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A PLAINVIEW KILL/BUTCHERING LOCALE ON THE LLANO ESTACADO — THE LUBBOCK LAKE SITE

by

Eileen Johnson and Vance T. Holliday

ABSTRACT

The Lubbock Lake site is a multi-component, stratified locality on the Llano Estacado (Southern High Plains). Part of a Plainview (Paleo-Indian) period bison kill/butchering locale is being excavated. Cultural designation is based on recovered projectile points, stratigraphic position, and radiocarbon dates. Tool assemblage consists of lithic and bone expedience tool kits. Geological, faunal, and paleoenvironmental settings create an interpretative framework for the cultural event. Only part of the Plainview lifeway system is reflected at the site. The locale represents a different level of social organization than seen at other Plainview period bison kill sites. Preliminary statements include a few differences and similarities between excavated Plainview sites.

INTRODUCTION

The Lubbock Lake site is a stratified, multi-component locality on the Llano Estacado, or Southern High Plains, of western Texas—eastern New Mexico (Fig. 1). The site is located in a meander bend of Yellowhouse Draw on the northern outskirts of the city of Lubbock, Texas. Discovered during a 1930’s WPA project to rejuvenate springs in the area, the site has long been known as a Paleo-Indian locality and principally as a Folsom site (Sellards 1952; Black 1974). However, testing operations (Wheat 1974; Kelley 1974; Green 1962) and work by the current Lubbock Lake Project (Johnson 1976; Holliday 1977) have demonstrated a fairly complete cultural sequence at the site for the past 12,000 years.

The Lubbock Lake Project is an interdisciplinary research program under the auspices of The Museum of Texas Tech University. Field operations began in 1973 and have centered on Paleo-Indian deposits. Three feature (area of concentrated materials) types are encountered: cultural, biological, and geological. Cultural features are activity areas. Within an activity area, specific subgroupings are designated micro-activity areas.

Work has been most extensive in a northwestern locality (Area 8) where a stratified sequence of five cultural features span the Paleo-Indian period as represented at the site. Within this sequence, most of the features are kill/butchering locales (an area where game animals were killed and butchered in the same place). One of these locales (designated feature FA8-11) was discovered during the 1976 field season. Work during that
and subsequent 1977 and 1978 seasons have established the feature as a Plainview period activity area. Cultural designation is based on both recovery of Plainview projectile points in situ and associated radiocarbon dates.

The Plainview type site (Sellers et al. 1947) is located on the Llano Estacado in Running Water Draw on the outskirts of the city of Plainview (Texas), approximately 50 miles north of Lubbock (Fig. 1). Few Plainview period sites have been excavated and there is some debate as to the culture's geographic extent and range in time (Dibble 1968; Irwin 1971; Wheat 1972). Even less is known about lifeway patterns of these peoples, their economic system, tool assemblages, and environment in which they interacted. The Lubbock Lake Plainview occupation does not answer all these questions. But the occupation does add to the limited data base and in some respects material recovered gives new insights into the culture.

This report is not meant as an overview or synthesis of Plainview culture, although an initial assessment of some aspects is discussed. Instead, because of limited knowledge of the culture, it functions as a vehicle for inventory and description of Plainview materials located in the kill/butchering locale at Lubbock Lake. Further excavations and additional localities will not only increase the database and allow an overview of the lifeway pattern, but also undoubtedly modify statements and clarify the situation concerning occupation at this particular site.

STRATIGRAPHY AND GEOCHRONOLOGY

The stratigraphic placement, depositional unit, and paleotopography of the feature are important to interpretation of the cultural event which took place in the activity area. This geologic perspective, together with the paleoenvironmental one, provides a frame of reference for occupation. This frame of reference is part of the basis of a Plainview lifeway pattern and, necessarily, an interstratified comparable item in the creation of that pattern. Most of the Paleoindian cultural sequence at Lubbock Lake is recorded in stratum 2 which contains exclusively lacustrine and marsh sediments (Holliday 1977; Stafford 1977). Description of stratum 2 deposits is based on the work of Stafford (1977).

Stratum 2 in Area 6 is divided into sub-strata 2A, 2B, and 2C. Substrata 2A and 2B are of concern to the Plainview occupation. Substratum 2A is a lacustrine deposit consisting of beds of pure diatomite and interlaminated clays and diatomaceous earth. The various laminae are designated local beds (Fig. 2). The base of substratum 2A in Area 6 has yielded a radiocarbon date (on shell) of 10,880 ± 90 years B.P. (SMU-292). Humates from the upper zone of the basal diatomite in Area 2 has yielded a date of 10,530 ± 90 years B.P. (SMU-285).

Substratum 2B, a massive diatomaceous earth unit, conformably overlies substratum 2A. This unit apparently represents a change in sedimentation within the lake basin whereby higher amounts of silt and clay were deposited relative to diatomite. Water turbulence during this time also may have destroyed or prevented deposition of diatomite laminations. Feature FA6-11 is situated near the base of substratum 2B, in a sub-unit designated 2B ciagnea. This sub-unit is part of the local bedding in Area 6 (Fig. 2).
Plainview Feature

The Plainview period activity area (feature FA6-11) is a bison kill/butchering locale (Fig. 3). It represents a small kill of a few individuals around the marshy edges of a pond. Full extent of the activity area is unknown. However, a part of the western boundary is definable, although a section of it was disturbed through 1930's dredging operations.

