AN ARCHAEOLOGICAL SURVEY OF THE TIGER CREEK COMPARTMENT 3 JASPER COUNTY TEXAS

Ву

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Contract Report Number 89

AN ARCHAEOLOGICAL SURVEY OF THE TIGER CREEK COMPARTMENT 3 JASPER COUNTY, TEXAS

BVRA Project Number 01-10

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ABSTRACT

An archaeological investigation of 153 acres of uplands overlooking Tiger Creek (Lake Sam Rayburn) in north Jasper County, Texas was performed by Brazos Valley Research Associates (BVRA) of Bryan, Texas in July 2001. Four prehistoric localities containing 1 flake found in a shovel test, 2 flakes found on the surface, 3 flakes found in a shovel test, and 1 dart point found in a shovel test were collected. The artifact density at each locality was too sparse to warrant an official site designation. One diagnostic artifact, a Yarbrough dart point made of petrified palm was found at Locality 2. This artifact dates to the Middle to Late Archaic period. Based on this study and previous work in the area, it is hypothesized that upland settings such as the locus of this investigation are low probability areas for significant archaeological sites. The flakes represent incidental activities such as tool maintenance, and the dart point is viewed as an isolated find, probably a point that was not retrieved after use. The artifacts have been turned over to the Corps of Engineers, Fort Worth District for curation. Copies of the report are on file at the Texas Historical Commission, Archeology Division; Texas Archeological Research Laboratory (TARL); and the Corps of Engineers, Fort Worth District.

ACKNOWLEDGMENTS

BVRA is appreciative of the assistance provided by the following individuals. Stephen P. Austin, Cultural Resources Manager at the Jefferson office of the Corps of Engineers, Fort Worth District and Keith Cook, Forester at Lake Sam Rayburn provided maps and logistical support during this project. William E. Moore, James E. Warren, Arthur Romine, Bobby Jemison comprised the field crew. William A. Martin at the Texas Historical Commission, Archeology Division, served as the reviewer for this project, and his input was valuable to the successful outcome of this investigation. The lithics found during the survey were examined by William A. Dickens. Adrianne Mraz, Research Assistant, at TARL, assisted the Principal Investigator in the records check of the site records for previously recorded sites in and near the project area. Lili Lyddon prepared the figures appearing in this report.

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INTRODUCTION

An archaeological survey of 153 acres (62 hectares) in an upland setting overlooking Tiger Creek in north Jasper County, Texas (Figure 1) was conducted by BVRA. The project area is located on federal land (Lake Sam Rayburn) that is regulated by the United States Army Corps of Enginers, Fort Worth District. The selected parcel is located in the northeast quadrant of the McGee Bend USGS 7.5' topographic map (Figure 2). It is the intention of the government to selectively thin timber in the 153 acre tract as a forest management tool.

Overall, the project area is located in a region known to contain significant archaeological sites. Because of this archaeological potential, an archaeological survey by professional archaeologists was warranted according to Section 110 of the National Historic Preservation Act. Since this is a federally funded project, no Antiquities Permit was required. In order to satisfy this requirement, BVRA was retained by the Corps of Engineers, Fort Worth District to examine the 153 acre tract for the presence of significant archaeological sites. The project number assigned by BVRA is 01-10, and the agreement number assigned by the Corps of Engineers is DACW63-01-P-0398. The field survey was conducted on July 23-27, 2001.

