroding burned rock feature at 41GR396. No intentionally modified shells were found.

Charred Vegetal Materials

Twenty-one samples of charred vegetal materials were obtained from shovel tests and natural cutbank exposures; several of the samples are from shovel tests in rockshelters. Samples range in size from small isolated fragments of only a few grams to one sample of charcoal weighing over 200 g. These include charred wood (18 fragments or samples), fragmentary charred seeds (2 specimens), and unidentified charred organic materials. One charred wood fragment, from a hearth at 41GR484, was subjected to radiocarbon assay and yielded an uncalibrated date of 260 ± 70 B.P.

None of the charred botanical remains were analyzed in detail, but a cursory examination (Jack Jackson, personal communication 1987) allowed rough identification of some of the samples. The charred seed fragments (possibly from a single seed) from rockshelter 41GR326 are flat bean or squash which most likely belong to the genus Phaseolus or Curcubita. These very likely represent food remains. A fragment of charred wood from the same rockshelter is most likely white oak (includes live oak). One charred wood fragment from another rockshelter (41KT57) is also identified as white oak.

Organic Soil Matrix Samples

Two samples of organic-rich soil were collected. The sample from 41GR484 is from a possible cultural stain exposed in a natural cutbank; the sample from 41KT79 is from a definite Late Prehistoric cultural midden exposed in a natural cutbank. These samples have not been analyzed.

Fossil Fish Fragment

This single specimen from a shovel test in rockshelter 41KT57 is a small diamond-shaped (6 mm length by 4 mm width by 1.5 mm thick) black silicate rock with parallel wavy lines on one face. It is extremely glassy in texture; under low-power magnification, it is obvious that it is a fossil of some type, most likely a fish scale or tooth. Its occurrence in the shovel test could be natural. It probably is a fossil weathered from the Triassic sandstone or shale layers, and it may have been brought into the shelter by wood rats. Other materials found in the shelter indicate human occupation as well. If this specimen was introduced into the shelter by cultural means, it probably was picked up because it was an oddity.

HISTORIC ARTIFACTS

Historic artifacts were not collected routinely during the survey but were collected if they were thought to be of some interpretive value (i.e., temporally diagnostic) or were unusual items at important historic sites. A total of 12 items were collected from the surface of six sites, and 3 items were collected from a shovel test at one site. Descriptions are presented by site rather than by artifact class.

41GR263

Two items were collected from the surface of 41GR263, the Roy Homestead. These are a round amber glass bead, 10 mm in diameter, with a 1 mm hole through the bead, and an iron-backed, flat, undecorated copper disk ornament 42 mm in diameter. The copper disk is crimped around the edges onto a flat iron disk with a wire attachment which forms a slot measuring about 8x20 mm. The ornament may be a decoration from some type of horse harness (e.g., bridle). The wire attachment is roughly the proper size for a 3/4-inch leather strap.

41GR331

Three glass fragments were collected from Shovel Test 2 (0-20 cm) at 41GR331, a possible homestead site. One is a small 3-mm-thick fragment of brown bottle glass. The other two fragments are clear flat glass (possibly window glass); one is 2 mm thick and the other is 3 mm thick.

41GR350

One piece of clear glass was collected from the surface of 41GR350, an historic dump area. It is a large jar base ca. 10 cm in diameter with an Owens suction scar indicating the piece was made on an automatic bottle machine after 1903 (Lorrain 1968). The base is embossed with the letters "KERR GLASS MFG CO SAND SPRINGS OKLA" around the edge and "PAT AUG 31 1915" in the center. The patent date indicates that the specimen was manufactured subsequent to, but not necessarily during, 1915.

41GR443

A glass sherd and two metallic cartridge cases were collected from the surface of 41GR443, a corral and dugout complex. The sherd is the rim and upper neck of a double-bead-mouth bottle of light aqua green glass; there are no mold seams, indicating that the lip was hand tooled. The specimen was not manufactured on an automatic bottle machine and was probably made around or before the turn of the century (Lorrain 1968). The metallic center-fire cartridges lack head stamps and are both of the same type; one is relatively intact, and the other is flattened. They are 33 mm in length, 12 mm in body diameter, and 13 mm in base (head) diameter. The cartridges are approximately .44 caliber and measure closest to a .44-40 Winchester (Barnes 1980:78, 116).

41GR474

One center-fire metallic cartridge case that lacks a head stamp was collected from the surface of 41GR474. It measures 33 mm in length, 12 mm in body diameter, and 13 mm in base (head) diameter; it is .44 caliber, most likely a .44-40 round (Barnes 1980:78, 116).

41KT42

Four metallic cartridge cases were collected from the surface of 41KT42. One is a small rim-fire cartridge approximately 8.5 mm in body diameter, 9.5 mm in base (head) diameter, and 15 mm in length. An "H" is stamped on the head. This mark was used on rim-fire cartridges made by the Winchester Repeating Arms Company (White and Munhall 1977:23, No. 3-115). This cartridge is most likely a .32-caliber "Extra Short," a pistol round introduced in 1871 and used through the 1920s (Barnes 1980:293).

Two of the cartridges are center-fire cases, measuring 12 mm in body diameter, 13 mm in base (head) diameter, and 33 mm in length. Both have identical head stamps -- "W.R.A. Co. 44 W.C.F." This stamp identifies the rounds as .44-caliber Winchester center-fire cartridges made by the Winchester Repeating Arms Company (White and Munhall 1977:156). This was a very popular round in the late 1800s and early 1900s that could be used in a number of different pistols and rifles, including Colt revolvers and Winchester Model 1873 repeating rifles (Barnes 1980:78).

The final specimen is a center-fire case with the head stamp "W.R.A. Co. 38 W.C.F." This is a .38-caliber Winchester center-fire cartridge made by the Winchester Repeating Arms Company. This round was used in pistols but was primarily a rifle cartridge. The Model 73 and Model 92 Winchester rifles and Colt pistols used the .38-40 round. It was introduced in 1874 and was commonly used until the 1930s (Barnes 1980:77, 179). The case measures 33 mm in length, 13 mm in base (head) diameter, and 12 mm in body diameter. The tapered neck has been flattened.

41KT84

A metallic cartridge case was collected from the surface of 41KT84, an historic homestead site. It is a flattened, center-fire cartridge that measures approximately 16 mm in length, 11 mm in body diameter, and 12 mm in base (head) diameter. There is no head stamp. It is approximately .38 to .40 caliber but cannot be more precisely identified.

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APPENDIX B: Inventory of Collected Artifacts

<u>Site</u>	<u>No. of Specimens</u>	<u>Description*</u>	<u>Location**</u>
41GR13	1	Dart point, untyped corner-notched, Edwards chert	Surface, plotted
	1	Triangular biface fragment, Alibates agate	Surface, plotted
	1	Squared biface fragment Edwards chert	Surface, plotted
	1	Ovate bifacial scraper, UID chert	Surface, plotted
	1	Tertiary flake, obsidian	Surface, plotted
	1	Mano, sandstone	Surface, plotted
	1	Tested core, obsidian	Surface, plotted
	1	Secondary flake, Potter chert	ST 2, 0-20 cm
	1	Tertiary flake, UID chert	ST 2, 0-20 cm
41GR33	1	Arrow point, Livermore, Edwards chert	Surface, plotted
	1	Alternately beveled biface fragment, black basalt	Surface, plotted
	1	Rectangular planar tool, Potter chert	Surface, plotted
	1	Secondary flake, Edwards chert	ST 1, 0-20 cm
	1	Primary flake, UID chert	ST 1, 20-40 cm
	1	Primary flake, UID chert	ST 1, 40-60 cm
41GR54	1	Tertiary flake, Edwards chert	ST 1, 40-60 cm
41GR204	2	Secondary flake, Edwards chert	ST 1, 0-20 cm
	4	Tertiary flake, Edwards chert	ST 1, 0-20 cm
	3	Tertiary flake, UID chert	ST 1, 0-20 cm
	1	Burned Potter chert	ST 1, 0-20 cm
	1	Burned sandstone	ST 1, 20-40 cm
	1	Burned Potter chert	ST 1, 20-40 cm
	1	Secondary flake, Potter chert	ST 1, 40-60 cm
	1	Angular debris, Edwards chert	ST 1, 40-60 cm
41GR205	1	Angular debris, UID chert	ST 1, 0-20 cm
41GR206	1	Tertiary flake, silicified wood	ST 1, 0-20 cm
	2	Tertiary flake, Potter chert	ST 1, 20-40 cm
	6	Burned sandstone	ST 1, 20-40 cm
41GR207	1	Miscellaneous rectangular scraper, maroon Ogallala quartzite	Surface, plotted
	1	Triangular gouge, Potter chert	Surface, plotted
41GR239	1	Mano, sandstone	Surface, plotted
41GR240	1	Mano, quartzite	Surface, plotted
	1	Rectangular planar tool, Potter chert	Surface, plotted

*UID = unidentified

**ST = shovel test; BHT = backhoe trench

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<u>Site</u>	<u>No. of Specimens</u>	<u>Description</u>	<u>Location</u>
41GR240, cont'd.	1	Miscellaneous rectangular scraper, Edwards chert	Surface, plotted
	1	Secondary flake, Potter chert	ST 1, 0-20 cm
	2	Tertiary flake, UID chert	ST 1, 0-20 cm
41GR243	1	Mano, sandstone	Surface, plotted
41GR250	1	Mano, quartzite	Surface, plotted
	1	Small ovate biface, Edwards chert	Surface, plotted
	1	Round chopper core tool, Potter chert	Surface, plotted
	1	Irregular core tool, Potter chert	Surface, plotted
	2	Primary flake, UID chert	ST 1, 0-20 cm
	2	Tertiary flake, Potter chert	ST 1, 0-20 cm
	2	Tertiary flake, Edwards chert	ST 1, 0-20 cm
	1	Expended pebble core, Edwards chert	ST 1, 0-20 cm
	2	Burned Potter chert	ST 1, 0-20 cm
	1	Tertiary flake, Potter chert	ST 1, 20-40 cm
	1	Burned Potter chert	ST 1, 20-40 cm
	1	Charred wood sample	ST 1, 20-40 cm
	1	Angular lithic debris, UID chert	ST 2, 0-20 cm
41GR251	1	Tertiary flake, UID chert	ST 1, 20-40 cm
41GR255	1	Tertiary flake, Potter chert	ST 1, 20-40 cm
	1	Burned UID chert	ST 1, 20-40 cm
41GR256	1	Dart point, Mahomet, Edwards chert	Surface, plotted
	1	Arrow point, Deadman's, Edwards chert	Surface, plotted
	1	Bilateral scraper, Edwards chert	Surface, plotted
41GR258	1	Mano, sandstone	Surface, plotted
	2	Secondary flake, UID chert	ST 1, 0-20 cm
	1	Burned Potter chert	ST 1, 0-20 cm
	1	Tertiary flake, Edwards chert	ST 1, 20-40 cm
41GR262	1	Triangular biface fragment, Edwards chert	Surface, plotted
41GR263	1	Dart point, untyped corner-notched, Edwards chert	Surface, plotted
	1	Mano, quartzite	Surface, plotted
	2	Triangular gouge, Potter chert	Surface, plotted
	1	Bifacial gouge, UID red quartzite	Surface, plotted
	1	Ovate bifacial scraper, UID black basalt	Surface, plotted
	1	Ovate bifacial scraper, UID chert	Surface, plotted
	1	Miscellaneous rectangular scraper, UID chert	Surface, plotted
	1	Bilateral scraper, Edwards chert	Surface, plotted
	1	Miscellaneous biface, Potter chert	Surface, plotted