Remains of bison (Bison antiquus) are stacked or grouped in restricted areas. There are at least four micro-activity areas within the feature, connected by a thin scatter of bone debris, lithic debitage, and tools. These micro-activity areas are bone concentrations, containing partial remains of individual bison (Table 1). One of the micro-activity areas is in the northeastern corner of the excavations (bone concentration #1), a second in the southeastern (bone concentration #2), and the third (bone concentration #3) and fourth (bone concentration #4) in the southwestern sections (Fig. 3). Butchering (expedition) tools. These tools are located within bone concentrations and across the

Lithic Tool Kit

Lithic collection consists of 10 tools and 51 unmodified flakes. Of the flakes, 50 are tiny resharpening ones. Six are from bone concentration #1; 10 from bone concentration #2; 18 from bone concentration #3; three from bone concentration #4; and the rest from the activity surface. Material used is diverse, but the most common is Edwards Formation chert. Other material used includes Morrison quartzite, other quartzites, chalcedony, white chert of unknown source, and silicified caliche. The one large, unmodified flake recovered is made from silicified caliche. Tools recovered also are made from a variety of lithic materials. However, none are from quartzites or white chert, indicating use of the quartzites or white chert, indicating use of the tools and resulting damage...

Two Plainview projectile points (Fig. 4) were recovered in the locale, both from bone concentration #3. Points were made from Alibates chert and were resharpened and reused as butchering tools. Treatment of the tools and resulting damage is reminiscent of that seen on Kersey points from the Jurgens site (Wheat 1976, 1977; Greiser 1977) that were reused as butchering tools.

The first point (TTU-A18464) is nearly complete except for the base. Lenticular in cross section, the point has irregular parallel flaking. Lateral grinding is still evident adjacent to the broken base. Sides are slightly convex due to resharpening. The blade section is 65.50 mm long and 19.95 mm wide at the broken basal end. Remnant lateral grinding extends along one edge for 8.80 mm and 7.75 mm on the other edge. Although the base is missing, size, shape, and flaking pattern fall within the range of variation for Plainview (J. B. Wheat and R. Knudson, personal communications). Both edges have been reworked into serrated margins. The serration points are worn and crushed, with use damage flakes removed along both edges.

The second Plainview point (TTU-A19941) is a basal section. Flaking is irregular parallel and the point is lenticular in cross section. It has a slightly contracting stem and concave base, with both lateral and basal grinding. Length of the remaining basal section is 38.80 mm and width at the widest point is 19.50 mm. Lateral grinding extends along one side 25.30 mm and the other 19.50 mm. The blade was broken below actual termination of the lateral grinding.

Alternating broken edges and the newly created distal end were reworked and reused. One side was retouched into a scalloped edge. The scallop points are crushed and rounded, with slight wear polish. Notches of the scallop edge exhibit use damage flake scarring. The other side has a broad notch that was either created when the point broke or is the result of removal of one large percussion flake. Edge crushing and use damage flake scarring is evident on both sides of the edge, along with slight wear polish. The broken distal end forms a blunted tip that was rounded and exhibits edge crushing. Use damage flake scarring occurs along the tip as does slight wear polish.

Scrapers, or unifacial cutting tools, comprise 40% of the lithic butchering tool kit. Three are flake scrapers, all of which show steep angle retouch. Of these, two are percussion flakes with large, single faceted platforms. The third flake (TTU-A15963) had the platform and bulb area removed and the broken edge steeply retouched (Fig. 5a). Use damage flake scarring occurs along the

Table 1. Inventory of Bone Concentrations in Plainview Bison (Bison antiquus) Kill/Butchering Locale (FA6-11), Lubbock Lake

<table>
<thead>
<tr>
<th>Bone Concentration #1</th>
</tr>
</thead>
<tbody>
<tr>
<td>skull sections</td>
</tr>
<tr>
<td>periophytes, right and left teeth: 1 (S); dp/p2 (right and left); p3 (right and left); dp/p4 (left)</td>
</tr>
<tr>
<td>mandibles, right and left coronoid process, left ascending ramus, left</td>
</tr>
<tr>
<td>axis</td>
</tr>
<tr>
<td>cervical vertebrae (3)</td>
</tr>
<tr>
<td>thoracic vertebrae (7)</td>
</tr>
<tr>
<td>thoracic vertebrae spinies (5)</td>
</tr>
<tr>
<td>lumbar vertebra</td>
</tr>
<tr>
<td>vertebral epiphyseal plates (2)</td>
</tr>
<tr>
<td>rib heads (3)</td>
</tr>
<tr>
<td>rib sections (20)</td>
</tr>
<tr>
<td>scapulae, right and left radial epiphysis, left ulnar olecranon, right ulnar, left metacarpal epiphysis, left</td>
</tr>
<tr>
<td>articulated carpal/metacarpal/phalanges/sesamoids unit right</td>
</tr>
<tr>
<td>first phalanges (2)</td>
</tr>
<tr>
<td>third phalanges</td>
</tr>
<tr>
<td>sesamoids (7)</td>
</tr>
<tr>
<td>lateral malleol, right and left</td>
</tr>
</tbody>
</table>

Fig. 3 Plot of feature FA6-11, a Plainview period bison (Bison antiquus) kill/butchering locale at Lubbock Lake.