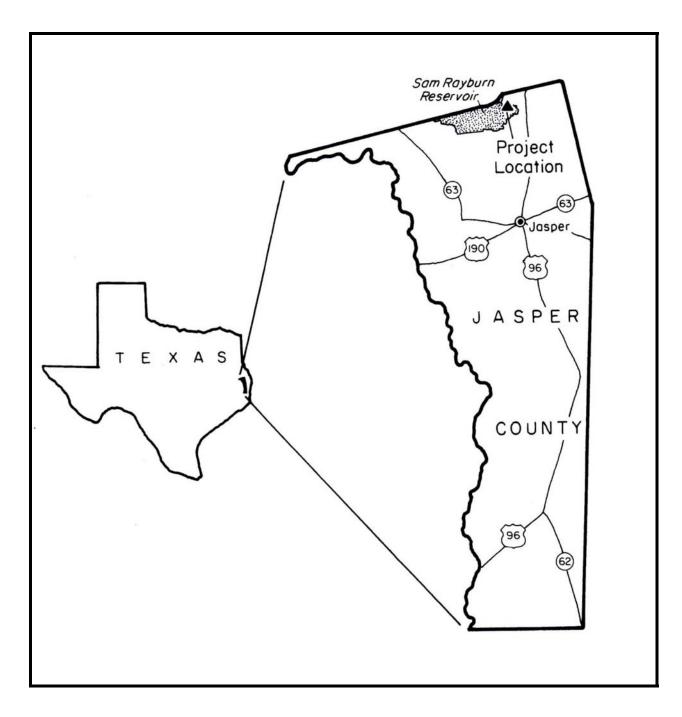


Figure 1. General Location Map

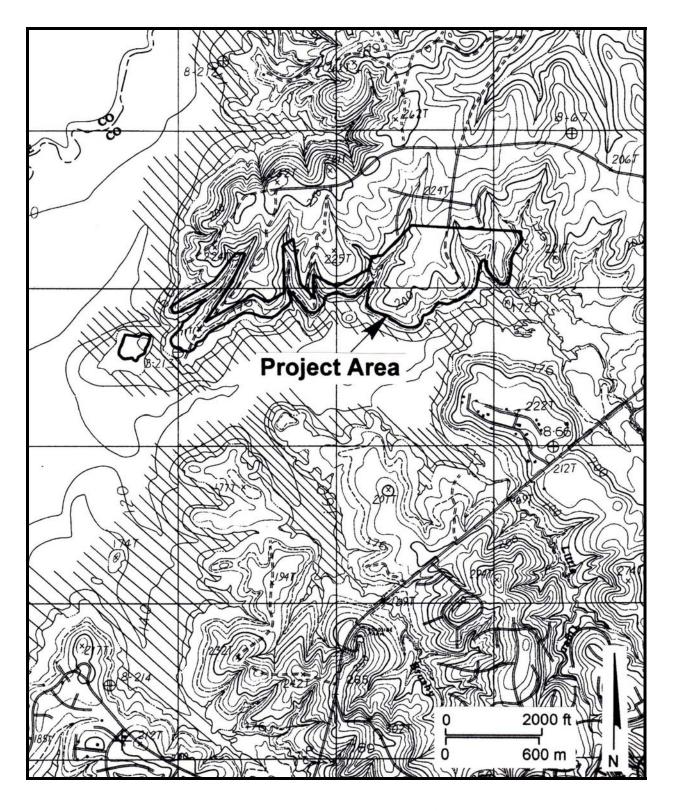


Figure 2. Project Area on Topographic Map

PROJECT SETTING

In general, the project area is located in the lower Gulf Coastal Plain (Fenneman 1938) along the Angelina River valley north of the confluence of that river with the Neches River. This area is within the Austroriparian biotic province (Blair 1950). Specifically, the area consists of mature and second growth upland forests composed of loblolly pine, yellow pine, and hardwoods that include various oaks.

There are four soil types in the project area according to the soil survey for Jasper County (Neitsch 1982:Sheet 7). These are the Letney-Tehran association, undulating (LTC) (Neitsch 1982:30), Melhomes soils, frequently flooded (Mo) (Neitsch 1982:32-33), Rayburn-Corrigan association, undulating (RAB) (Neitsch 1982:37), and Tehran-Letney association, hilly (TLE) (Neitsch 1982:43-44). The project area depicted on the soils map appears as Figure 3.

LTC soils are present in areas 5-6 and 10. They are deep sandy soils on uplands on broad ridges and side slopes above drainageways. They occupy most of the highest landforms in the survey area. Slopes range from 1 to 8 percent. Letney soils are well drained, and Tehran soils are somewhat excessively drained. Permeability of the soils is moderately rapid, and runoff is slow. The available water capacity is medium for Letney soils and low for Tehran soils. These soils are typically used as woodland.

MO soils are present in area 5 and 6, but constitute only small percentage of these areas. These are deep, nearly level and gently sloping sandy soils on poorly defined drains and lower slopes in drainageways. They are saturated throughout most of the year. Slopes are mostly 2 percent or less, but some areas on lower side slopes range to 5 percent. Melhomes soils are poorly drained, runoff is very slow, and permeability is rapid.

RAB soils are present in areas 1-4 and 6. These are deep and moderately deep loamy soils on ridges and middle to upper side slopes on uplands. Slopes range from 1 to 5 percent. Rayburn soils are moderately well drained, and Corrigan soils are somewhat poorly drained. Runoff is slow to rapid and permeability is very slow. The available water capacity for Rayburn soils is medium and low for Corrigan soils.

TLE soils are present in areas 1-2 and 6-9. These are deep sandy soils on ridge tops and side slopes above drainageways on uplands. Slopes range from 8 to 20 percent. Tehran soils are somewhat excessively drained, and Letney soils are well drained. Permeability of Tehran and Letney soils is moderately rapid, and runoff is slow. The available water capacity is low for Tehran soils and medium for Letney soils.

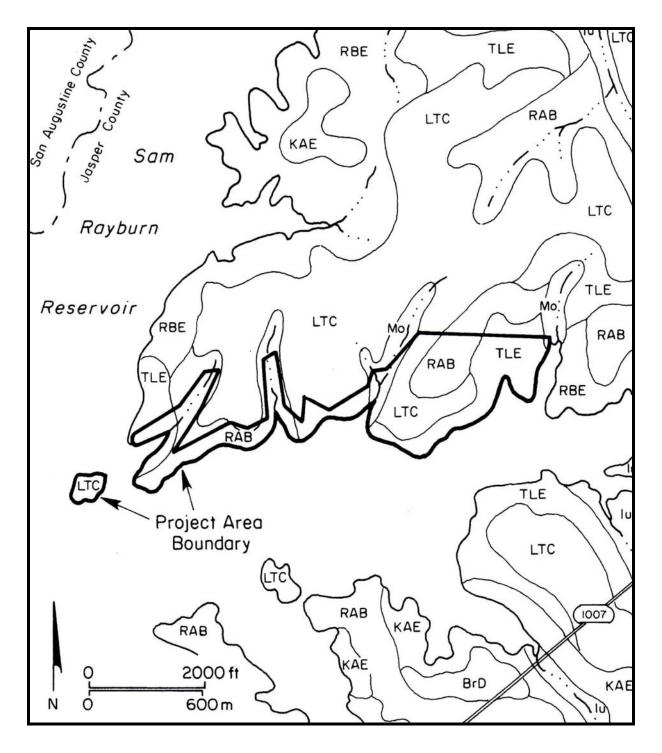


Figure 3. Project Area Soils

ARCHAEOLOGICAL BACKGROUND

According to a planning document for the Eastern Planning Region of Texas published in 1993 (Kenmotsu and Perttula 1993:Figure 1.1.2), Jasper County is situated within the Southeast Texas archeological study region. In 1985, according to a statistical overview prepared by the Texas Historical Commission (Biesaart et al. 1985:151), Jasper County contained 86 recorded sites. The site files at TARL revealed 149 recorded sites at the time of this survey. In 1985, 0 sites in the county had been excavated, 10 had been tested by hand, 1 had been tested by machine, and 73 had been surface collected. Twenty-three recorded prehistoric sites in the county were listed as Archaic and 54 sites were listed as Late Prehistoric (Biesaart et al. 1985:151). One site contained burials.