<u>Site</u>	<u>No. of Specimens</u>	<u>Description</u>	<u>Location</u>
41GR263, cont'd.	1	Alternately beveled biface fragment, Edwards chert	Surface, plotted
	1	Glass bead (historic)	Surface, plotted
	1	Copper disk (historic)	Surface, plotted
	1	Tertiary flake, Potter chert	ST 1, 0-20 cm
	1	Burned, UID chert	ST 1, 0-20 cm
	1	Burned Potter chert	ST 1, 0-20 cm
	1	Secondary flake, UID chert	ST 1, 20-40 cm
	2	Secondary flake, UID chert	ST 2, 0-20 cm
	7	Tertiary flake, Potter chert	ST 2, 0-20 cm
	2	Tertiary flake, Edwards chert	ST 2, 0-20 cm
	3	Tertiary flake, UID chert	ST 2, 0-20 cm
	4	Angular debris, UID chert	ST 2, 0-20 cm
	1	Angular debris, silicified wood	ST 2, 0-20 cm
	1	Angular debris, maroon Ogallala quartzite	ST 2, 0-20 cm
	2	Angular debris, Potter chert	ST 2, 0-20 cm
	2	Burned UID chert	ST 2, 0-20 cm
	5	Burned sandstone	ST 2, 0-20 cm
	1	Arrow point fragment, untyped, Edwards chert	ST 2, 0-20 cm
	1	Secondary flake, Potter chert	ST 2, 20-40 cm
	1	Tertiary flake, Potter chert	ST 2, 20-40 cm
	1	Tertiary flake, Edwards chert	ST 2, 20-40 cm
	1	Tertiary flake, Tecovas jasper	ST 2, 20-40 cm
41GR264	1	Dart point, untyped stemmed, Edwards chert	Surface, plotted
	1	Mano, sandstone	Surface, plotted
	1	Miscellaneous end scraper, Edwards chert	Surface, plotted
	1	Tested core, Tecovas jasper	Surface, plotted
	1	Oval bifacial core tool, gray Ogallala quartzite	Surface, plotted
	1	Tertiary flake, Edwards chert	ST 1, 0-20 cm
	1	Burned Edwards chert	ST 1, 0-20 cm
	2	Secondary flake, Edwards chert	ST 1, 0-20 cm
	2	Angular debris, UID chert	ST 1, 0-20 cm
	3	Burned Potter chert	ST 1, 20-40 cm
	1	Secondary flake, maroon Ogallala quartzite	ST 1, 20-40 cm
	2	Secondary flake, Edwards chert	ST 1, 20-40 cm
	2	Tertiary flake, Edwards chert	ST 1, 20-40 cm
	1	Burned sandstone	ST 1, 20-40 cm
	1	Primary flake, Edwards chert	ST 2, 0-20 cm
	1	Tertiary flake, Potter chert	ST 2, 0-20 cm
	7	Tertiary flake, Edwards chert	ST 2, 0-20 cm
	1	Angular debris, UID quartzite	ST 2, 0-20 cm
	1	Angular debris, maroon Ogallala quartzite	ST 2, 0-20 cm
	1	Angular debris, Potter chert	ST 2, 0-20 cm
	2	Angular debris, UID chert	ST 2, 0-20 cm
	4	Burned UID chert	ST 2, 0-20 cm

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<u>Site</u>	<u>No. of Specimens</u>	<u>Description</u>	<u>Location</u>
41GR264,	3	Burned Potter chert	ST 2, 0-20 cm
cont'd.	3	Rodent bones	ST 2, 0-20 cm
	1	Primary flake, UID chert	ST 3, unknown depth
	1	Secondary flake, Potter chert	ST 3, unknown depth
	2	Tertiary flake, UID chert	ST 3, unknown depth
	2	Angular debris, maroon Ogallala quartzite	ST 3, unknown depth
	1	Burned Potter chert	ST 3, unknown depth
	1	Burned silicified wood	ST 3, unknown depth
	1	Burned UID chert	ST 3, unknown depth
41GR269	1	Miscellaneous end scraper, Edwards chert	Surface, plotted
	1	Burned Potter chert	ST 1, 0-20 cm
41GR271	1	Arrow point, UID fragment, Edwards chert	Surface, plotted
	1	Secondary flake, Edwards chert	ST 2, 0-20 cm
41GR274	1	Dart point, UID fragment, Edwards chert	Surface, plotted
41GR275	1	Bifacial reamer, Edwards chert	Surface, plotted
41GR277	1	Miscellaneous rectangular scraper, UID chert	Surface
	1	Miscellaneous end scraper, Edwards chert	Surface
	1	Small ovate biface, Edwards chert	Surface
	1	Tertiary flake, Alibates agate	Surface
	1	Angular debris, Tecovas jasper	Surface
	1	Unifacially edge-trimmed flake, UID quartzite	ST 1, 0-20 cm
	1	Primary flake, maroon Ogallala quartzite	ST 1, 0-20 cm
	2	Tertiary flake, UID chert	ST 1, 0-20 cm
	1	Tertiary flake, Tecovas jasper	ST 1, 0-20 cm
	1	Turtle bone	ST 1, 0-20 cm
	1	Freshwater mussel shell	ST 1, 20-40 cm
	1	UID bone	ST 1, 20-40 cm
41GR279	1	Miscellaneous end scraper, Edwards chert	Surface
41GR291	1	Oval bifacial core tool, UID chert	Surface, plotted
	1	Mano, sandstone	Surface, plotted
	1	Secondary flake, UID chert	ST 1, 0-20 cm
	1	Angular debris, maroon Ogallala quartzite	ST 1, 0-20 cm
	1	Primary flake, UID chert	ST 1, 20-40 cm
41GR302	1	Gouge preform, Potter chert	Surface, plotted
	3	Tertiary flake, Potter chert	ST 1, 0-20 cm
	1	Tertiary flake, Edwards chert	ST 1, 0-20 cm
	1	Angular debris, Potter chert	ST 1, 0-20 cm
	1	Snail shell	ST 1, 0-20 cm

<u>Site</u>	<u>No. of Specimens</u>	<u>Description</u>	<u>Location</u>
41GR302,	1	Secondary flake, UID chert	ST 2, 0-20 cm
cont'd.	1	Burned sandstone	ST 2, 0-20 cm
41GR303	1	Biface fragment, probable dart point midsection, Edwards chert	Surface, plotted
	1	Unilateral scraper, Edwards chert	Surface, plotted
	1	Ovate scraper, Edwards chert	Surface, plotted
	1	Triangular gouge, Potter chert	Surface, plotted
	1	Miscellaneous end scraper, UID chert	Surface, plotted
	1	Tertiary flake, Potter chert	ST 1, 0-20 cm
	1	Tertiary flake, maroon Ogallala quartzite	ST 1, 0-20 cm
41GR309	1	Triangular gouge, Potter chert	Surface, plotted
	1	Bifacial gouge preform, Potter chert	Surface, plotted
	1	Miscellaneous end scraper, Edwards chert	Surface, plotted
	1	End scraper preform, Potter chert	Surface, plotted
	1	Bilateral scraper, maroon Ogallala quartzite	Surface, plotted
	1	Bilateral scraper, UID chert	Surface, plotted
	1	Unifacially edge-trimmed flake, maroon Ogallala quartzite	Surface, plotted
	1	Unifacially edge-trimmed flake, gray Ogallala quartzite	Surface, plotted
	1	Tertiary flake, UID chert	ST 2, 0-20 cm
41GR312	1	Unifacially edge-trimmed flake, maroon Ogallala quartzite	Surface, plotted
	1	Mano, sandstone	Surface, plotted
41GR314	1	Unilateral scraper, Potter chert	Surface, plotted
	1	Tertiary flake, Edwards chert	ST 1, 0-20 cm
	1	Burned UID chert	ST 1, 0-20 cm
41GR323	1	Tertiary flake, Edwards chert	ST 1, 0-20 cm
	1	Angular debris, Edwards chert	ST 1, 0-20 cm
	2	Medium mammal bone	ST 1, 20-40 cm
	1	Angular debris, Edwards chert	ST 1, 40-60 cm
	7	Freshwater mussel shell	ST 1, 40-60 cm
41GR325	1	Arrow point, Deadman's, UID quartzite	Surface, plotted
	1	Arrow point, Washita or Harrell, UID chert	Surface, plotted
	1	Arrow point, UID fragment, Potter chert	Surface, plotted
	1	Biface fragment, probable dart point tip, Potter chert	Surface, plotted
	1	Squared biface fragment, Edwards chert	Surface, plotted
	1	Alternately beveled biface, UID chert	Surface, plotted
	1	Small subtriangular biface, UID chert	Surface, plotted
	1	Bifacial drill, stemmed, Edwards chert	Surface, plotted
	1	Bilateral scraper, Alibates agate	Surface, plotted

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<u>Site</u>	<u>No. of Specimens</u>	<u>Description</u>	<u>Location</u>
41GR326	1	Freshwater mussel shell	ST 1, 40-60 cm
	2	Charred seed fragments	ST 1, 40-60 cm
	1	Charred wood sample	ST 1, 40-60 cm
41GR329	1	Miscellaneous end scraper, Edwards chert	Surface, plotted
41GR331	3	Glass fragments	ST 2, 0-20 cm
41GR332	1	Rectangular planar tool, Potter chert	Surface, plotted
	1	Mano, sandstone	Surface, plotted
	1	Bifacial gouge preform, Potter chert	Surface, plotted
	1	Triangular biface fragment, Edwards chert	Surface, plotted
41GR334	1	Small ovate biface, Edwards chert	Surface
41GR335	1	Rectangular planar tool, Potter chert	Surface
41GR336	1	Miscellaneous end scraper, Edwards chert	Surface, plotted
41GR337	1	Irregular core tool, UID conglomerate	Surface, plotted
	2	Tertiary flake, UID chert	ST 1, 0-20 cm
	1	Burned UID chert	ST 1, 0-20 cm
	1	Angular debris, Edwards chert	ST 1, 20-35 cm
41GR338	1	Triangular gouge, UID black basalt	Surface, plotted
	1	Triangular gouge, maroon Ogallala quartzite	Surface, plotted
	1	Unilateral scraper, Edwards chert	Surface, plotted
	1	Tested core, Tecovas jasper	Surface, plotted
	1	Bifacial drill, Edwards chert	Surface, plotted
	1	Secondary flake, Potter chert	ST 1, 0-20 cm
	1	Secondary flake, UID chert	ST 1, 40-60 cm
41GR339	1	Mano, quartzite	Surface, plotted
	1	Alternately beveled biface fragment, Edwards chert	Surface, plotted
	1	Miscellaneous end scraper, pink Ogallala quartzite	Surface, plotted
41GR340	1	Dart point, UID fragment, Edwards chert	Surface, plotted
	1	Bifacial end scraper, Edwards chert	Surface, plotted
	2	Secondary flake, UID chert	ST 1, 0-20 cm
41GR343	1	UID burned bone	ST 3, 0-20 cm
	2	Burned UID chert	ST 3, 0-20 cm
41GR345	1	Triangular gouge, Potter chert	Surface, plotted
41GR349	1	Mano, sandstone	Surface, plotted
	1	Burned Potter chert	ST 1, 20-30 cm