Fig. 4 Plainview points recovered from bone concentration #3 in the bison kill/butchering locale. Note that both have been resharpened (serrated or scalloped edges) for use as butchering tools.
Bone Concentration #2

fetal
thoracic vertebrae
vertebral spines
rib sections
pelvic sections
postnatal
radius, left
rib sections
sacrum
patella

Bone Concentration #3

skull
nasals, right and left
maxillae/premaxillae, right and left
teeth: (3)
mandibles, right and left
dentary symphyses
hyoids, right and left
axis
thoracic vertebrae
thoracic vertebrae
vertebral epiphysial plates
rib heads
rib sections
costal cartilage
sternal sections
scapulae, right and left
first phalanges
second phalanges
third phalanges
sesamoids
innominates, right and left
femur, left
first tarsal, left
fourth tarsals, left
calcaneum, left
astragal, left
metatarsals, left

Bone Expediency Tool Kit

Bone butchering tools are now recognized throughout the Plains from several Paleo-Indian localities (Frison 1974, 1977; T. Greiser 1977; Johnson 1977b, 1978a; Wheat 1977). Johnson (1976, 1977b, in press) designates these items as expediency tools. The expediency concept is defined within a technological framework, not a functional one. Expediency tools were made quickly and efficiently regardless of their performance. Wear pattern criteria indicative of tool use includes microflaking, polishing, and rounding of surfaces (Johnson in press). This class of tools was created from bones of animal carcasses being slaughtered. They were used in the butchering process and then discarded with the rest of the faunal debris; after processing was completed. With an available abundant resource, only production knowledge of these tools need be brought to each kil. Associated manufacturing debris and bone reduction areas within Lubbock Lake kills support this interpretation.

Four expediency tools were recovered in the Plainview kill/butchering locale (FA-611) at the site. A scapula knife (TTU-A15944) was found within bone concentration #3. It was made from a right scapula (Fig. 6a). Several scapula blade segments lying nearby are distal corner (Fig. 5c). It is made from silicified caliche. A core-scraper (TTU-A19568), made from Edwards Formation chert, is an exhausted, unifacial, conical core (Fig. 5d). Use damage flake scarring occurs along two opposite edges.

Utilized flakes form another major segment of the lithic butchering tool kit. These flakes are smaller and much thinner than the ones used in making unifacial cutting tools. Use pattern is different on all four flakes, three of which are from Edwards Formation chert. One (TTU-A19424) is a hinge flake with use damage flake scarring restricted to the left laterodistal edge. Another (TTU-A18075) has wear at the right distal corner. The third (TTU-A19999) has use damage flakes removed along both right lateral and distal edges. The fourth utilized flake (TTU-A19710), made from chalcedony, demonstrates use damage flake scarring along left postero-lateral and right antero-lateral edges on the ventral side.
Bison Remains

Within the bone bed itself, the partial remains of six bison were recovered. Remains of each individual still exist in unexcavated deposits as may those of additional bison. Each area of concentration essentially represents a single bison (Table 1), although there are scattered elements from various animals between concentrations. Animals consist of three sub-adults, two mature bison, and a fetus. In general, each animal was butchered where it had been killed, around and in the marshy edge of the pond. Fetal remains are in bone concentration #2. Either the remains of the mother of the fetus is nearby in unexcavated deposits or the fetus was taken from one of the females in the other concentrations and butchered away from her carcass.

Presence of two of the animals is indicated by occurrence of additional elements. A mature male bison is based on presence of a right calcaneum found in concentration #4. Although only a left calcaneum has been recovered of the mature female bison, the former element represents another individual because of its much larger size. Other elements in bone concentration #4 representing this animal are the adult sacrum, pelvis, right femur, right patella, and right tibia. A sub-adult is represented by an isolated right mandible. A few non-fetal remains found in bone concentration #2 could not be sexed or aged because of their fragmentary nature.

The mature female was located in the southwestern concentration (#5) which contained both Plainview points and an expedience tool. Skull, maxillae, mandibles, and associated post-cranial elements were recovered (Table 1). The female was approximately 7.6 years old. Age and sex determinations are based on criteria and categories established by Reher (1974) and Wilson (1974) for the Casper population. Worn mandibular tooth rows place the age into the 5.6 to 11.6 years group; but maxillary dental characters appear to place it in a more discrete age group of 7.6 years. Wear on the M2 and M3 lingual style is slight but lingual styles of the M1 and M2 are in wear. Sex is based on interior mandibular width below the M2. Right mandibles measure 72.2 mm and the left 74.2 mm. Although some crushing has occurred, measurements are still well within the Casper female population (Reher 1974:117).

One of the subadults is located in concentration #1. Skull sections, mandibles, and a few post-cranial elements were recovered (Table 1). Mandibles are aged to 3.6 years: the first cusp of the M3 shows wear, M1 and M2 are in wear, P3 is erupting, and P2 has very slight wear. Neither mandible could be measured for a sex determination as both had the border below the M3 removed during butchering. However, slender size of the recovered metacarpal (unfused epiphyses) suggests that the animal was a female.

The second subadult is represented by mandibles and post-cranial remains in bone concentration #4 (Table 1). Mandibles were aged to 1.6 years: M1 unerupted but visible in alveoles; M2 erupted to the level of M3; with the first cusp in beginning wear and no wear on the second cusp. Although M2 was unerupted, an estimated mandibular width below M3 was taken for sex determination. Right mandible measure 83.1 mm; left 83.7 mm. Although these measurements are within adult female range of the Casper population (Reher 1974:117), the large size for a very young animal indicates that it is probably a male.

The isolated mandible representing the third subadult was broken into a number of pieces. Although it could be reconstructed for an age estimate, it could not be measured for a sex determination. This subadult was about 4.6 years old. Premolars are erupted and in wear; M1 and M2 are in regular wear; and the first and second cusps of M3 are in wear with slight wear on the third cusp.