In the volume by (Kenmotsu and Perttula 1993:Figure 1.1.3) an evaluation was made regarding density of sites in Texas counties. At this time Jasper County was next to last with 0.001 - 0.1 sites per square mile. In 1993, Jasper County contained 99 recorded archaeological sites. Of this number, 27 were regarded as not significant, 62 were of unknown significance, 9 were probably significant, and 1 was considered to be significant according to National Register criteria (Kenmotsu and Perttula 1993:Table 2.1.1).

Unfortunately, there are major forces that continue to threaten the integrity of archaeological sites in Jasper County. These include population growth (City of Jasper and surrounding area), highway construction, Lake Sam Rayburn (formerly McGee Bend), and the lumbering industry.

Although private contract archaeology firms have played a part, most of the archaeological sites known to exist in Jasper County have been identified by surveys associated with reservoir construction and in-house projects by National Forest personnel. The earliest archaeological research in the area was performed in the late 1930s and early 1940s by researchers from The University of Texas at Austin. At that time prehistoric cemeteries and mound sites were considered to be of primary importance. From the late 1940s until the mid 1970s, most of the archaeological research in East Texas was carried out in connection with reservoir construction. In 1948, for example, Robert L. Stephenson published the results of his work at the proposed McGee Bend Reservoir in Angelina, Jasper, Nacogdoches, Sabine, and San Augustine counties (Stephenson 1948a, 1948b). At the time this was the only systematic professional major archaeological investigation in the county. Since that time several studies regarding reservoirs such as Dam "B" (Stephenson 1949), Big Cow Creek (Moir n.d.), and Rockland Lake (Prikryl (1987) have been published.

Recent projects at Lake Sam Rayburn include work by the Center for Environmental Archaeology (Ferring 1993), Horizon Environmental Services (Nichols 1995), Southern Archaeological Consultants (Keller 1998), and AR Consultants (Skinner and Trask 1996. 1999, Trask and Skinner 1999).

It is beyond the scope of this negative report to discuss in detail the archaeological background of Jasper County, especially when numerous contract reports are available. The interested reader is referred to the statistical overview (Biesaart et al. 1985), the planning document published by the Texas Historical Commission (Kenmotsu and Perttula 1993), the other reports cited above, and the Abstracts in Contract Archaeology series also published by the Texas Historical Commission for more detailed information regarding the archaeology of Jasper County.

METHODS

Prior to entering the field, a records check was conducted for BVRA by Adrianne Mraz, Research Assistant at TARL. Ms. Mraz checked the site files for previously recorded sites in the project area. In addition, information pertaining to previous archaeological work in the region was obtained from the library at BVRA. The field survey crew relied on the topographic map McGee Bend and the soils book for Jasper County (Neitsch 1982). The method utilized to assess the project area consisted of shovel tests and probes and a surface inspection of exposed areas. In all, 69 tests and 30 shovel probes were excavated. Shovel tests were 30 x 50 cm in size and dug in arbitrary 10 cm levels. Probes were not dug by levels or screened. Each test was dug to a minimum depth of 50 cm or to clay. All earth excavated through shovel testing was screened using 1/4" hardware cloth, and a shovel test log (Appendix I) was kept. Profiles of the shovel tests were sketched in the field and the tests were drawn on a project area map. Shovel tests and transects are depicted on area maps in Appendix II. The depth of all artifacts recovered from the positive shovel tests were noted. Each artifact was bagged and saved for future analysis. Shovel tests were marked with blue flagging.

The 153 acre project area was divided into ten segments. Figure 4 depicts a map of the project area showing the ten areas surveyed. At the beginning of this project it was decided that those areas closest to the edge of the bluff would be referred to as high probability areas for the presence of prehistoric sites. Inland areas away from the edge of the bluff, gullies, and slopes were regarded as low probability areas. Four areas (3, 5, 7, and 8) were found to be on steep slopes and were, therefore, not tested. According to the Scope of Work prepared by the Corps of Engineers, shovel tests were dug along 20 meter transects at 20 meter intervals in high probability areas and along 40 meter transects at 40 meter intervals in low probability areas. Gullies and slopes were not tested. In this report those shovel tests dug on transects or on a grid to define site areas are referred to as "stratified." No random tests were excavated. Prior to the beginning of the survey, a meeting was held between the Principal Investigator, the Cultural Resources Manager for the lake (Stephen P. Austin), and the lake forester (Keith Cook). At that time it was decided that single transects would be utilized in the narrow areas along the lake margin. Parallel transects would be employed in the larger areas such as the island (Area 10) and the large area to the east (Area 6). Transects were marked with pink flagging.

In addition, the May 22, 1998 archaeological survey standards prepared by the Texas Historical Commission was followed. According to this document, one shovel test per every three acres must be dug in a project area between 100 and 200 acres. Thus, the 69 tests dug at Tiger Creek - Compartment 3 exceeds the number suggested in the survey standards.

When artifacts were recovered, additional tests were dug in order to define site boundaries. In the three localities (artifacts found on the surface excluded) identified during this survey, tests were dug in the four cardinal directions until two sterile tests were dug or the boundary in either direction was defined by a natural restriction such as a steep slope (see Survey Area 1 and Survey Area 4). Field maps depicting shovel tests locations and transects were drawn. Black-and-White photographs (35 mm) were taken of the general area.

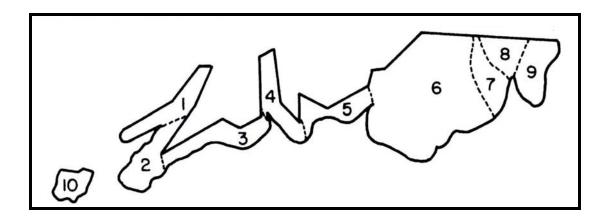


Figure 4. Project Area Depicting Segments Surveyed

During the course of the field survey, the Cultural Resources Manager for Lake Sam Rayburn (Stephen P. Austin) and the forester at Lake Sam Rayburn (Keith Cook) were informed on a regular basis as to the progress of the investigation. Regarding the presence of small numbers of artifacts found in four localities, it was decided that these areas were insignificant and would not be recorded as archaeological sites. Also, a decision was made not to utilize GPS equipment to precisely identify the location of these localities. Therefore, the locations of shovel tests and localities are approximated on the area maps. As a result, the identification of positive shovel tests in the report will not comprise the presence of significant cultural resources to the extent they will be subjected to vandalism.