<u>Site</u>	<u>No. of Specimens</u>	<u>Description</u>	<u>Location</u>
41GR350	1	Rectangular gouge, UID quartzite	Surface, plotted
	1	Triangular gouge, green Ogallala quartzite	Surface, plotted
	1	Miscellaneous biface, maroon Ogallala quartzite	Surface, plotted
	1	Glass jar base, clear	Surface, plotted
	1	Secondary flake, UID quartzite	ST 1, 40-60 cm
	1	Angular debris, UID quartzite	ST 1, 20-40 cm
41GR359	1	Dart point, UID stemmed, Edwards chert	Surface, plotted
	1	Dart point, UID fragment, Edwards chert	Surface, plotted
	1	Alternately beveled biface fragment, Edwards chert	Surface, plotted
	2	Tertiary flake, UID chert	ST 1, 0-30 cm
	3	Tertiary flake, Edwards chert	ST 1, 0-30 cm
	3	Angular debris, UID chert	ST 1, 0-30 cm
	4	Burned Potter chert	ST 1, 0-30 cm
	1	Burned sandstone	ST 1, 30-40 cm
41GR363	1	Bifacial reamer, Edwards chert	Surface, plotted
41GR364	1	Rectangular gouge, Potter chert	Surface, plotted
	1	Angular debris, UID conglomerate	Surface, plotted
41GR366	1	Rectangular planar tool, green Ogallala quartzite	Surface, plotted
41GR367	1	Unifacially edge-trimmed flake, Edwards chert	Surface, plotted
41GR368	1	End scraper, snub-nosed, Edwards chert	Surface, plotted
41GR372	1	Burned Potter chert	ST 1, 0-20 cm
	1	Burned Potter chert	ST 1, 20-40 cm
	1	Angular debris, UID chert	ST 1, 20-40 cm
41GR373	1	Rectangular planar tool, Potter chert	Surface, plotted
	1	Mano, quartzite	Surface, plotted
41GR374	1	Round chopper core tool, Potter chert	Surface, plotted
41GR376	1	Dart point, UID fragment, Edwards chert	Surface
	1	Triangular gouge, Potter chert	Surface
	1	Triangular gouge, gray Ogallala quartzite	Surface
	1	Bifacial end scraper, Edwards chert	Surface
	1	Expended pebble core, Edwards chert	Surface
	1	Secondary flake, Tecovas jasper	Surface
	1	Angular debris, Tecovas jasper	Surface
	1	Primary flake, Potter chert	ST 1, 0-20 cm
	1	Tertiary flake, Edwards chert	ST 1, 0-20 cm

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<u>Site</u>	<u>No. of Specimens</u>	<u>Description</u>	<u>Location</u>
41GR376, cont'd.	1	Tertiary flake, UID chert	ST 1, 0-20 cm
	2	Angular debris, maroon Ogallala quartzite	ST 1, 0-20 cm
	1	Miscellaneous end scraper, Edwards chert	ST 1, 20-40 cm
41GR377	1	Oval bifacial core tool, UID black basalt	Surface, plotted
	1	Round chopper core tool, Potter chert	Surface, plotted
41GR378	1	Tertiary flake, UID chert	ST 1, 20-40 cm
41GR379	1	Angular debris, UID chert	ST 1, 0-20 cm
	1	Primary flake, maroon Ogallala quartzite	ST 2, 0-20 cm
	2	Burned Potter chert	ST 2, 0-20 cm
41GR381	1	Triangular gouge, Potter chert	Surface, plotted
	1	Rectangular gouge, UID chert	Surface, plotted
41GR383	1	Rectangular gouge, UID chert	Surface, plotted
	1	Rectangular planar tool, Edwards chert	Surface, plotted
41GR384	1	Triangular gouge, pink Ogallala quartzite	Surface, plotted
41GR388	1	Triangular gouge, Edwards chert	Surface, plotted
	1	Triangular biface fragment, Edwards chert	Surface, plotted
	1	Ovate scraper, Potter chert	Surface, plotted
	1	Miscellaneous rectangular scraper, Edwards chert	Surface, plotted
	1	Mano, sandstone	Surface, plotted
	2	Tertiary flake, UID chert	ST 1, 0-20 cm
	1	Burned Potter chert	ST 1, 0-20 cm
41GR390	1	Secondary flake, Potter chert	ST 1, 0-20 cm
	3	Tertiary flake, UID chert	ST 1, 0-20 cm
	1	Burned sandstone	ST 1, 0-20 cm
	1	Angular debris, UID chert	ST 1, 20-40 cm
	3	Burned Potter chert	ST 1, 20-40 cm
41GR393	1	Dart point, UID stemmed, Edwards chert	Surface, plotted
	1	Rectangular gouge, Potter chert	Surface, plotted
	1	Triangular gouge, gray Ogallala quartzite	Surface, plotted
	1	Triangular gouge, Potter chert	Surface, plotted
	1	Gouge preform, silicified wood	Surface, plotted
	1	Miscellaneous end scraper, maroon Ogallala quartzite	Surface, plotted
	1	Rectangular planar tool, Edwards chert	Surface, plotted
	1	Rectangular planar tool, Potter chert	Surface, plotted
	1	Round chopper core tool, Potter chert	Surface, plotted
	1	Mano, sandstone	Surface, plotted
	1	Unilateral scraper, Edwards chert	Surface, plotted

<u>Site</u>	<u>No. of Specimens</u>	<u>Description</u>	<u>Location</u>
41GR396	1	Ceramic sherd, El Paso Polychrome	Surface, plotted
	1	Arrow point, Fresno, Edwards chert	Surface, plotted
	1	Tertiary flake, Tecovas jasper	Surface, plotted
	1	Mano, sandstone	Surface, plotted
	1	Freshwater mussel shell	Surface, plotted
	1	Tertiary flake, Edwards chert	ST 1, 0-20 cm
	1	Tertiary flake, UID chert	ST 1, 0-20 cm
	2	Burned Potter chert	ST 1, 0-20 cm
	1	Tertiary flake, UID chert	ST 1, 20-40 cm
	1	Burned Potter chert	ST 1, 20-40 cm
	1	Tertiary flake, Edwards chert	ST 1, 40-60 cm
41GR406	1	Miscellaneous end scraper, Edwards chert	Surface, plotted
	1	Angular debris, Potter chert	ST 1, 0-20 cm
41GR407	1	Arrow point, untyped corner-notched, moss agate	Surface, plotted
	2	Secondary flake, UID chert	ST 1, 0-20 cm
	1	Angular debris, UID chert	ST 1, 0-20 cm
	1	Tertiary flake, UID quartzite	ST 1, 20-38 cm
41GR408	1	Triangular gouge, Potter chert	Surface, plotted
41GR422	1	Irregular core tool, maroon Ogallala quartzite	Surface, plotted
	2	Tertiary flake, UID chert	ST 1, 20-40 cm
	2	Burned sandstone	ST 1, 20-40 cm
41GR425	1	Dart point, unidentified corner-notched, Edwards chert	Surface, plotted
	1	Primary flake, Edwards chert	ST 2, 5 cm
41GR427	1	Triangular biface fragment, Edwards chert	Surface, plotted
	1	Bifacial reamer, Edwards chert	Surface, plotted
41GR429	1	Dart point, untyped corner-notched, Edwards chert	Surface, plotted
	1	Primary flake, Edwards chert	ST 2, 0-10 cm
	1	Angular debris, Potter chert	ST 2, 0-10 cm
41GR432	1	Arrow point, Fresno, Edwards chert	Surface, plotted
41GR438	1	Arrow point, Deadman's, UID chert	Surface, plotted
	1	Arrow point, Deadman's, Edwards chert	Surface, plotted
41GR439	1	Tertiary flake, Edwards chert	ST 1, 20-40 cm
	1	Tertiary flake, Edwards chert	ST 2, 20-40 cm

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<u>Site</u>	<u>No. of Specimens</u>	<u>Description</u>	<u>Location</u>
41GR441	1	Miscellaneous biface, Edwards chert	Surface, plotted
	1	Unifacially edge-trimmed flake, maroon Ogallala quartzite	ST 1, 0-20 cm
	1	Freshwater mussel shell	ST 1, 0-20 cm
41GR442	1	Dart point, Nolan, Edwards chert	Surface, plotted
41GR443	1	Glass, bottle neck fragment	Surface, plotted
	2	Metal, cartridge cases	Surface, plotted
41GR444	1	Arrow point, untyped corner-notched, chalcedony	Surface, plotted
	1	Alternately beveled biface fragment, Alibates agate	Surface, plotted
41GR446	1	Miscellaneous biface, maroon Ogallala quartzite	Surface, plotted
41GR450	1	Angular debris, UID quartzite	ST 1, 0-20 cm
	2	Freshwater mussel shell	ST 1, 0-20 cm
41GR451	1	Dart point, untyped corner-notched, Potter chert	Surface, plotted
41GR456	1	Bilateral scraper, UID chert	Surface, plotted
	1	Miscellaneous end scraper, Edwards chert	Surface, plotted
	1	Mano, sandstone	Surface, plotted
	1	Bifacial gouge, Edwards chert	Surface, plotted
	1	Miscellaneous biface, Tecovas jasper	Surface, plotted
	1	Tertiary flake, Edwards chert	ST 1, 20-40 cm
	1	Tertiary flake, UID chert	ST 2, 0-20 cm
41GR458	1	Triangular biface fragment, Edwards chert	Surface, plotted
41GR461	1	Dart point, Ensor, Edwards chert	Surface, plotted
41GR467	1	Burned sandstone	ST 1, 0-20 cm
	1	Tertiary flake, Edwards chert	ST 3, 60-80 cm
	1	Angular debris, UID chert	ST 3, 100-120 cm
41GR471	1	Tested core, UID chert	Surface, plotted
41GR474	1	Arrow point, UID fragment, Edwards chert	Surface, plotted
	1	Metal, cartridge case	Surface, plotted
	1	Tertiary flake, UID chert	ST 1, 40-60 cm
	1	Tertiary flake, UID chert	ST 3, 60-80 cm
41GR476	1	Tertiary flake, Edwards chert	ST 1, 40-60 cm