Butchering

In general, three major categories of butchering evidence are cut lines, blow marks, and bone damage. At the Lubbock Lake Plainview locale, cut lines appear infrequently on bones. This situation is due to two factors, one being poor preservation and some weathering. But most importantly, the second factor is extensive use of bone butchering tools. Expedient choppers leave very distinctive blow marks and bone damage pattern (Frison 1974:52), but not cut lines. Therefore, much of the butchering techniques seen in the Plainview locale is based on bone damage and blow marks.

Without going into bison anatomy and specific reasons for blow placement (Johnson 1976, 1978b), blows are generally delivered to areas in order to sever certain muscle attachments during the process of stripping.
muscle bundles and ligaments. Bone damage or breakage can accomplish the same purpose, such as in crushing or removal of a trochanter or tuberosity. Bone damage also allows removal of a bone for easier access to muscle masses, such as in tongue removal. Additionally, certain types of bone breakage form part of the marrow processing pattern. Comments on butchering procedures and damage are based on experimental butchering of artiodactyls. Figure 7 illustrates areas of butchering damage evidence from recovered bison elements.

Seven mandibles were recovered from the locale, representing the three sub-adults and a mature female bison. Each set was treated somewhat differently during butchering. Within a set, damage is the same on each mandible. Damage to mandibles of the mature female was noted in several areas. The coronoid process was snapped, a type of damage that results when a blow is delivered to the zygomatic arch in freeing the mandible from the skull and in severing attachment for various head and jaw muscles (Frison 1974; Johnson 1978b). Mandibular cut and articular process of the angle were damaged. A blow had been delivered to the angle of the mandibular foramen. The mandible was broken at the symphyseal surface in order to separate the set. Defleshing cut lines appear on the interior below the M2; skinning cut lines occur along the exterior of the mandibles just posterior to the mental foramen in the diastema area.

The sub-adult mandible set in concentration #1 have the ascending ramus and angle removed to the M3. The recovered right ascending ramus shows further damage: a blow to the mental foramen; pitting damage on the mandibular notch; and coronoid process snapped. Both mandibles were broken at the mental foramen, the diastema and symphyseal surface removed.

The sub-adult mandible set in concentration #4 have the ascending ramus removed. The angle to the base of M3 is also removed on one. Mandibles were broken apart at the symphyseal surface. Defleshing cut lines occur on the interior border below P2 and P3 of the left mandible.

The isolated fifth mandible was broken apart, probably as a result of marrow extraction. Partially reconstructible, observable evidence is the probable result of both butchering technique and marrow processing. Breakage at the symphyseal surface detached the set, while a blow to the diastema area resulted in opening the mandibular border. Posterior mandibular sections were not recovered, although damage probably would be similar to that seen in other sets.

These actions and resulting bone damage were part of several processes: hide removal, muscle detachment and stripping, and tongue removal. The few hyoids recovered were snapped and broken during tongue removal. The nasal and maxillae were broken out of a skull through pounding action, perhaps for brain removal.

Post-cranially, wings of an atlas were damaged and recovered axes split apart. This type of injury results during neck severing and loosening neck muscle attachments. Vertebrae removed processes were removed or showed crushing damage. Spine tips were broken or spines removed; occasionally to the centrum. One sacrum had a wing of its entire spine area removed through puncturing action, with crushing marks occurring along broken edges. A variety of front and hind leg muscles, including the hump, attach along the spinal column. Ribs were disarticulated and broken at either end, with an occasional blow mark evident along the broken border.

Recovered scapulae were treated similarly. Acrinion and spine were removed along with all or a portion of the distal blade. One scapula had the tuber scapulae removed, with crushing marks evident along the broken edge. A blow was delivered at the base of the acrinion between the two borders. A number of shoulder and upper back muscles attach in these areas. Lower front leg units were disintegrated at the cartilage joint and discarded as an articulated unit. Hind leg units were treated similarly.

Some crushing marks occur around the edge of the external femoral ball of a sub-adult femur. Three short ligaments encapsulate this ball in the pelvic acetabulum. Loosening these ligaments aid in severing the leg from the pelvic girdle. Apex of patellae and medial angle on one were removed. Pounding in sinew on angle on one were removed. Pounding in ligaments, freeing the patella for use as a handle in stripping upper leg muscle bundles. Cut lines occur along the lateral ridge of two astragali, resulting from disarticulation of the hock joint. The only evidence noted for marrow processing was the broken mandible. Two femora showed evidence of carnivore chewing at either ends.

Fetal remains were located in two small piles, constituting bone concentration #2. Piles contained ribs, centra, and vertebral spines, with sections of the pelvic girdle in both piles. Only the spinal column of the fetus was recovered, cranial and appendicular elements presumably contained in adjacent unexcavated deposits. Although little bone damage in terms of butchering evidence was noted, context of recovery, disarticulation and piling of elements, and associated resharpening flakes strongly suggest processing by Plainview people.

Seasonality

Seasonality of the kill becomes a question, and there is some conflicting evidence. Mandibular ages indicate a fall kill, as fetal remains may suggest a spring slaughter. Welles (1974) cautioned against using fetal material as a seasonality factor because of high incidence among bison of out-of-season births. Lubbock Lake specimens were aged using criteria/categories established from a fall kill population. However, visual schedules are known to be inaccurate (Novakowski, 1965; Keis 1969). Although small range of variation, particularly in wear, within a category is expectable, possibilities of pattern differences between northern and southern herds have not been fully explored. Furthermore, small sample size does not adequately test a seasonal model. Dental thin sectioning (annual cementum rings) is an accurate age determining technique (Novakowski 1965; Keis 1969) that may lead to resolution of Lubbock Lake seasonality questions.