The ten areas surveyed are discussed below. As stated above, these areas are illustrated in Appendix II. All shovel tests excavated in the project area are drawn on enlarged topographic maps to scale.

AREAS SURVEYED

Area 1

This area consists of a high ridge that terminates at the lakeshore (Figure 5). The area has been disturbed through erosion of the lake at the bluff edge and vehicle traffic (Figure 6). Overall, surface visibility was very good. The survey crew walked the shoreline and surface on the ridge top in an effort to locate surface indications of a prehistoric or historic site. Nothing was found on the surface, and shovel testing was initiated to examine the subsurface. A single transect (1) was initiated at the northern end of this area with shovel tests excavated at 20 meter intervals. At shovel test 6, a single burned chert flake was found at 10 cm in loamy sand. The test was dug to 70 cm, and no additional artifacts were found. Next, additional tests (8 and 9) were dug to the west at 10 meter intervals. The combination of two negative shovel tests and the presence of a steep slope were the determining factors for terminating tests in this direction. No tests were dug to the east because of a steep slope in that direction. The transect was continued to the south with two additional tests (10 and 11). Both were negative. A Corps of Engineers marker (301-1-29) was found near shovel test 11. The distance from shovel test 11 to this marker was measured for location purposes. The single flake in shovel test 6 is referred to in this report as a locality (Locality 1). It was found in RAB soils.



Figure 5. Area 1 (General View Along Shoreline)



Figure 6. Area 1 (Shoreline Disturbance)

This area consists of a high ridge that terminates at the lakeshore (Figure 7). The area has been disturbed through erosion of the lake at the bluff edge and vehicle traffic. Overall, surface visibility was very good. The survey crew walked the shoreline and surface on the ridge top in an effort to locate surface indications of a prehistoric or historic site. No artifacts were observed on the surface, and shovel testing was initiated to examine the subsurface. A single transect (2) was initiated at the northern end of this area with shovel tests excavated at 20 meter intervals near the shore and forty meter intervals at the northern end. At shovel test 61, a Yarbrough dart point was found at 35 cm in loamy sand. The test was dug to 70 cm, and no additional artifacts were found. At this depth yellow clay was encountered. A local collector reported sites in this area when the water is lower. Figure 8 depicts a shoreline view and the area where campers often drive their vehicles. Eight additional tests were dug (four in each direction) at 10 meter intervals, and they were negative. The tests dug in a northeast-southwest direction were dug along transect 3, and the remaining tests were a continuation of transect 2. The dart point in shovel test 61 is referred to in this report as a locality (Locality 2). It was found in RAB soils.

Area 3

This area consists of a steep hillside that parallels the lakeshore. A single transect (4) was followed. Random shovel probes revealed shallow loamy sand over red and yellow clay. No cultural materials were observed on the surface. Because of the steep slope in this area no shovel tests were dug.



Figure 7. Area 2 (General View Along Shoreline)



Figure 8. Area 2 (Area of Vehicular Traffic)

This area consists of a high ridge that terminates at the lakeshore. The area has been disturbed through erosion of the lake at the bluff edge and vehicle traffic. Overall, surface visibility was very good. The survey crew walked the shoreline and surface on the ridge top in an effort to locate surface indications of a prehistoric or historic site. Two flakes made from opal were collected from the eroded lakeshore (Locality 3), and shovel testing was initiated at that point (shovel test 12) to examine the subsurface. A single transect (5) was initiated at the southern end of this area with shovel tests excavated at 20 meter intervals. At shovel test 18, 1 chert flake was found at 30 cm in loamy sand. The test was dug to 50 cm, and no additional artifacts were found. Next, an additional test (20) was dug to the east at a 10 meter interval. No artifacts were found. Another test (19) was dug to the west, and 2 chert flakes were found at 30 cm. Additional tests were dug to the south (transect 6) and to the north. These tests were negative. The western boundary was decided by a steep slope, and the eastern boundary was found to be outside the limits of Corps property. The three flakes in the two shovel tests are referred to in this report as a locality (Locality 4). They were found in LTC soils.

Area 5

This area consists of a steep hillside that parallels the lakeshore. A single transect (7) was followed. Random shovel probes revealed shallow loamy sand over a red and yellow clay. No cultural materials were observed on the surface. Because of the steep slope in this area no shovel tests were dug.

Area 6

This area consists of a high ridge that terminates at the lakeshore. The area near the water has been disturbed through erosion of the lake. Overall, surface visibility was very good along the shore. The survey crew walked the shoreline and surface on the ridge top in an effort to locate surface indications of a prehistoric or historic site. Nothing was found on the surface, and shovel testing was initiated to examine the subsurface.

Three transects (8-10) were followed. Transect 8 was initiated at the southern edge of the hilltop approximately 150 meters from the edge of the lake. In all, six tests (45-50) were dug. The western and southern edges of this area are composed of steep slopes. Returning in a southerly direction, transect 9 was followed. Two tests (51 and 52) were dug. A final transect (10) was dug on a high area. Two tests (53 and 54) were dug. No cultural materials were found within this area.

This area consists of an inland steep hillside with little lakeshore frontage. A single transect (11) was followed. Random shovel probes revealed shallow loamy sand over a red and yellow clay. No cultural materials were observed on the surface. Because of the steep slope in this area no shovel tests were dug.