<u>Site</u>	<u>No. of Specimens</u>	<u>Description</u>	<u>Location</u>
41GR477	1	Tertiary flake, UID chert	ST 2, 0-10 cm
41GR482	1	Ceramic sherd, undecorated	Surface, plotted
41GR484	12	Large mammal bones	BHT 14, 40 cm
	1	Soil matrix sample	BHT 14, 40 cm
	1	Charred wood sample from hearth	Cutbank, 25 cm
41GR488	1	Charred wood sample	Cutbank, 40-60 cm
41GR489	1	Unifacially edge-trimmed flake, Potter chert	Surface, plotted
41GR493	1	Primary flake, UID chert	ST 1, 0-20 cm
	3	Tertiary flake, UID chert	ST 1, 0-20 cm
	1	Burned UID chert	ST 1, 0-20 cm
	1	Burned Edwards chert	ST 1, 0-20 cm
41GR497	1	Bifacial drill, Edwards chert	Surface, plotted
	1	Freshwater mussel shell	ST 1, 0-20 cm
41GR502	1	Mano, sandstone	Surface, plotted
41GR504	1	Dart point, Castroville, Edwards chert	Surface
	1	Tertiary flake, UID chert	ST 1, 40-60 cm
	1	Primary flake, UID chert	ST 1, 60-80 cm
	1	Tertiary flake, Potter chert	ST 1, 60-80 cm
	1	Secondary flake, Potter chert	ST 1, 80-100 cm
	1	Secondary flake, maroon Ogallala quartzite	ST 1, 80-100 cm
	1	Secondary flake, maroon Ogallala quartzite	ST 1, 100-120 cm
41GR506	1	Angular debris, UID chert	ST 1, 0-20 cm
41GR508	1	Unilateral scraper, Edwards chert	Surface, plotted
41GR512	1	Tested core, silicified wood	ST 1, 40 cm
41GR515	1	Arrow point, Harrell, Edwards chert	Surface, plotted
	1	Secondary flake, UID jasper/agate	Surface, plotted
	1	Tertiary flake, UID chert	ST 2, 0-20 cm
	1	Tertiary flake, UID chert	ST 2, 40-60 cm
	1	Burned sandstone	ST 2, 155 cm
	1	Charred wood sample	Cutbank/hearth
41GR521	1	Mano, quartzite	Surface, plotted
	1	Ovate scraper, Edwards chert	Surface, plotted

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<u>Site</u>	<u>No. of Specimens</u>	<u>Description</u>	<u>Location</u>
41GR523	1	Burned sandstone	ST 1, 20-40 cm
	1	Burned Edwards chert	ST 1, 60-70 cm
	1	Burned Potter chert	ST 1, 60-70 cm
	1	Angular debris, Edwards chert	ST 1, 90-100 cm
41GR529	1	Bilateral scraper, Edwards chert	Surface, plotted
41GR539	2	Bison bones	Cutbank, 1.6 m
41GR541	1	Dart point, untyped corner-notched, Edwards chert	Surface, plotted
41GR543	1	Primary flake, UID chert	ST 1, 0-20 cm
	1	Angular debris, UID chert	ST 1, 0-20 cm
	1	Burned Potter chert	ST 1, 0-20 cm
41GR544	1	Mano, sandstone	Surface, plotted
41GR546	1	Concave retouched flake, Edwards chert	Surface, plotted
	1	Primary flake, silicified wood	ST 2, 20-40 cm
	1	Tertiary flake, Edwards chert	ST 2, 20-40 cm
	4	Tertiary flake, UID chert	ST 2, 20-40 cm
	1	Burned UID quartzite	ST 2, 20-40 cm
41GR549	1	Bison tooth	ST 1, 60-80 cm
41GR555	2	Angular debris, UID chert	ST 1, 0-20 cm
	1	Primary flake, Potter chert	ST 1, 0-20 cm
41GR559	1	UID bone	ST 1, 30 cm
	1	Tertiary flake, Potter chert	ST 1, 50 cm
	3	Charred wood fragments	ST 1, 50 cm
	1	UID bone	ST 2, 50 cm
	1	Charred wood fragments	ST 2, 50 cm
	2	UID bone	ST 2, 65-75 cm
	3	Charred wood fragments	ST 2, 65-75 cm
41GR560	1	Small subtriangular biface, Edwards chert	Surface, plotted
41GR562	1	Tertiary flake, Edwards chert	ST 1, 20-40 cm
	2	Freshwater mussel shell	ST 1, 20-40 cm
41GR564	1	Burned Potter chert	ST 1, 0-20 cm
41GR566	1	End scraper, Edwards chert	Surface, plotted
41GR568	35	Deer and UID mammal bones	BHT 13, 2 m
	2	Snail shells	BHT 13, 2 m

<u>Site</u>	<u>No. of Specimens</u>	<u>Description</u>	<u>Location</u>
41KT33	1	Ovate scraper, Edwards chert	Surface, plotted
	1	Denticulate, maroon Ogallala quartzite	Surface, plotted
	1	Mano, sandstone	Surface, plotted
	1	Primary flake, Potter chert	ST 1, 20-40 cm
	2	Tertiary flake, Potter chert	ST 2, 0-20 cm
	1	Angular debris, UID chert	ST 2, 0-20 cm
	3	Burned sandstone	ST 2, 0-20 cm
	2	Freshwater mussel shell	ST 2, 0-20 cm
	5	Burned sandstone	ST 2, 20-40 cm
	1	Freshwater mussel shell	ST 2, 20-40 cm
	1	Tertiary flake, UID chert	ST 2, 40-60 cm
	2	Freshwater mussel shell	ST 2, 40-60 cm
	1	UID burned organic material	ST 2, 40-60 cm
41KT34	2	Tertiary flake, Potter chert	ST 1, 0-20 cm
	2	Tertiary flake, Edwards chert	ST 1, 0-20 cm
	1	Tertiary flake, UID chert	ST 1, 0-20 cm
	1	Angular debris, UID chert	ST 1, 0-20 cm
	1	Burned Potter chert	ST 1, 0-20 cm
	1	Tertiary flake, Edwards chert	ST 1, 40-60 cm
	1	Tertiary flake, UID chert	ST 1, 40-60 cm
	1	Burned Potter chert	ST 1, 40-60 cm
	2	Burned Potter chert	ST 2, 0-20 cm
	1	Burned limestone	ST 2, 0-20 cm
	1	Angular debris, UID chert	ST 2, 20-40 cm
	1	Burned Potter chert	ST 2, 20-40 cm
	1	Angular debris, UID chert	ST 3, 0-20 cm
	1	Burned limestone	ST 3, 0-20 cm
	2	Burned Potter chert	ST 3, 20-40 cm
41KT37	1	Triangular gouge, Potter chert	Surface, plotted
	1	Tertiary flake, UID chert	ST 1, 20-40 cm
	1	Burned limestone	ST 2, 0-20 cm
41KT38	1	Burned sandstone	ST 1, 0-20 cm
	1	Burned Potter chert	ST 1, 0-20 cm
	1	Tertiary flake, Edwards chert	ST 2, 0-20 cm
	1	Angular debris, UID chert	ST 2, 0-20 cm
41KT39	1	Rectangular gouge, Potter chert	Surface
	1	Unifacially edge-trimmed flake, black Ogallala quartzite	Surface
41KT42	1	Dart point, Ensor, Edwards chert	Surface, plotted
	1	Arrow point, Fresno, Alibates agate	Surface, plotted
	1	Biface fragment, possible dart point tip, Edwards chert	Surface, plotted
	1	Unifacially edge-trimmed flake, UID chert	Surface, plotted
	4	Metal, cartridge cases	Surface, plotted

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<u>Site</u>	<u>No. of Specimens</u>	<u>Description</u>	<u>Location</u>
41KT47	1	Ceramic sherd, Pecos Glaze Polychrome V	Surface, plotted
	1	Ovate scraper, Edwards chert	Surface, plotted
	1	Secondary flake, Edwards chert	ST 1, 20-40 cm
	1	Tertiary flake, UID chert	ST 1, 40-60 cm
41KT49	1	Dart point, untyped stemmed, Edwards chert	Surface, plotted
	1	Bifacial gouge, UID chert	Surface, plotted
	1	Bifacial gouge, UID red quartzite	Surface, plotted
	1	Tertiary flake, Edwards chert	ST 1, 0-20 cm
	2	Burned sandstone	ST 1, 0-20 cm
41KT51	1	Tertiary flake, Edwards chert	ST 1, 0-20 cm
	2	Tertiary flake, Edwards chert	ST 1, 20-40 cm
	1	Charred wood fragment	ST 1, 20-40 cm
	1	Snail shell	ST 1, 60-80 cm
41KT52	3	Metate fragment, sandstone	Surface, plotted
	1	Primary flake, UID chert	ST 1, 20-40 cm
	1	Tertiary flake, UID chert	ST 1, 20-40 cm
	1	Freshwater mussel shell	ST 1, 40-60 cm
	1	Snail shell	ST 1, 40-60 cm
	2	Tertiary flake, Edwards chert	ST 2, 0-20 cm
	1	Angular debris, UID chert	ST 2, 80-100 cm
	1	Burned sandstone	ST 2, 100-120 cm
	1	Burned limestone	ST 4, 60-80 cm
41KT53	27	Ceramic sherds, Pecos Glaze Polychrome V	Surface, plotted
	1	End scraper, snub-nosed, Edwards chert	Surface, plotted
	1	Ceramic sherd, Pecos Faint Striated	ST 2, 0-20 cm
	2	Ceramic sherds, Pecos Faint Striated	ST 2, 20-40 cm
	1	Ceramic sherd, UID plainware	ST 2, 60-80 cm
41KT57	1	Freshwater mussel shell	ST 1, 20-30 cm
	1	Charred wood sample	ST 1, 20-30 cm
	1	Tertiary flake, UID quartzite	ST 1, 30-40 cm
	1	Secondary flake, UID chert	ST 1, 30-40 cm
	1	Freshwater mussel shell, burned	ST 1, 30-40 cm
	1	Charred wood sample	ST 1, 30-40 cm
	1	Freshwater mussel shell	ST 1, 40-45 cm
	4	Burned UID rock	ST 1, 40-45 cm
	1	Charred wood sample	ST 1, 40-45 cm
	1	Fossil fish scale	ST 1, 40-45 cm
41KT59	1	Dart point, Nolan, UID chert	Surface
41KT61	1	Irregular core tool, pink Ogallala quartzite	Surface, plotted
	1	Unifacially edge-trimmed flake, UID chert	Surface, plotted