Small animal remains in the locale are numerous. Muskrat (Ondatra zibethicus) and green-winged teal (Anas crecca carolinensis) were dietary items of Plainview peoples. Most muskrat remains are disarticulated and scattered around bone concentrations, with a few bones exhibiting cut lines. Broken wing elements from two teals were found in separate piles. Green-winged teals winter over today in the Lubbock area and can be found from September to April (Peterson 1963). Their remains in the locale could accommodate either a fall or spring kill. At present, the strongest possibility appears to be a fall kill at the locale, with a cautionary note to above objections.

PALEENVIRONMENT

A variety of microvertebrates, important to determining the paleoenvironment, have been recovered from feature deposits. All excavated sediment is water-processed through a series of fine mesh screens, in a modified operation created by Guilday and McCrady (Guilday et al. 1964). Concentrates are size graded. Sorting yields microbiocultural items in addition to various microbiological remains. Table 2 lists all vertebrates recovered from the feature. Avifauna was identified by Rea (in press), the rest of the faunal assemblage by the senior author.

Microtines are of greatest significance and no longer range on the Llano Estacado. Occurrence of the southern bog lemming (Synaptomys cooperi) at the site is the furthest western known extension of this lemming and one of the latest occurrences geologically outside its present range (Lundelius 1974a). Two relict populations exist in restricted areas of southwestern Kansas, with the major population ranging in northeastern North America. A temperate zone animal, this lemming prefers moist meadows, marshes, and wet sedge bogs. In parts of its range, it can also be found in dry upland areas (Dott et al. 1973). Relict populations are maintained in favorable habitats around marshes.

Other microtines in the assemblage are the meadow vole (Microtus pennsylvanicus) and prairie vole (M. ochrogaster). The meadow vole has a northern-northeastern distribution. It is a grasslands species that favors grassy-grassland communities near permanent waters such as marshes, ponds, and streams. The prairie vole is a northern and central Great Plains and prairie animal. This vole favors dry open grassland areas.

The fourth microtine is muskrat. Although widespread over most of North America, the Canadian River north of the Llano Estacado is the nearest population today to Lubbock Lake. Muskrats inhabit permanent waters of marshes, ponds,
streams, and other waterways (Burt and Grossenheider 1964).

Temperature fluctuation and availability of effective moisture or bodies of water appear to be primary factors regulating range of these various microtines. Because of relict populations of southern bog lemming, area of sympatry today for these animals is either the marshes of southwestern Kansas or extreme northeastern Kansas.

As a taxonomic note, Anas carolinensis (American green-winged teal) and A. crecca (European green-winged teal) are considered conspecific (AOU 1973; Rea in press).

Synonomy relegates carolinensis to the subspecific level, hence identification of Lubbock Lake material to sub-species.

Three major habitat zones are represented in the faunal assemblage for this feature. A body of water is indicated by various remains of catfish, frogs, surface feeding ducks, marsh birds, mud turtles, muskrats, meadow voles, and bog lemmings. Several of these animals require permanent waterways and indicate either a marsh or marshy area around a body of water. These requirements are concordant with geologic data which indicate a marshy area around a pond (Stafford 1977). A riparian meadow grasslands forms an ecotone between the pond and dryer grasslands area.

A mixed grasslands prairie is implied by remaining animals in the assemblage. Cotton rats and prairie voles prefer areas of tall grass, while box turtles, prairie dogs, ground squirrels, kangaroo rats, woodrats, and jackrabbits favor open expanses of short grasses and brushlands. Sagebrush and forbs probably grew in patches of the prairie as these are a favored browse for pronghorn antelope. Bison are a grasslands form that would have grazed throughout the prairie-meadowland area.

The draw in the area of the site is a narrow one, approximately 500 meters across. Habitat zones probably existed in narrow strips or bands along the draw, easily traversed by both man and animals. The site's immediate environs, from geologic data and habitat information, can be reconstructed as a ponded waterway coursing through a marsh.

Table 2. Species List, Feature FA6-11 Plainview Period, Lubbock Lake

<table>
<thead>
<tr>
<th>Mammalia</th>
<th>Pisces</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lepus californicus (Gray)</td>
<td>black-tailed jackrabbit</td>
</tr>
<tr>
<td>Spermophilus tridecemlineatus (Mitchill)</td>
<td>thirteen-line ground squirrel</td>
</tr>
<tr>
<td>Cynomys ludovicianus (Ord)</td>
<td>black-tailed prairie dog</td>
</tr>
<tr>
<td>Geomys burarius (Shaw)</td>
<td>plains pocket gopher</td>
</tr>
<tr>
<td>Dipodomys ordi (Woodhouse)</td>
<td>Ord's kangaroo rat</td>
</tr>
<tr>
<td>Sigmodon hispidus (Say and Ord)</td>
<td>hispid cotton rat</td>
</tr>
<tr>
<td>Neotoma micropus Baird</td>
<td>southern plains woodrat</td>
</tr>
<tr>
<td>Neotoma albignla Hartley</td>
<td>white-throated woodrat</td>
</tr>
<tr>
<td>Microtus pennsylvanicus (Ord)</td>
<td>meadow vole</td>
</tr>
<tr>
<td>Microtus ochrogaster (Wagner)</td>
<td>prairie vole</td>
</tr>
<tr>
<td>Symaptomys cooperi Baird</td>
<td>southern bog lemming</td>
</tr>
<tr>
<td>Odontolyx sp.</td>
<td>deer</td>
</tr>
<tr>
<td>Antilocapra americana (Ord)</td>
<td>pronghorn antelope</td>
</tr>
<tr>
<td>Bison antiquus Leidy</td>
<td>extinct bison</td>
</tr>
</tbody>
</table>