Area 8

This area consists of an inland steep hillside with no lakeshore frontage. A single transect (12) was followed. Random shovel probes revealed shallow loamy sand over red and yellow clay. No cultural materials were observed on the surface. Because of the steep slope in this area no shovel tests were dug.

Area 9

This area consists of an inland steep hillside with little lakeshore frontage. A single transect (13) was followed. This area is surrounded by steep hills and gullies; these areas were not tested. A single transect (13) was followed working south to north. Six tests (39-44) were dug. No cultural materials were found.

Area 10

This area is an island created by the inundation of the lake. The area was heavily wooded at the time of this survey. The survey crew conducted a surface inspection of the shoreline, and no artifacts were seen. Four transects (14-17) were dug in a north-south direction at 40 meter intervals with tests dug between 15 and 20 meters. Based on the proximity of this landform to the submerged creek it was hypothesized that Area 10 was a high probability area for prehistoric sites. Local informants told the crew that artifacts had been found on the western shore of the island when the lake was down. In all, 14 shovel tests were dug on the island with negative results.

RESULTS AND RECOMMENDATIONS

The records check at TARL revealed no previously recorded archaeological site in the project area. Significant sites in the county have been documented by professional studies such as those at Lake Sam Rayburn (formerly McGee Bend). Three archaeological sites were found to be present in the vicinity. Sites 41JP129 and 41JP30 are located approximately 400 and 500 meters east of the eastern boundary of Tiger Creek Compartment 3 and on the same side of the lake. No site forms were present at TARL; therefore, no information was available to the survey crew for these sites. Site 41JP47 is on the opposite shore from these sites, also on Tiger Creek. The site was recorded by Bill and Nita Davis in 1957 and visited later that year by Curtis Tunnel and Bill Davis. Material collected included ceramics, projectile points, blades, and flakes. The only documentation of this site is a single page site form.

The field survey investigated a 148 acre tract that parallels the lakeshore and a 5 acre island to the southwest. The project area consists of loamy sands that vary in depth from 5 cm to at least 70 cm. The primary cause for disturbance is the result of erosion from the lake, and secondary erosion was noted as the result of vehicular traffic.

Skinner and Trask (1999:48) believe prehistoric occupation at Lake Sam Rayburn was concentrated in the floodplain of the Angelina River and its tributaries. They hypothesize that prehistoric groups probably made excursions into the uplands for specific maintenance resources or to pursue limited extractive activities. Keller (1998:10) refers to ridge crests and slopes above approximately 185 feet located at a considerable distance from water as low probability areas. Although 153 acres is a relatively small area in terms of total land holdings by the federal government at Lake Sam Rayburn, the lack of significant archaeological sites certainly offers strength to any hypothesis that upland areas are low probability areas for major or long-term campsites during the prehistoric period. No significant upland sites have been found to date at Lake Sam Rayburn.

The four localities identified during this survey are consistent with short term activities such as tool maintenance as evidenced by the small flakes scattered over the landform at various depths and the single dart point which probably represents a hunting loss. The burned nature of the flake at Locality 1 suggests natural causes such as a grass or forest fire since no evidence of a hearth was found. Analysis of the dart point revealed an impact fracture that strongly supports the conjecture that it is was abandoned as a hunting loss. The only temporal statement that can be made regarding the localities in the project area is the dart point that has been typed as *Yarbrough*, an Archaic type of unknown age that was found at Locality 2(Figure 9).

It is the opinion of BVRA that no significant archaeological sites exist within the 153 acre Tiger Creek Compartment 3. Therefore, it is recommended that selective timber thinning be allowed to proceed as planned.

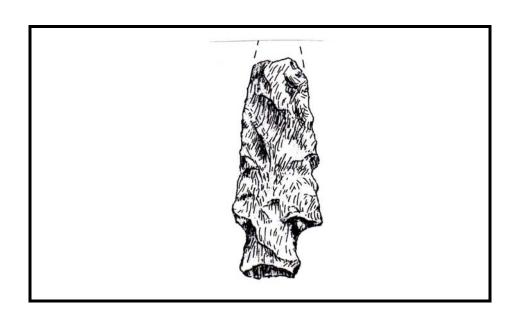


Figure 9. Yarbrough dart point found at Locality 2

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APPENDIX I: SHOVEL TEST LOG

Test	Depth	Description	Results
		Area 1	
01	60 cm*	loamy sand (transect 1)	sterile
02	60 cm*	loamy sand (transect 1)	sterile
03	60 cm*	loamy sand (transect 1)	sterile
04	10 cm	loamy sand over red clay (transect 1)	sterile
05	60 cm*	loamy sand (transect 1)	sterile
06	70 cm*	loamy sand (transect 1)	flake
07	40 cm	loamy sand over red clay (transect 1)	sterile
80	40 cm	loamy sand over red clay (no transect)	sterile
09	60 cm*	loamy sand (no transect)	sterile
10	60 cm*	loamy sand (transect 1)	sterile
11	45 cm	loamy sand over red clay (transect 1)	sterile
		Area 2	
55	40 cm	loamy sand over red clay (transect 2)	sterile
56	40 cm	loamy sand over red clay (transect 2)	sterile
57	50 cm	loamy sand over red clay (transect 2)	sterile
58	30 cm	loamy sand over red clay (transect 2)	sterile
59	30 cm	loamy sand over red clay (transect 2)	sterile
60	10 cm	loamy sand over red clay (transect 2)	sterile
61	70 cm	loamy sand over yellow clay+ (transect 2)	dart point at 35 cm