<u>Site</u>	<u>No. of Specimens</u>	<u>Description</u>	<u>Location</u>
41KT66	1	Mano, sandstone	Surface, plotted
	1	Angular debris, UID chert	ST 2, 0-20 cm
41KT69	1	Charred wood sample	Cutbank, 40 cm
41KT75	1	End scraper, snub-nosed, Edwards chert	Surface, plotted
41KT77	1	Tertiary flake, Edwards chert	ST 1, 40-60 cm
41KT78	1	Bifacial drill, reworked dart point, Edwards chert	Surface, plotted
41KT79	1	Deer bone	Cutbank, 25 cm
	1	Arrow point, UID fragment, Edwards chert	Cutbank, 40 cm
	1	Alternately two-beveled knife, Alibates agate	Cutbank, 40 cm
	2	Tertiary flake, UID chert	Cutbank, 40 cm
	1	Burned sandstone	Cutbank, 40 cm
	1	Large mammal bone	Cutbank, 40 cm
	14	UID bone	Cutbank, 40 cm
	2	UID burned bone	Cutbank, 40 cm
	1	Deer tooth	Cutbank, 40 cm
	1	Charred wood fragment	Cutbank, 40 cm
	1	Soil matrix sample	Cutbank, 40 cm
41KT80	1	Rectangular gouge, UID chert	Surface, plotted
	1	Concave retouched flake, Edwards chert	Surface, plotted
	1	Oval bifacial core tool, Potter chert	Surface, plotted
41KT81	1	Bifacial drill, Edwards chert	Surface, plotted
	1	Bifacial drill, Potter chert	Surface, plotted
	1	Mano, quartzite	Surface, plotted
41KT83	1	End scraper, snub-nosed, Edwards chert	Surface, plotted
	1	End scraper preform, Edwards chert	Surface, plotted
	1	Bilateral scraper, Edwards chert	Surface, plotted

APPENDIX C: Analysis of Vertebrate Remains

by James W. Westgate

The archeological survey at Justiceburg Reservoir yielded a small amount of vertebrate materials. Bones and bone fragments are represented by 81 specimens, 21 of which were found in natural exposures, 47 were recovered in backhoe trench excavations, and 13 were found in shovel tests. Twenty-one bone fragments (26%) are unidentifiable. Identifiable specimens include 1 undefined mammal (1%), 26 medium-sized (fox- to deer-sized) mammal (32%), 13 large-sized (bison-sized or larger) mammal (16%), 1 turtle carapace element (1%), 3 rodent (4%), 13 deer (16%), and 3 Bison or Bos (4%). Table 48 presents a detailed analysis of the recovered vertebrate remains.

The turtle carapace element is a peripheral bone from a juvenile and not readily identifiable below ordinal level. The animal may have been either terrestrial or aquatic.

The sites yielded evidence of the presence of at least two mammalian species identifiable at the generic level. Most of the medium-sized mammal remains belong to either white-tail deer (Odocoileus virginianus) or mule deer (O. hemionus). Both species are inhabitants of the Justiceburg area of the Texas Panhandle (Burt and Grossenheider 1964:229), and no species-differentiating remains such as antlers were recovered. Whitetail deer are browsers living in a variety of habitats but tend to be forest-dwelling animals. Mule deer inhabit western scrub and grasslands where browse plants are present. It is notable that the entire lot of 35 deer and medium-sized mammal bones and bone fragments from 41GR568 (BHT 13) may represent one individual.

Large mammal bones collected from the surface of sites belong to either bison (Bison bison) or cattle (Bos sp.). As with the deer remains, the large mammal remains are elements which do not allow confident discrimination between those two species. Southern bison inhabit grasslands and open plains, while their northern counterparts inhabit woodlands (Burt and Grossenheider 1964:236). Cattle are grazed in a variety of scrub and grasslands.

TABLE 48
ANALYSIS OF VERTEBRATE REMAINS

Site Number	Provenience*	Identification	Element	Number of Specimens	Condition	Side	Minimum Number of Individuals
41GR264	ST 2, 0-20 cm	Rodentia	Unidentified	1	Fragmentary	-	1
			Femur	1	Proximal 1/4	Left	
			Calcaneum	1	Proximal 3/4	Right	
41GR277	ST 1, 0-20 cm	Chelonia, juvenile	Peripheral	1	Complete	-	1
	ST 1, 20-40 cm	Unidentifiable		1	Fragmentary	-	1
41GR323	ST 1, 20-40 cm	Mammal, medium	Calcaneum	1	Medial 3/4	Left	1
			Unidentified	1	Fragmentary	-	
41GR343	ST 3, 0-20 cm	Unidentifiable		1	Fragmentary, burned?	-	1
41GR484	BHT 14, 40 cm	Mammal, large	Unidentified	12	Fragmentary	-	1
41GR539	Cutbank, 1.6 m	<u>Bison bison</u> or <u>Bos</u> sp.	Phalanx	1	Complete	-	1
			Tarsal	1	Complete	-	1
41GR549	ST 1, 60-80 cm	<u>Bison bison</u> or <u>Bos</u> sp.	Lower incisor	1	Complete	Left	1
41GR559	ST 1, 30 cm	Mammal	Unidentified	1	Fragmentary	-	1
	ST 2, 50 cm	Unidentifiable		1	Fragmentary	-	1
	ST 2, 65-75 cm	Unidentifiable		2	Fragmentary, burned	-	

*ST = shovel test; BHT = backhoe trench.

Table 48, continued

Site Number	Provenience	Identification	Element	Number of Specimens	Condition	Side	Minimum Number of Individuals
41GR568	BHT 13, 2 m	<u>Odocoileus virginianus</u> or <u>O. hemionus</u>	Humerus	1	Distal 1/3	Right	1*
			Scapula	1	Proximal 1/2	Right	
			Ulna	1	Proximal 1/3	Left	
			Femur	1	Proximal 3/4 (5 pieces)	Right	
			Tibia	1	Distal 1/2	Right	
			Metatarsal	1	Proximal 1/2	Right	
			Calcaneum	1	Complete	Right	
			Astragalus	2	Complete	Right, left	
			Phalanx	2	Complete	-	
		Mammal, medium	Rib	17	1 3/4 complete, 2 distal 1/2, 2 proximal 1/3, 3 shaft, 9 fragmentary	3 Right, 4 left	
			Scapula	4	Fragmentary	-	
			Limb shaft	3	Fragmentary	-	
41KT79	Cutbank, 25 cm	<u>Odocoileus virginianus</u> or <u>O. hemionus</u>	Scapula	1	Proximal 1/3	Left	1
	Cutbank, 40 cm	<u>Odocoileus virginianus</u> or <u>O. hemionus</u>	Molar 1 or 2	1	Complete	Right	1
		Mammal, large	Limb shaft	1	Fragmentary	-	
		Unidentifiable		16	Fragmentary, some burned, 1 butchered	-	

*Entire lot probably represents one individual.

REFERENCES CITED

Burt, W. H., and R. P. Grossenheider

1964 A Field Guide to the Mammals. Houghton Mifflin Co., Boston.

APPENDIX D: Geoarcheological Trench Data

Michael D. Blum

Backhoe Trench 1

- Zone 4 0-90 cm; reddish brown (5YR 4/4) sands; massive; calcareous; numerous roots and burrows; diffuse boundary with burned sandstone cobble.
- Zone 3 90-130 cm; dark reddish brown (5YR 3/4) sandy loam; massive to weak coarse blocky; calcareous; roots and burrows; gradual boundary.
- Zone 2 130-170 cm; reddish brown (5YR 4/4) loamy sands with dispersed siliceous pebbles; massive; calcareous with few, fine nodules of calcium carbonate; roots and burrows; gradual boundary.
- Zone 1 170-300 cm; reddish brown (5YR 4/4) loamy sands with dispersed siliceous pebbles; massive; calcareous; roots and burrows; stone line of possible cultural origin with small flecks of dispersed charcoal at 210 cm; base of trench.

Backhoe Trench 2

- Zone 4 0-60 cm; dark yellowish brown (10YR 4/4) loamy sands; massive; calcareous; roots and burrows; clear boundary.
- Zone 3 60-90 cm; dark reddish brown (5YR 3/3) loam; granular to strong medium blocky; calcareous; roots and burrows; clear boundary.
- Zone 2 90-130 cm; dark reddish brown (5YR 3/3) loam with occasional dispersed siliceous pebbles; granular to strong medium blocky; calcareous with few, fine small nodules of calcium carbonate; roots and burrows; gradual boundary.
- Zone 1 130-270 cm; dark reddish brown (5YR 3/3) loam with occasional dispersed siliceous pebbles; strong medium blocky; calcareous with filaments of calcium carbonate on ped faces; roots and burrows. Base of trench.

Backhoe Trench 3

- Zone 4 0-50 cm; dark reddish brown (5YR 3/4) loamy sands; massive; calcareous; roots and burrows; gradual boundary.
- Zone 3 50-90 cm; dark brown (5YR 4/4) loamy sands; massive to weak medium blocky; calcareous; roots and burrows; gradual boundary.
- Zone 2 90-150 cm; reddish brown (5YR 4/4) loamy sands; weak medium blocky; calcareous with few, fine nodules of calcium carbonate; roots and burrows; gradual boundary.
- Zone 1 150-360 cm; reddish brown (5YR 4/4) loamy sands; massive; calcareous; roots and burrows; base of trench.

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Backhoe Trench 4

- Zone 4 0-50 cm; dark yellowish brown (10YR 3/4) loamy sands; massive; calcareous; roots and burrows; gradual boundary.
- Zone 3 50-100 cm; dark brown (7.5YR 4/4) sandy loam; massive to weak coarse blocky; calcareous; roots and burrows; gradual boundary.
- Zone 2 100-140 cm; dark brown (7.5YR 4/4) loamy sands; weak coarse blocky; calcareous with few, fine nodules of calcium carbonate; roots and burrows; gradual boundary.
- Zone 1 140-310 cm; reddish brown (5YR 4/4) sands with occasional dispersed siliceous pebbles; massive; calcareous; roots and burrows; base of trench.

Backhoe Trench 5

- Zone 3 0-50 cm; dark brown (10YR 3/3) loamy sands; massive; calcareous; roots and burrows; clear boundary.
- Zone 2 50-120 cm; dark brown (7.5YR 4/4) loam; massive to weak coarse blocky; calcareous; roots and burrows; sample at 100 cm produced radiocarbon age of 1760 ± 60 years B.P. (Tx-5759); gradual boundary.
- Zone 1 120-240 cm; dark brown (7.5YR 4/4) loamy sands; weak coarse blocky; calcareous with few, fine nodules of calcium carbonate; roots and burrows; base of trench.

Backhoe Trench 6

- Zone 3 0-100 cm; dark brown (10YR 4/3) sands; massive; calcareous; roots and burrows; isolated burned sandstone cobble at 35 cm; clear boundary.
- Zone 2 100-200 cm; reddish brown (5YR 4/4) sandy loam; massive to weak coarse blocky; calcareous with filaments of calcium carbonate on ped faces; roots and burrows; gradual boundary.
- Zone 1 200-300 cm; dark brown (7.5YR 4/4) loamy sands; weak coarse blocky; calcareous with filaments of calcium carbonate on ped faces; roots and burrows; base of trench.