Aves

| Anas platyrhynchos Linnaeus | mallard |
| Anas strepera Linnaeus OR A. acuta Linnaeus | gadwall or pintail |
| Anas crecca carolinensis (Gmelin) | American green-winged teal |
| Gallinula chloropus (Linnaeus) | common gallinule |
| Fulica americana Gmelin | American coot |

Reptilia

| Chelydra serpentina (Linnaeus) | snapping turtle |
| Kinosternon flavescens (Agassiz) | yellow mud turtle |
| Chrysemys scripta (Schoepff) | pond slider |
| Terrapene ornata (Agassiz) | box turtle |

Amphibia

| Rana catesbeiana Shaw | bull frog |
| Rana pipiens Schreiber | leopard frog |

Discussions

Plainview occupation at Lubbock Lake has been identified on the basis of recovery of two Plainview projectile points from the FA6-11 Plainview project site points from the FA6-11 Plainview point site. These finds indicate that the area was occupied by the Plains Indians, who inhabited the region about 10,000 years ago (Sellards 1962; Worthington 1953). Thus, the Plainview type is considered to be an indicator of a cultural tradition that inhabited the area about 10,000 years ago (Sellards 1962; Worthington 1953). Wheat (1972), Wheat (1972: 154) considered the Plainview occupation to be one of several closely related groups to the Firstview complex, a late Paleoindian manifestation seen primarily in the Great Plains.
the Southern Plains from about 10,500 to 8,500 years ago.

At Lubbock Lake, major subdivisions of late Paleoindian occupation include the Plainview tradition and Firstview complex. The Plainview occupation feature (F6A-11) is stratigraphically above a Folsom age occupation (F6A-8) dating to about 10,500 years and below a Firstview occupation that dates at around 8,500 years (Holliday 1977; Johnson and Holliday in press). On the basis of stratigraphic position and correlation with dates from other areas of the site, feature F6A-11 is dated at about 10,000 years B.P. This evidence is in line with known dates for the Plainview period (Dibble 1970; Wheat 1972).

In discussing temporal and spatial distribution of Plainview, a problem arises as to definition of the Plainview type. Leonard and Anderson (1966) observed considerable variation within Plainview collections and noted that a rigorous definition of the type had not been made. Wheat (1972) and Knudson (1973) remark that Plainview has become a catch-all term for any projectile point with a lanceolate blade and concave base.

An example of this situation is seen in the early collection from Lubbock Lake. A complete point was found eroding out of the Texas Archeological Research Laboratory notes on file at the Austin site (TM 882-69) as Plainview. Based on the published drawing and photograph, the artifact resembles the Plainview type. The original artifact is missing. However, a set of drawings and photographs are on file at TARL, published drawing was inaccurate and the artifact bears much closer affinities to the Firstview type (Holliday 1977:23).

According to Wheat (1972:145-146), the Plainview type is essentially parallel-sided with a slightly to moderately concave base. Flaking may occur on the tip. The type is well controlled flaking to have a grinding plane with sides often ground to several variations or "modes." Some types expand slightly from the base to the midpoint (type I); while others taper gradually from the base to the point where edges converge to form the tip (type II). A few examples are contracted just above the base, then expand to the midpoint.

Leonard and Anderson (1966) provide a general discussion of the Plainview type in comparison with Clovis points found at Domebo. Wheat's (1972) discussion of Paleoindian projectile point typology and distribution aids in putting Plainview typology into perspective. A careful examination of the literature reveals that relatively few sites with unmistakable Plainview affinities have been reported.

**Distribution**

Two of the best known and documented Plainview localities are the Plainview type site (Sellars et al. 1947) and Bonfire Shelter (Dibble and Lorrain 1968). Plainview (Sellars et al. 1947) is a communal mass kill where remains of over 100 extinct bison (Bison antiquus) were found in association with 18 projectile points and 15 lanceolates. One of the most striking items about this "type" is the variation in point styles. Technologically, however, the artifacts are quite similar (Knudson 1973). Stylistic variation in the type collection may, in part, be responsible for use of the Plainview type as a catch-all category.

Bonfire Shelter (Dibble and Lorrain 1968) is located on the Rio Grande River, near the town of Langtry, Texas, approximately 280 miles south of Lubbock. The rockshelter is located in a side canyon of the river. The site is a stratified bison jump with three distinct bone beds. Bone Bed 2, which is of interest here, represents three separate kills of a total of over 120 extinct bison (Bison antiquus). Eight projectile points or sections were recovered from the bone beds. Four of the specimens are Plainview or Plainview-like (while Midland and Milnesand are offered as possibilities). Two of the items are possible broken Plainview or Milnesand points, although Dibble (personal communication) now considers them more likely to be knives. Of the remaining two, one is a Folsom point and the other possibly an unfluted Folsom (Dibble 1968:34-37). The Folsom point was recovered from the lowermost of the three components that make up Bone Bed 2.