Test	Depth	Description	Results
62	40 cm	loamy sand over yellow clay+ (transect 2)	sterile
63	50 cm	loamy sand over yellow clay (transect 2)	sterile
64	45 cm	loamy sand over yellow clay+ (transect 2)	sterile
65	30 cm	loamy sand over yellow clay+ (transect 2)	sterile
66	20 cm	loamy sand over yellow clay+ (transect 3)	sterile
67	5 cm	loamy sand over red clay+ (transect 3)	sterile
68	70 cm	loamy sand over yellow clay+ (transect 3)	sterile
69	60 cm	loamy sand over yellow clay (transect 3)	sterile
		Area 3	
		STEEP HILLSIDE - NO SHOVEL TESTS	
		Area 4	
12	50 cm	loamy sand over yellow clay (transect 5)	sterile
13	50 cm*	loamy sand (transect 5)	sterile
14	10 cm	loamy sand over red clay (transect 5)	sterile
15	15 cm	loamy sand over red clay (transect 5)	sterile
16	60 cm	loamy sand over red clay (transect 5)	sterile
17	60 cm*	loamy sand (transect 5)	sterile
18	50 cm	loamy sand over red clay (transect 5)	flake
19	40 cm	loamy sand over red clay (transect 6)	flakes (2)
20	50 cm	loamy sand over red clay (no transect)	sterile
21	60 cm*	loamy sand (transect 6)	sterile

Test	Depth	Description	Results
21	60 cm*	loamy sand (transect 6)	sterile
22	60 cm*	loamy sand (transect 6)	sterile
23	30 cm	loamy sand over red clay (transect 6)	sterile
24	10 cm	loamy sand over red clay (transect 6)	sterile
		Area 5	
		STEEP HILLSIDE - NO SHOVEL TESTS	
		Area 6	
45	60 cm*	loamy sand (transect 8)	sterile
46	60 cm*	loamy sand (transect 8)	sterile
47	60 cm*	loamy sand (transect 8)	sterile
48	60 cm*	loamy sand (transect 8)	sterile
49	60 cm*	loamy sand (transect 8)	sterile
50	60 cm*	loamy sand (transect 8)	sterile
51	60 cm*	loamy sand (transect 9)	sterile
52	60 cm*	loamy sand (transect 9)	sterile
53	60 cm*	loamy sand (transect 10)	sterile
54	60 cm*	loamy sand (transect 10)	sterile
		Area 7	

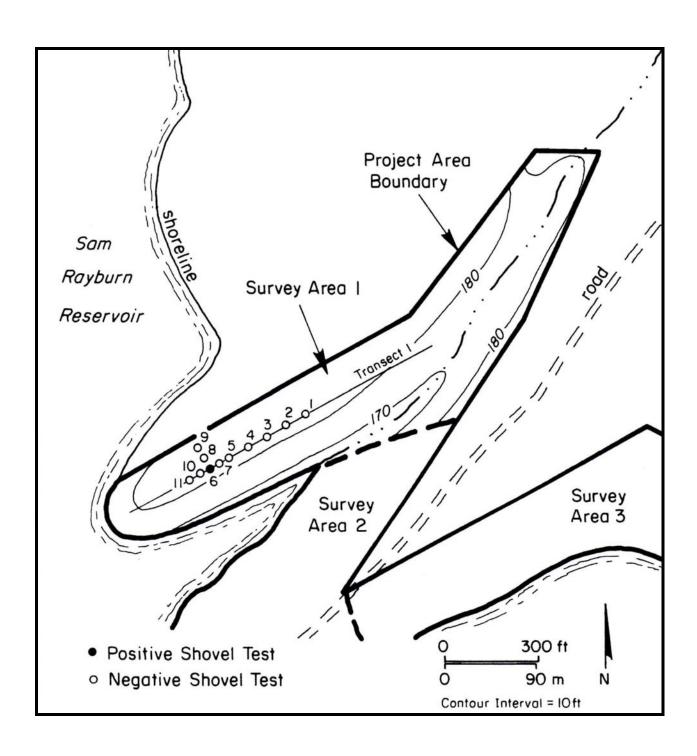
STEEP HILLSIDE - NO SHOVEL TESTS

Test	Depth	Description	Results
		Area 8	
		STEEP HILLSIDE - NO SHOVEL TESTS	
		Area 9	
39	60 cm*	loamy sand (transect 13)	sterile
40	60 cm*	loamy sand (transect 13)	sterile
41	30 cm	loamy sand over red clay (transect 13)	sterile
42	30 cm	loamy sand over red clay (transect 13)	sterile
43	60 cm*	loamy sand (transect 13)	sterile
44	60 cm*	loamy sand (transect 13)	sterile
		Area 10	
25	60 cm*	loamy sand (transect 14)	sterile
26	60 cm*	loamy sand (transect 14)	sterile
27	60 cm*	loamy sand (transect 14)	sterile
28	60 cm*	loamy sand (transect 14)	sterile
29	60 cm*	loamy sand (transect 15)	sterile
30	60 cm*	loamy sand (transect 15)	sterile
31	60 cm*	loamy sand (transect 15)	sterile
32	60 cm*	loamy sand (transect 15)	sterile
33	60 cm*	loamy sand (transect 15)	sterile
34	30 cm	loamy sand over red clay (transect 16)	sterile
35	30 cm	loamy sand over red clay (transect 16)	sterile