Backhoe Trench 7

- Zone 3 0-90 cm; dark brown (7.5YR 4/4) sands; massive; calcareous; roots and burrows; clear boundary.
- Zone 2 90-210 cm; dark brown (7.5YR 4/4) to yellowish brown (10YR 5/4) interbedded muds and sands; massive to stratified; calcareous; clear boundary.
- Zone 1 120-240 cm; yellowish brown (10YR 5/4) sands; cross-stratified; calcareous; base of trench.

Backhoe Trench 8

- Zone 2 0-150 cm; dark reddish brown (7.5YR 4/4) sandy loam with occasional dispersed siliceous pebbles; massive; calcareous; sample from 140 cm produced radiocarbon age of 810 ± 50 years B.P. (TX-5760); clear boundary.
- Zone 1 150-200 cm; yellowish red (5YR 4/6) sandy loam; strong coarse blocky structure; calcareous with few, fine nodules of calcium carbonate; base of trench.

Backhoe Trench 9

- Zone 3 0-120 cm; dark reddish brown (7.5YR 4/4) loamy sands with occasional dispersed siliceous pebbles and pebble stringers; massive; calcareous; roots and burrows; clear boundary.
- Zone 2 120-190 cm; yellowish red (5YR 4/6) sandy loam; weak coarse blocky; calcareous with few, fine nodules of calcium carbonate; roots and burrows; sample at 150 cm produced a radiocarbon age of 4780 ± 60 years B.P. (Tx-5761); gradual boundary.
- Zone 1 190-290 cm; yellowish red (5YR 4/6) sandy loam; weak coarse blocky; calcareous with few, fine nodules and filaments of calcium carbonate; roots and burrows; base of trench.

Backhoe Trench 10

- Zone 3 0-40 cm; dark reddish brown (5YR 3/4) loamy sands; massive; calcareous; roots and burrows; clear boundary.
- Zone 2 40-120 cm; dark reddish brown (5YR 3/4) loamy sands with dispersed siliceous pebbles and pebble stringers; massive; calcareous; sharp and steeply dipping boundary.
- Zone 1 120-300 cm; yellowish red (5YR 4/6) sandy loam; massive to weak coarse blocky; calcareous with few, fine nodules of calcium carbonate; base of trench at bedrock contact.

Backhoe Trench 11

- Zone 3 0-70 cm; dark yellowish brown (10YR 4/4) loamy sands with dispersed siliceous pebbles; massive; calcareous; roots and burrows; gradual boundary.
- Zone 2 70-150 cm; reddish brown (5YR 4/4) loamy sands with dispersed siliceous pebbles and pebble stringers; massive; calcareous; clear boundary.
- Zone 1 150-300 cm; yellowish red (5YR 4/6) sandy loam with dispersed siliceous pebbles; massive to weak coarse blocky; calcareous with few, fine nodules of calcium carbonate; contains concave channel fill within this zone; base of trench.

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Backhoe Trench 12

- Zone 3 0-45 cm; brown (10YR 5/3) sands; massive; calcareous; roots and burrows; clear boundary.
- Zone 2 45-100 cm; dark reddish brown (5YR 3/4) sandy muds; massive to weak coarse blocky; calcareous; roots and burrows; sample at 50 cm produced a radiocarbon age of 560 ± 50 years B.P. (Tx-5762); gradual boundary.
- Zone 1 100-250 cm; reddish brown (5YR 4/4) muddy sands; massive to weak coarse blocky; calcareous; sample at 130 cm produced a radiocarbon age of 860 ± 70 years B.P. (Tx-5763); base of trench.

Backhoe Trench 13

- Zone 3 0-40 cm; dark brown (10YR 3/3) muddy sands; massive; calcareous; roots and burrows; clear boundary.
- Zone 2 40-170 cm; dark brown (7.5YR 4/4) muddy sands; massive to weak coarse blocky; calcareous; roots and burrows; sample at 150 cm produced radiocarbon age of 1910 ± 60 years B.P. (Tx-5764); gradual boundary.
- Zone 1 170-310 cm; dark brown (7.5YR 4/4) to reddish brown (5YR 4/4) muddy sands; massive to weak coarse blocky; calcareous with few, fine nodules of calcium carbonate; roots and burrows; base of trench.

Backhoe Trench 14

- Zone 3 0-40 cm; reddish brown (5YR 4/4) muddy sands, with occasional dispersed siliceous pebbles; massive to laminated; calcareous; roots and burrows; clear boundary.
- Zone 2 40-80 cm; dark brown (7.5YR 4/4) sandy muds; massive to weak, medium blocky; calcareous; roots and burrows; gradual boundary.
- Zone 1 80-200 cm; yellowish red (5YR 4/6) to reddish brown (5YR 4/4) muddy sands; massive to finely laminated; calcareous; roots and burrows; samples at 100 and 150 cm yielded radiocarbon ages of 1160 ± 60 years B.P. (Tx-5765) and 1830 ± 70 years B.P. (Tx-5766), respectively; base of trench.

Backhoe Trench 15

- Zone 3 0-40 cm; strong brown (7.5YR 4/6) muddy sands; massive; calcareous; roots and burrows; gradual boundary.
- Zone 2 40-170 cm; dark brown (10YR 3/3) muddy sands; massive, calcareous; roots and burrows; clear boundary.
- Zone 1 170-230 cm; dark brown (7.5YR 4/4) sands to muddy sands; massive to weak coarse blocky; calcareous, with some very light cementation around grains evident; some roots and burrows; base of trench.

Backhoe Trench 16

- Zone 2 0-50 cm; strong brown (7.5YR 4/6) muddy sands; massive; calcareous; roots and burrows; gradual boundary.
- Zone 1 50-240 cm; dark brown (10YR 3/3) muddy sands; massive, calcareous; roots and burrows; base of trench.

Backhoe Trench 17

- Zone 4 0-20 cm; pale brown (10YR 6/3) fine sands; massive; noncalcareous; roots and burrows; clear boundary.
- Zone 3 20-60 cm; dark brown (10YR 3/3) sandy muds; massive; calcareous; roots and burrows; sample at 50 cm produced a radiocarbon age of 740 ± 50 years B.P. (Tx-5767); gradual boundary.
- Zone 2 60-170 cm; strong brown (7.5YR 4/6) muddy sands; massive; calcareous; clear boundary.
- Zone 1 170-250 cm; strong brown (7.5YR 4/6) gravelly sands, with siliceous pebbles smaller than 2 cm in diameter; cross-stratified; base of trench.

Backhoe Trench 18

- Zone 1 0-250 cm; light brown (10YR 6/4) fine sands; massive to ripple laminated; noncalcareous; some roots and burrows; base of trench.

Backhoe Trench 19

- Zone 1 0-300 cm; light brown (10YR 6/4) fine sands; massive to ripple laminated; noncalcareous; some roots and burrows; base of trench.

Backhoe Trench 20

- Zone 1 0-200 cm; light brown (10YR 6/4) to reddish brown (5YR 4/4) sands and muds; interbedded, with ripple laminated sands alternating with massive muds and sands; noncalcareous sands to calcareous muds; occasional roots and burrows; base of trench.

APPENDIX E: Biographical Data for Nonaboriginal Rock Art Sites

Martha Doty Freeman

This appendix is an alphabetized list of names and initials which appear at rock art sites in the project area. All names are alphabetized by the last name or last initial; initials or incomplete names appear first under each alphabetical heading and are followed by complete names. Dates which appear in association with names follow the names. Site numbers follow dates.

Information was found for approximately one-third of the inscriptions by examining federal censuses, General Land Office records, county histories, regional histories, and newspapers.

A

EVA - 1912 (site 41GR51)

Information about this inscription was not located in 1987.

Agnes - 1924 (site 41KT54)

Information about this inscription was not located in 1987.

Fred Antelop[e] (site 41GR526)

Information about this inscription was not located in 1987.

B

AB - 1935 (sites 41GR244, 41GR545)

This inscription may refer to Allene Boren, adopted daughter of Nannie (Justice) and Dee Boren (Didway 1973:25), or it may be a brand.

EVB - 1914, 1926 (sites 41GR284, 41GR559)

Information about this inscription was not located in 1987.

JMB - 1887 (site 41GR545)

James Minus (Buddy) Boren was one of three brothers who came to Garza County from Bell County with the Longs. According to a son, J. M. Boren came with the Longs in 1892 (Boren 1978, 1987), but the petroglyph at 41GR545 together with the initials of Walter Roy and the OS (Overall and Street) brand which was bought out by the Longs, clearly proves that Boren was cowboying for Andy Long in Garza County by 1887, the date appended to his name at 41GR545. Boren later settled in Section 6, Blk. 6 (Texas. General Land Office 1921), and became Garza County's first judge (Boren 1987). He died in Garza County on November 15, 1937.

JTB (site 41GR283)

These initials may belong to John Boren. For biographical details, see below, "Mr. and Mrs. John Boren."

MKB - 1933 (site 41GR51)

These initials may belong to Mildred Boren, daughter of Ella and James Minus Boren, who was born ca. 1903 (Garza County Probate Record 1:379-380).

RB - 1925, 1936 (site 41GR51, 41GR557)

These initials may belong to Rosa Boren. For biographical details, see below, "Rosa Boren."

SB (site 41GR317)

These initials may belong to S. D. Boren. For biographical details, see below, "Dee Boren."

SDB (site 41GR308)

These initials probably belong to S. D. Boren. For biographical details, see below, "Dee Boren."

WSB - 1934, 1936 (sites 41GR305, 41GR313)

Information about this inscription was not located in 1987.

Robert Benem (site 41GR445)

Information about this inscription was not located in 1987. It may be associated with an 1854 date.

P. C. Bennett - 1923 (site 41GR567)

This inscription may have been made by a P. C. Bennett who died in Kent County on April 17, 1927. A notation associated with the inscription indicates that Bennett was from Bluffdale, Texas.

Cecil Boren - 1917 (sites 41GR448, 41GR517)

Cecil Boren was the son of S. D. and Nannie Boren. He was born in about 1905 and died in Scurry County on June 27, 1924, but is buried in the Justiceburg Cemetery (41GR522).

Dee Boren (site 41GR445)

Dee Boren, also known as S. D. Boren, was the third of the Boren brothers employed by the Longs as a cowboy. He was born in Texas in 1876 and homesteaded Section 114, Block 5 in 1900, living first at site 41GR443. His wife was Nannie, and they had a son named Cecil D. Boren (Boren 1978, 1987; U.S. Bureau of the Census 1910).

Mr. and Mrs. John Boren - 1918 (site 41GR51)

John Boren was one of three brothers who came to Garza County from Bell County and worked for the Long Brothers as cowboys. Boren was born in Carroll County, Arkansas, on November 27, 1868, to George E. and Sarah (Hodges) Boren. In about 1900, he took up four sections in southeastern Garza County and worked for Connell, Clark, and Scharbauer, new owners of the Longs's OS Ranch. He married Xira Kate Bunker on October 7, 1900, and in 1902 started construction on a new frame home. John Boren was elected Commissioner of Precinct 4 in 1911, and Kate Boren served as County Trustee for several years. She died in March 1932; John Boren died on December 10, 1963 (Boren 1978, 1987; U.S. Bureau of the Census 1910; Didway 1973:19-21).