Plainview points are reported from a number of other Southern Plains localities. Lake Theo (Harrison and Killen 1978), just east of the Llano Estacado escarpment, and 90 miles northeast of Lubbock (Fig. 1), has stratified Folsom and Plainview occupations. Limited testing produced in situ Plainview point base fragments, other lithic tools, and manufacturing debris. However, exact nature of the occupation has not been determined.

Lone Wolf Creek (Cook 1927; Figgins 1927; Worthomton 1957) is near Colorado City, Texas, just east of the Llano Estacado, approximately 100 miles southeast of Lubbock (Fig. 1). One broken and two complete projectile points were found along with remains of extinct bison (Bison antiquus). Worthomton (1957:110) identified one projectile point as Milnesand (other point lost) and the basal fragment as Plainview. An examination of the artifacts (housed at the Denver Museum of Natural History) revealed that the apparent basi of the cortical complete projectile point is the result of a single hinge flake having been removed from the base. Otherwise, the broken artifact exhibits the same attributes as the complete Milnesand point.

Wheat (1972:116) identified a possible Plainview point in material from Blackwater Draw Locality #1 (Hester 1972), 100 miles northwest of Lubbock (Fig. 1). The point was originally reported by Sellars (1952:74) as belonging to the "Portales complex." However, as noted by Wheat (1972), this "complex" was ill-defined and rather anomalous, containing a variety of distinct, different projectile points. Plainview points also are reported from surface collections at Anderson Basin No. 2, near Blackwater Draw Locality #1 (Hester 1975a:28) and from a site near Sunray, Texas (Hester 1975b:252), 200 miles north of Lubbock.

Recent work at St. Mary's Hall (Hester 1978, 1977a, 1978), in central Texas, produced material from apparently a campsite. Plainview points and other lithic tools were recovered. This site represents the first excavated camping area for the Plainview culture. Plainview points also were noted eroding out of a creek cut-bank at the Johnston-Heller site in south Texas (Birmingham and Hester 1976).

Plainview points have been reported from several other sites in central Texas: Levi Rockshelter (Alexander 1962), McCann (Preston 1969), and Acton (Blaine et al. 1968). The latter consists of surface finds. Projectile points from the two former sites thought to be Plainview are instead Golondrina points. Both Plainview and Golondrina occur in the Acton (Blaine et al. 1968) surface collection. Golondrina originally was considered to be a Plainview variant (L. Johnson 1964) but subsequently has been determined to be technologically quite distinct (Knudson 1973:40; Hester 1977b:175). Golondrina distribution is confined to central and southern Texas and northeastern Mexico. The point type dates somewhat younger than Plainview.

In the Red River drainage of southern Oklahoma, Plainview points are reported from Pumkin Creek (Wyckoff and Taylor 1971) and Perry Ranch (Saunders 1976; Saunders and Penman 1979). The Pumpkin Creek collection consists of surface finds. Saunders and Penman (1979:56-58) reject a Golondrina classification for the Perry Ranch material, preferring the Plainview category. However, the Plainview points appear morphologically and technologically more similar to Golondrina. Points from the site excavated slightly near the middle of the blade are particularly well flaked, have obtuse basal corners and deep basal concavities. These are Golondrina attributes (Saunders and Penman:57). Basal thinning is common to both Plainview and Golondrina. The reported radiocarbon date just over 7000 years B.P. falls within the Golondrina age range.

Nall (Baker et al. 1957) is another Plainview site reported from the Oklahoma Southern Plains in the Panhandle region. A surface collection, most of the artifacts fit the Plainview type.

On the Northern Plains, Plainview points were reported from Red Smoke (Davis 1957) and Lime Creek (Davis 1962). However, Wheat (1972:144) considers the Lime Creek Plainview material to be Frederick. This may also be the case at Red Smoke, although Goshen is also a possibility.

Although there are reports of occurrence of Plainview points as far north as Alberta (Canada), recombination of supposed Plainview points and sites indicates that the type is part of a Southern Plains cultural tradition.
Table 3. Radiocarbon Dates for Plainview and Golondrina Sites on the Southern Plains

<table>
<thead>
<tr>
<th>Site</th>
<th>Date (years B.P.)</th>
<th>References</th>
<th>Site</th>
<th>Date (years B.P.)</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plainview</td>
<td>9,800 ± 500*</td>
<td>Broecker and Kulp</td>
<td>Plainview</td>
<td>7,100 ± 160</td>
<td>Brannon et al. 1957</td>
</tr>
<tr>
<td>Lubbock Lake</td>
<td>9,820 ± 150*</td>
<td>Libby 1955</td>
<td>Lubbock Lake</td>
<td>9,960 ± 80</td>
<td>This paper</td>
</tr>
<tr>
<td>Devil's Mouth</td>
<td>8,780 ± 310</td>
<td>Sorrow 1968</td>
<td>Baker Cave</td>
<td>9,030 ± 230</td>
<td>Douglas 1970</td>
</tr>
<tr>
<td>Baker Cave</td>
<td>8,910 ± 140</td>
<td>Word and Douglas 1970</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Levi Rockshelter</td>
<td>9,020 ± 150</td>
<td>Hester in press</td>
<td>Levi Rockshelter</td>
<td>6,750 ± 60</td>
<td>Alexander 1962</td>
</tr>
<tr>
<td>Perry Ranch</td>
<td>7,030 ± 190</td>
<td>Saunders and Penman 1979</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

* age estimate due to early dating methods
* not considered reliable due to early methods and materials dated