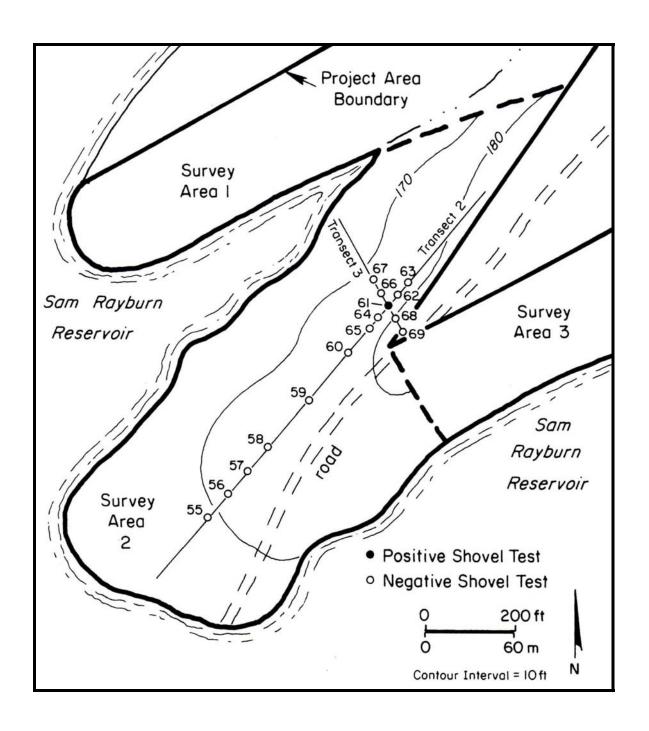
Test	Depth	Description	Results
35	30 cm	loamy sand over red clay (transect 16)	sterile
36	60 cm	loamy sand with gravels (no transect)	sterile
37	40 cm	loamy sand over red clay (transect 17)	sterile
38	40 cm*	gray mud (transect 17)	sterile