Rosa Boren - 1901 (site 41GR445)

Information about this inscription was not located in 1987.

X. K. Boyen - 1901 (site 41GR445)

Inscription is that of Xira K. Boren, the wife of John S. Boren. She was born in ca. 1873 in Ohio (U.S. Bureau of the Census 1910). For other biographical details, see "Mr. and Mrs. John Boren."

Dee Boyen

For information about this inscription, see "Dee Boren."

Rosa Boyen

This inscription probably was made by Rosa Boren.

Br...ge (?)

Information about this inscription was not located in 1987.

Buford Browning (site 41GR473)

Information about this inscription was not located in 1987.

Jesse Browning (site 41GR473)

Information about this inscription was not located in 1987.

R. C. Burns - 1883 (site 41GR51)

This is probably the signature of Rollie C. Burns, one of the Panhandle's best-known cowboys and observers of Texas as it changed from an open- to a fenced-range country. Burns was born in Nodaway County, Missouri, on April 6, 1857, and moved to Texas in 1861. He joined a surveying expedition to the Panhandle in 1873 and stayed on to work on various ranches. In 1883-1884 he was manager of the Llano Cattle Company's Curry-Comb Ranch in Garza County which headquartered near the present-day town of Post but leased land south to the vicinity of the project area (Holden 1932:1-29).

C

ALC - 1941 (site 41GR448)

Information about this inscription was not located in 1987.

DKC - 1888[?] (site 41GR305)

The date of this inscription suggests that "DKC" may have been an employee of the OS Ranch owned by Andy and Francis Long.

WRC - 1914 (site 41GR242)

Information about this inscription was not located in 1987.

Bandy Cash - 1935 (site 41GR315)

In 1987, Bandy Cash was still a resident of Post, Texas. On December 24, 1932, he married Mildred Woodard, daughter of Milton and Hattie (Reed) Woodard and granddaughter of John and Martha Jane (Riley) Reed, residents of the project area since 1905. One son of Bandy and Mildred Cash, Norman Cash, born in 1933, became a Major League baseball player with the White Sox and, later, the Detroit Tigers (Didway 1973:83).

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Norm Cash (site 41GR315)

For information about this inscription, see "Bandy Cash."

Cecil (site 41GR517)

This inscription may refer to Cecil Boren; cartoon figures are associated. For other biographical details, see "Cecil Boren."

Anna Lea Cowan (site 41GR464)

Information about this inscription was not located in 1987.

Bill Cowan (site 41GR464)

Information about this inscription was not located in 1987.

E. Cowan - 1915 (site 41GR464)

Information about this inscription was not located in 1987. A notation following Cowan's name indicates that he was from Fluvanna, Texas.

D

DCD - 1940 (site 41GR322)

Information about this inscription was not located in 1987.

MED - 1931 (site 41GR545)

Information about this inscription was not located in 1987.

Dee (site 41GR308)

For information about this inscription, see "Dee Boren."

Eva Davis - 1924 (site 41KT54)

Information about this inscription was not located in 1987.

Maud Davis - 1908 (site 41KT54)

Information about this inscription was not located in 1987.

Hollis and Verda [Verla] Drake (site 41GR525)

Information about this inscription was not located in 1987.

Vanie Duke - 1912 (site 41KT60)

Information about this inscription was not located in 1987.

E

FE - 1901 (site 41GR475)

Information about this inscription was not located in 1987.

EMMA (site 41GR526)

Appears with the name "ORA," but information about this inscription was not located in 1987.

Ethel - 1932 (site 41GR321)

Information about this inscription was not located in 1987.

Jim E. (site 41KT76)

Information about this inscription was not located in 1987.

L. E. English - 1922 (site 41GR51)

A notation beside his name indicates that Mr. English was a geologist. Judging from the date, he may have been involved in the early oil development in Garza County.

P. M. Esqueda - 1937 (site 41KT54)

Information about this inscription was not located in 1987.

I. C. Evans - 1911 (site 41GR545)

Information about this inscription was not located in 1987.

F

BJF (site 41GR448)

Information about this inscription was not located in 1987.

JEF - 1901 (site 41GR545)

Information about this inscription was not located in 1987.

J. A. Ferguson - 1926 (site 41GR536)

A notation associated with this inscription indicates that Ferguson was from Post.

J. C. Fritz - 1937 (site 41GR51)

Information about this inscription was not located in 1987.

G

HG - 1910 (site 41KT72)

This inscription may have been made by Hall Graham, friend of the John Mason family who owned Section 48, Block 5 (Didway 1973:47).

JHG (site 41KT65)

Information about this inscription was not located in 1987.

WWG - 1908 (site 41KT65)

This inscription may have been made by W. W. Glass, a 24-year-old native Texas cattleman in 1880 when he lived in Garza County on Harvey's Creek (U.S. Bureau of the Census 1880).

Genneva (JA) - 1927 (site 41GR545)

Information about this inscription was not located in 1987. "JA" may or may not be associated.

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Gladys (site 41GR545)

For information about this inscription, see "GP."

I. W. Gr...is - 1943 (site 41GR558)

Information about this inscription was not located in 1987.

Al Groves (site 41GR526)

Information about this inscription was not located in 1987.

W. L. Groves - 1897 (site 41GR526)

The date of this inscription suggests that "W. L. Groves" may have been an employee of the OS Ranch owned by Andy and Francis Long.

H

HH - 1936 (site 41GR517)

Information about this inscription was not located in 1987.

VH (site 41GR418)

Information about this inscription was not located in 1987.

J

AHJ - 1901 (site 41GR473)

This inscription probably refers to Appleton Henry Justice who married Della Exa Stell on November 3, 1912 (The Post Dispatch, April 8, 1987:2). A. H. Justice was the son of Mattie and Jeff D. Justice. He was born in July 1885 and lived at site 41GR474 (U.S. Bureau of the Census 1900).

AJ (site 41GR494)

For information about this inscription, see "AHJ."

GJ (site 41GR473)

This inscription may belong to Georgia Justice, 10-year-old daughter of Jeff D. and Mattie Justice (U.S. Bureau of the Census 1900).

JJJ - 1909 (site 41GR558)

Information about this inscription was not located in 1987. It is probably associated with the Jeff Justice inscription at the same site and could be that of Jeff Justice, Jr.

LCJ - 1911 (site 41GR445)

Information about this inscription was not located in 1987.

LEJ (site 41GR298)

Information about this inscription was not located in 1987.

LMJ (site 41GR550)

Information about this inscription was not located in 1987.

NJ - 1927 (site 41GR556)

This inscription may belong to Naomi Jones, daughter of Charlie A. and Lillie (Justice) Jones (Didway 1973:25).

RJ - 1937 (sites 41GR313, 41GR317, 41GR321)

Information about this inscription was not located in 1987.

Pearle [sic] J - 1902 (site 41GR51)

This inscription probably refers to Pearl Justice, one of Jeff and Mattie Justices' eight children. Eventually, Pearl married Will Williams, an OS cowboy who homesteaded on Section 70, Block 5, north of the project area (Didway 1973:24-25; Women's Division of Post Chamber of Commerce n.d. 1978; Texas. General Land Office 1933).

Little Jeff - 1931 (site 41GR51)

This inscription may refer to Jeff Justice, Jr. or to his son, Jeff (Didway 1973:25).

Shirley June - 1931 (site 41GR51)

This inscription probably refers to Shirley June Justice, daughter of Jeff and Doyle (Bridges) Justice and granddaughter of Jeff D. and Mattie (Humphreys) Justice (Didway 1973:24-25).

E. S. Jackson - 1889 (site 41GR51)

The date of this inscription suggests that E. S. Jackson may have been an employee of the OS Ranch owned by Andy and Francis Long.

A. Y. Jennings - 1923 (41GR333)

Information about this inscription was not located in 1987.

Boyd Jones - 1940 (site 41GR51)

Information about this inscription was not located in 1987.

Truman Jones - 1938 (site 41GR51)

Truman Jones was the son of Charles A. and Lillie (Justice) Jones and grandson of Jeff D. and Mattie (Humphreys) Justice (Didway 1973:24-25).

Earl Justice - 1915 (site 41GR51, 41GR516)

Information about this inscription was not located in 1987.

Jeff Justice - 1904 (site 41GR51, 41GR558)

Jeff D. Justice was born in Alabama on December 7, 1861, and married Mattie Humphreys on December 8, 1878. After moving to Dunn and then Snyder, where Justice served as county treasurer from 1892-1894, the couple and their eight children homesteaded four sections in 1899. Their first home probably was the dugout at site 41GR474; soon after 1900, they constructed a Victorian frame ranchhouse nearby.

While Justice was primarily a rancher, he also was responsible for the platting of the town of Justiceburg and for the operation of a number of businesses there, including a store and lumberyard. He died on January 2, 1934, in Post and was buried in Snyder (Didway 1973:23-25).

Jeff Justice, Jr. - 1931 (site 41GR51)

This inscription probably was made by the son of Jeff D. and Mattie (Humphreys) Justice, and husband of Doyle (Bridges) Justice (Didway 1973:24-25). According to the 1900 Garza County census, Jeff Justice, Jr. was born in May 1887.

Myrtle Justice - 1913 (site 41GR51)

This inscription could be that of Mattie Justice, wife of Jeff Justice. For further information about Mattie Justice, see "Jeff Justice."

Vada Justice (site 41GR557)

Information about this inscription was not located in 1987.

K

RKK - 1886 (site 41GR305)

The date of this inscription suggests that "RKK" may have been an employee of the OS Ranch owned by Andy and Francis Long.

Kelly & Roy (site 41GR526)

For information about this inscription, see "O. B. Kelly" and "W. Roy."

O. B. Kelly - 1897 (site 41GR51)

O. B. Kelly, born in April 1871 in Texas, came to the project area in 1892 as an employee of the OS Ranch, then owned by A. J. and F. M. Long. He married Lula Elkins, a local teacher, on August 13, 1899, and they moved to the Llano Ranch in 1903. Eventually, he became foreman of the ranch as well as first sheriff of Garza County (U.S. Bureau of the Census 1900; Didway 1973:21-22).

(Key), J - 1945 (site 41GR51)

This inscription probably is that of John R. Key, born December 1897 to John and Sarah Key (U.S. Bureau of the Census 1900). Key's relationship to Mona and Raymond Key is not known at this time.

(Key), Mona - 1945 (site 41GR51)

See Mona Key.

Mona Key - 1940 (site 41GR51)

Mona Key was the wife of Raymond Key, whose parents, John and Beulah Irene (Fouts) Key, settled in Garza County in 1900. In about 1910, the family built a home in the new Burnham townsite, then moved it to the Justiceburg townsite (Didway 1973:37-39).

L

CJL - 1915, 1918, 1925 (sites 41GR465, 41GR475, 41GR545, 41GR556, and 41GR559)

For information about this inscription, see "C. J. Leininger."

EML - 1929 (site 41GR242)

Information about this inscription was not located in 1987.

HHL (sites 41GR525, 41GR526)

Letters are connected. Information about this inscription was not located in 1987.

V.AL. - 1941 (site 41GR448)

Information about this inscription was not located in 1987.

C. J. Leininger - 1915, 1918, 1925, 1929 (sites 41GR51, 41GR464, 41GR465, 41GR475, 41GR536, 41GR545, 41GR552, 41GR556, 41GR559)

C. J. and Mrs. Leininger ran the hotel in Justiceburg; their clientele included the crews on the train as well as the regular passengers. Dates inscribed at four petroglyphic sites and mentioned in a county history (Didway 1973:87), suggest that the Leiningers must have been Justiceburg residents from the World War I era until the early 1930s.

Lincoln - 1841 (site 41GR315)

Information about this inscription was not located in 1987. Inscription appears to be recent and is probably a hoax.

Emmett Long - 1915 (site 41GR51)

Information about this inscription was not located in 1987.

Mc

Melvin McCallom (site 41GR315)

Information about this inscription was not located in 1987.

Adam G. McCoy - 1885 (site 41KT54)

The date of the inscription suggests that Adam G. McCoy may have been an employee of the OS Ranch owned by Andy and Francis Long.

W. C. [or G.] McMeans - 1921, 1930 (sites 41GR51, 41GR419)

Information about this inscription was not located in 1987.

C. E. McReynolds - 1925 (site 41GR51)

Information about this inscription was not located in 1987.

M

Myrtl - 1915 (site 41GR285)

This inscription may be that of Myrtle (or Mattie?) Justice.

C. Mann - 1881 (site 41GR445)

The date of the inscription suggests that C. Mann may have been an employee of the Overall and Street outfit near Fluvanna, or of Andy and Francis Long.

J. Melza (site 41GR525)

Information about this inscription was not located in 1987.

Ellen Moore - 1938 (site 41GR51)

Information about this inscription was not located in 1987.

N

Nan OA (site 41GR445)

Information about this inscription was not located in 1987. It may be associated with an 1854 date.

Nannie (site 41GR545)

This inscription may have been made by Nannie Justice, daughter of Jeff and Mattie Justice (Didway 1973:23-24).

H. Nunn (site 41GR437)

This individual may have been related to the Nunn family of Scurry County who came to the Deep Creek area in the late 1870s or early 1880s (Anderson 1984:100).

O

Obaden - [18]87 (site 41GR308)

Information about this inscription was not located in 1987.

Jerry Odom (site 41GR558)

Information about this inscription was not located in 1987.

Percy Olive - 1925 (site 41GR51)

Information about this inscription was not located in 1987.

ORA (site 41GR526)

Appears with the name "EMMA"; information about this inscription was not located in 1987.

P

CSP - 1907 (site 41KT76)

Information about this inscription was not located in 1987.

GP - 1927 (site 41GR545)

This inscription may belong to Gladys Pettigrew, daughter of Mr. and Mrs. Ernest C. Pettigrew, who came to Garza County in the fall of 1922 and settled on the Forrest Tuffing place east of Justiceburg (Women's Division of Post Chamber of Commerce n.d.: 114).

Pearl (site 41GR545)

This inscription probably was made by Pearl Justice, daughter of Jeff and Mattie Justice (Didway 1973:23-24).

Howard Penn - 1935 (site 41GR536)

A notation associated with this inscription indicates that Penn was from Fort Worth.

J. C. Pintle - 1930[?] (site 41GR464)

Information about this inscription was not located in 1987.

H. L. Pumphrey - 1921 (site 41GR51)

Information about this inscription was not located in 1987.

R

HDR - 1925 (site 41GR545)

Information about this inscription was not located in 1987.

USR - June 6, 1849 (site 41GR333)

This inscription appears to be associated with military activity in the project area. However, no records have been discovered to date which positively identify a military unit prior to Marcy's expedition to the vicinity of the Double Mountains in October 1849.

WR (site 41GR545)

For information about this inscription see "W. Roy."

WVR (sites 41GR308, 41GR545)

For information about this inscription, see "W. Roy."

Holl R - 1944 (site 41KT60)

Information about this inscription was not located in 1987.

Ranch - 1923 (site 41GR51)

Information about this inscription was not located in 1987.

Eugenia Reed - 1932 (site 41GR51)

Information about this inscription was not located in 1987.

Newton Renfroe - 1935 (site 41GR537)

Information about this inscription was not located in 1987.

Roy (site 41GR545)

For information about this inscription, see "W. Roy."

W. Roy - 1887 (41GR545)

This inscription was made by Walter V. "Cap" Roy, an employee of the Long Brothers and the OS Ranch, and homesteader on Section 96, Block 5 (see sites 41GR263 and 41GR565). Roy married Myrtle Hoffman on January 15, 1908, in Denton. He became a resident of Post in 1951 and died on May 27, 1959. He is buried in Terrace Cemetery, Post (Didway 1973:30).

S

BTS (site 41KT76)

Information about this inscription was not located in 1987.

DS (site 41KT76)

Information about this inscription was not located in 1987.

D.A.S. (site 41KT76)

Information about this inscription was not located in 1987.

F.K.S. (site 41KT76)

Information about this inscription was not located in 1987.

MS - 1940 (41GR51)

Information about this inscription was not located in 1987.

SMS - 1916 (41GR54)

Information about this inscription was not located in 1987.

OS - 1889 (sites 41GR51, 41GR545)

According to McCrary (1970:8), the OS brand originated in the early 1880s after cattlemen Andy J. and Francis M. Long bought EO cattle belonging to Overall and Street near Fluvanna and combined them with their own cattle and those from the 202 Ranch owned by the Lexington Ranch Company with which they were involved. They owned the brand, cattle, and leases throughout the project area until June 7, 1901, when they sold them to Connell, Scharbauer, and Clark, who continued to use the OS brand (Cox 1895:399-400, 465; Holden 1932:76).

Ed Scott - 1887 (site 41GR322)

This inscription was made by Ed Scott, Sr., manager of the Llano, or Curry Comb, Ranch which was located in the northwestern quarter of Garza County and was acquired by C. W. Post (Holden 1932:103-104; The Post Dispatch, September 12, 1957:1). His son, Ed Scott, Jr., who came to Garza County in 1889 to work for the Longs, became one of the most memorable employees of the OS Ranch (The Post Dispatch, September 12, 1957:1).

J. C. Smith - 1886 (site 41KT50)

This inscription may refer to Joe Smith of Griffith Canyon whose daughter, Ella Smith, taught children from the project area in the Bud Marable home (Didway 1973:85).

Della Stell - 1908 (site 41KT54)

This inscription refers to Della Exa Stell, who was born on September 12, 1892, to pioneer ranchers Mary Lou Ella Stell and Bush Malone Stell at Runnels, Texas. She married Appleton Henry Justice on November 3, 1912, at her parents' ranch home near Polar in Kent County. Justice died in 1918, and she continued to live on their Garza County ranch until 1923. She lived in West Texas and New Mexico, then retired to Lubbock in 1964 where she died on April 2, 1987 (The Post Dispatch, April 8, 1987).

JEP Stell - 1924 (site 41KT54)

Information about this inscription was not located in 1987.

JFP Stell - 1911 (site 41KT60)

For information about this inscription, see "JEP Stell."

Wille Stell - 1924 (site 41KT54)

Information about this inscription was not located in 1987.

Earl Stevens - 1918 (site 41GR553)

Information about this inscription was not located in 1987. A notation associated with the name suggests that Stevens was from Ohio.

E. G. Strickland - 1944 (site 41GR51)

Information about this inscription was not located in 1987.

Fulton Strickland - 1944 (site 41GR51)

Information about this inscription was not located in 1987.

William L. Strickland - 1944 (site 41GR51)

Information about this inscription was not located in 1987.

T

ALT - 1901, 1904, 1908, 1910, 1911 (site 41GR553)

Information about this inscription was not located in 1987.

FBT - 1904 (site 41GR553)

This inscription may be that of Forrest Tuffing. For biographical information about the Tuffing family, see Lee Tuffing.

MT - 1901 (site 41GR553)

Information about this inscription was not located in 1987.

RT - 1898 (site 41GR545)

The date of this inscription suggests that "RT" may have been an employee of the OS Ranch owned by Andy and Francis Long.

Lee Tuffing - 1913 (site 41GR455)

Lee Tuffing, son of Mr. and Mrs. Arthur Tuffing, was born in Ohio. The family migrated to Texas and bought Section 10, Block 5, from T. J. Payne in 1901 (Garza County Deed Record 7:222). Mrs. Tuffing began a school and a post office which were named Leforest for Lee and his brother, Forrest Tuffing (Didway 1973:57-59; The Post Dispatch, September 12, 1957:3).

U

BU (site 41GR317)

Information about this inscription was not located in 1987.

W

ECW (site 41GR298)

Information about this inscription was not located in 1987.

EEW (site 41GR317)

Information about this inscription was not located in 1987.

EMW - 1934 (site 41GR307)

For information about this inscription, see "E. M. Woodard."

WIIIW (site 41GR308)

This inscription may be that of Will Williams. For information about Williams, see "Will W."

WW (site 41GR315)

This inscription may be that of Will Williams. For information about Williams, see "Will W."

WBW - 1918 (site 41GR557)

Information about this inscription was not located in 1987.

Wallace (site 41GR558)

Information about this inscription was not located in 1987.

Will W - 1904 (site 41GR294)

This inscription probably is that of Will Williams, an OS cowboy who homesteaded Section 70, Block 5, and married Mattie Pearl Justice (Texas. General Land Office 1933; Women's Division of Post Chamber of Commerce n.d.:78).

Verne W[a]lden - 1912, 1917 (sites 41GR51, 41GR445)

Verne Walden is listed on the Garza County 1910 census as Vern Walden, seven-year-old son of George B. and Asa P. Walden. The family's placement in the census suggests that they lived in or very near Justiceburg.

P. E. Ware - 1931 (site 41KT73)

Information about this inscription was not located in 1987.

H. M. Williams - 1909 (site 41GR51)

Information about this inscription was not located in 1987.

Sallie Williams - 1900 (site 41GR51)

This inscription is probably associated with a member of the Will or Mary Williams families mentioned in the 1900 census and living in the eastern portion of the project area. According to a county history (Women's Division of Post Chamber of Commerce n.d.:78), Will Williams helped his mother bring his younger siblings to Garza County after his father died in Hamilton County. It seems likely, therefore, that Sallie Williams, living with her widowed mother, Mary, in 1900, was Will Williams' sister.

W. G. Williams (site 41GR308)

Information about this inscription was not located in 1987.

E. M. Woodard - 1912, 1917 (site 41GR416)

This inscription belongs to Early M. Woodard, who is listed in the 1910 Garza County census as having been a 20-year-old native of Texas and farmer in the vicinity of the project area. His wife was Hattie E. Woodard, and they had a five-month-old son, Elvin C. Hattie Woodard was a daughter of John Samuel and Martha Jane (Riley) Reed (The Post Dispatch, September 15, 1949:1).

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