^{*} not dug to clay + numerous gravels

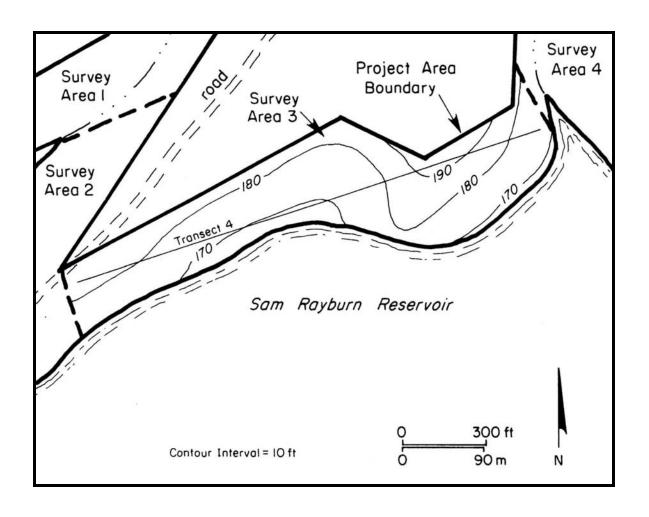
APPENDIX II SURVEY AREAS DEPICTING SHOVEL TESTS AND TRANSECTS



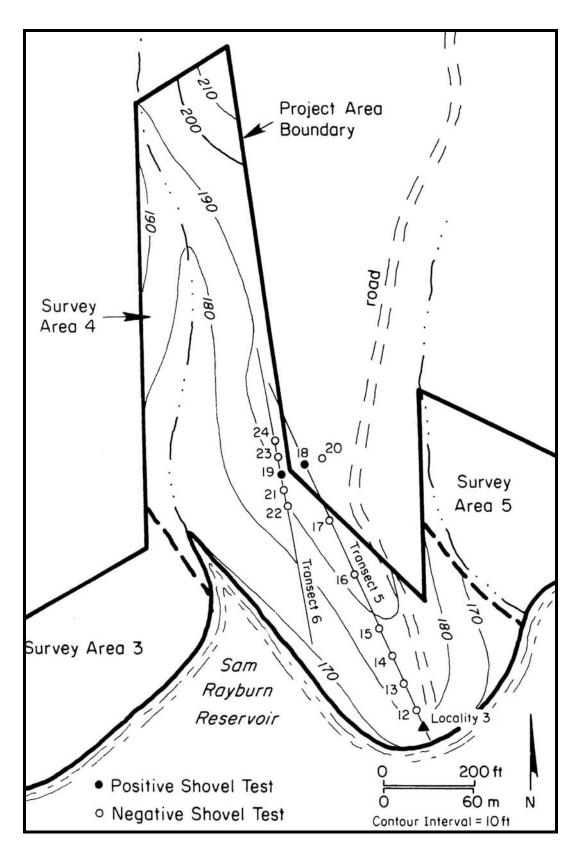
Survey Area 1



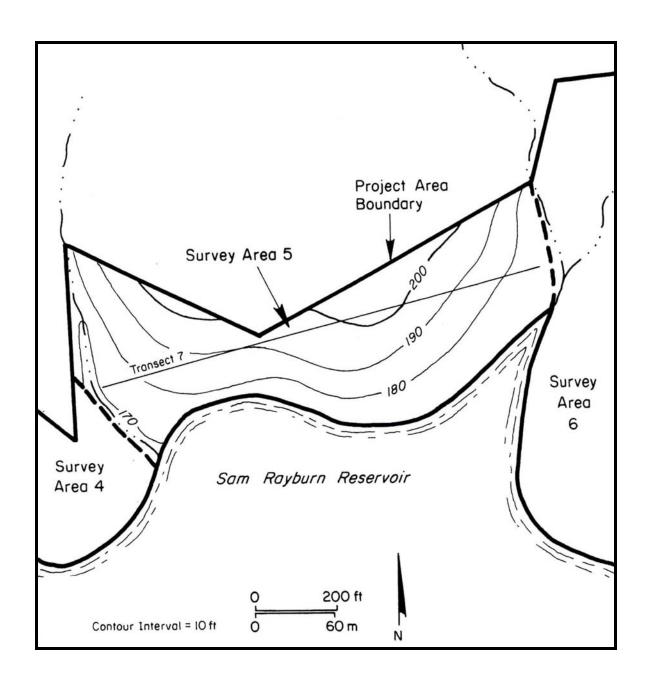
Survey Area 2



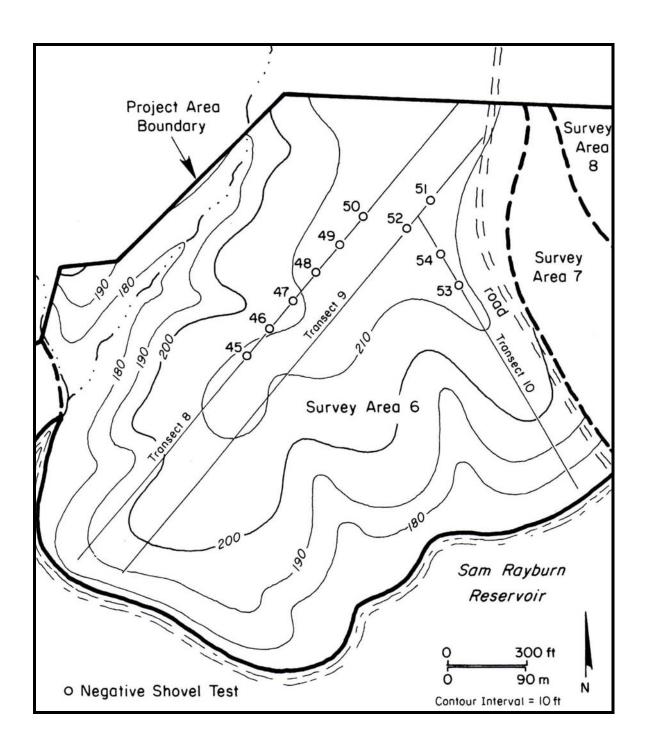
Survey Area 3



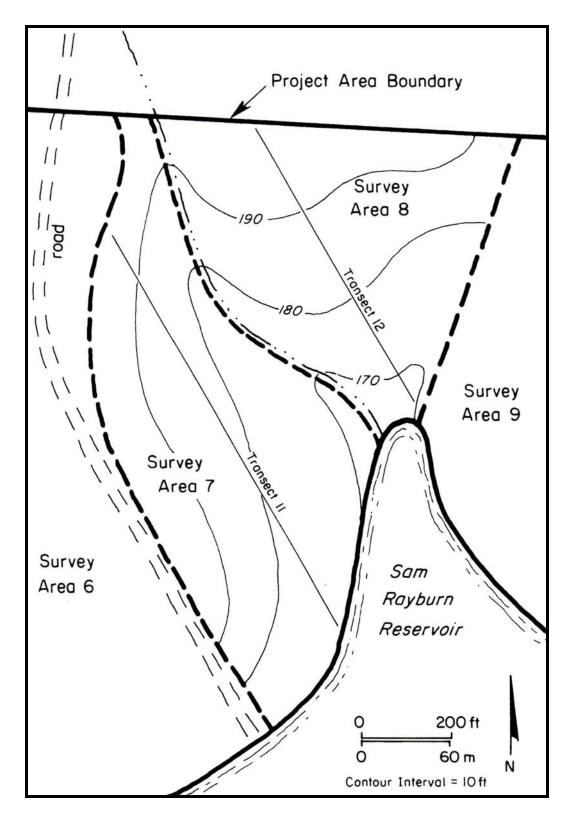
Survey Area 4



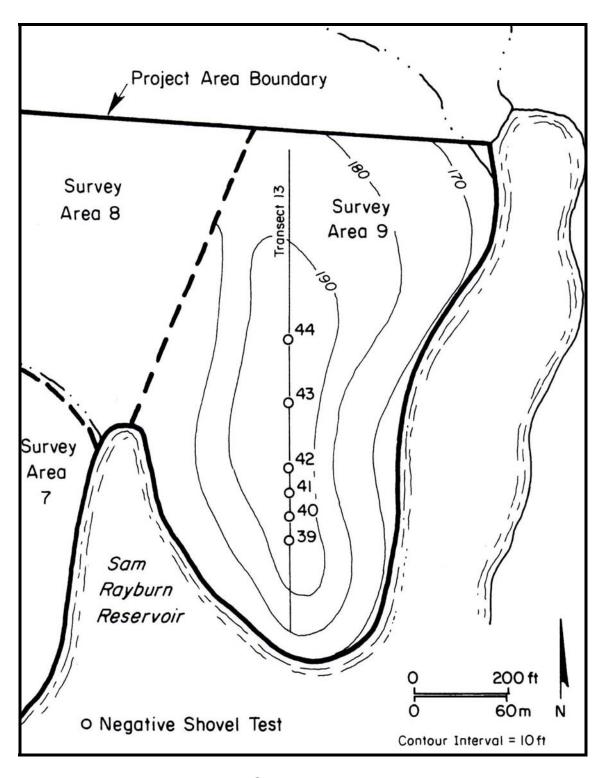
Survey Area 5



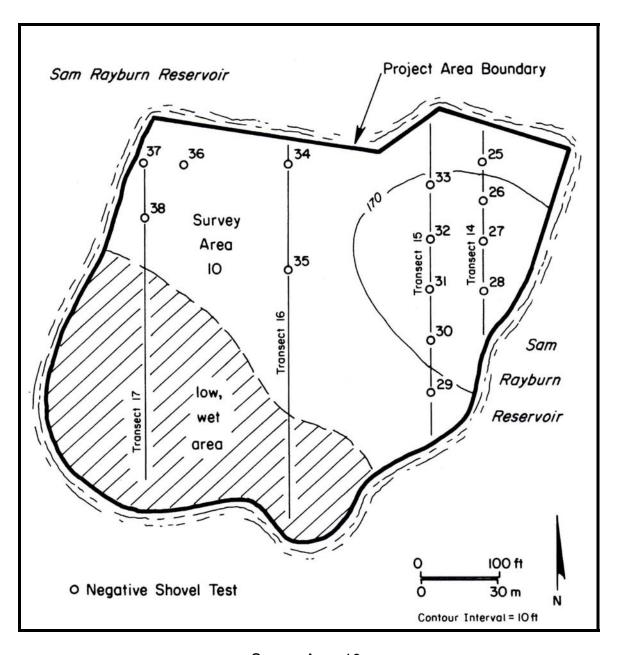
Survey Area 6



Survey Areas 7 and 8



Survey Area 9



Survey Area 10