Dating

The Plainview period is not well dated (Table 3). Wyckoff and Taylor (1971:47-48) and Saunders and Penman (1979:58) review the dating of what are considered Plainview sites in discussing Pumpkin Creek and Perry Ranch, respectively. However, there are several problems evident in these discussions. The best dated Plainview site, Bonfire Shelter (Dibble 1968, 1970), is not mentioned in the dating discussion by Saunders and Penman (1979:58). Also, Perry Ranch (Saunders and Penman 1979) is a Golondrina locality rather than Plainview. The reported date of 7000 ± 190 years B.P. (Saunders 1976; Saunders and Penman 1979) does not apply to Plainview. Three dates from Levi Rockshelter (Table 3) also date a Golondrina rather than a Perry Ranch. Dates from Levi Rockshelter are consistent with each Baker Cave (Word and Douglas 1970; Hester 1968), and Devil's Mouth (Sorrow 1968), Val Verde County (Texas), are also consistent (Table 3). These sites provide a Golondrina age range of about 9,000 to 7,000 years ago. This period is younger than available Plainview dates. Dates from Red Smoke (8,862 ± 230 years B.P.; Davis 1953:383) Lime Creek (9,524 ± 460 years B.P.; Davis 1962:31) must also be rejected since these sites do not have Plainview affiliations.

Lubbock Lake, Plainview (Broecker and Kulp 1957; Brannon et al. 1957), and Bonfire Shelter (Dibble 1968, 1970) are the only accepted Plainview sites that have yielded radiocarbon dates. At Lubbock Lake, the Plainview occupation is dated at about 10,000 years B.P. on the basis of stratigraphic correlation with dates from other areas of the site (Table 3).

Two dates are reported from the Plainview type site. A date of 9,820 ± 500 years B.P. was secured on shell (Broecker and Kulp 1957). Although appearing consistent, the date is a general age estimate due to problems with dating shell during the early years and the very large standard deviation. Uncharred bone from the site yielded a date of 7,100 ± 160 years B.P. (Brannon et al. 1957). This assay remains questionable because of problems encountered by early workers in bone dating and its non-consistency with other Plainview dates.

Bonfire Shelter yielded a series of dates from a hearth associated with the uppermost Plainview level in Bone Bed 2 (Table 3). This information and that thus far available from Lubbock Lake indicate that the Plainview period dates around 10,000 years ago. Since Plainview occupations are found stratigraphically above Folsom, the Plainview period would seem to be no older than perhaps 10,300 years. The upper limit for Plainview is unknown.

Comparisons

The Plainview period bison kill/butchering locale at Lubbock Lake represents a small kill of a minimum six individuals (three subadults, two adults, and a fetus). Bison were killed around the marshy edge of a pond and slaughtered where they fell. Bones of the individual carcasses were piled or grouped in discrete units. Little bone breakage occurred for marrow processing but some breakage was done for tool manufacture. This pattern of occupation is in contrast to that seen at Plainview (Sellards et al. 1947) and Bonfire Shelter (Dibble and Lorraine 1968).

Mass kills occurred at these localities, with bone elements strewn across the butchering floor, creating a thick and expansive bone bed. Although an instance of stacking of like elements was noted at Bonfire Shelter (Lorraine 1968), in general, the patterns at both sites seems to be random. Intensive marrow processing occurred at both localities causing extensive bone fracturing. Reanalysis of material from both localities has yielded no preliminary evidence of use or manufacture of expediency tools at Plainview. However, a few bone expediency tools are known from Bonfire Shelter (Johnson 1977b).

Different patterns seen at these three localities reflect different levels of social organization within the group responsible for the accumulations. The locale at Lubbock Lake represent activities of a small group of people, a residential unit. Size estimates of a residential unit are generally about 10 people (Wilmsen 1974). The other composed of two or three families or an extended family. A number of these residential units were probably interspersed throughout the draw, with an unknown territorial range.

On the other hand, Bonfire Shelter and Plainview represent band-level activities. They represent communal kills where a number of residential units came together for the good of the group. Using Wheat's (1972:123) ratios developed for Olsen-Chubbuck, it may be that approximately 75 people processed bison at Plainview, while a possible average of 30 people (3 times) carried out activities at Bonfire Shelter.

Different levels of organization and number of people involved are reflected in the different butchering patterns at these localities. A butchering pattern is composed of several parts, including meat extracting technique, secondary by-product retrieval, bone disposal, and available tool kit. Reanalysis of materials indicate that meat extraction techniques are similar among localities. This is expectable as the different groups share a common culture. Furthermore, there is a limited number of ways in disjointing a bison.
numerous and ratio of tools/animals is closer to or exceeds that seen in the locale at Lubbock Lake.

Seasonality of the kills may be a difference between localities. The fall months appear to be a cautious determination for the kill at the Plainview locale at Lubbock Lake. Sellards et al. (1947:934) believed that the kill at Plainview occurred during the spring or early summer because of numerous fetal remains (not recovered). No seasonal determination has yet been made of the Bonfire Shelter material. As a scheduling matter, it would be reasonable to expect a utilization difference of the same resource during various parts of the year as other resources become available. Late spring—early summer is the time suggested by Wheat (1972:90) for the Olsen-Chubbuck kill. Although later reported as a probable summer to early fall kill (Frison 1978:178), Wheat (personal communication) follows his original determination. As the two estimates overlap, a summer kill may be an acceptable time.

Mandibles from both Bonfire Shelter and Plainview collections are in the process of re-examination for sex and age (dental thin sectioning) data. Perhaps for the post-Folsom Paleoindian occupation on the Southern Plains, late spring—early summer may have been the traditional time for communal kills. Differences exist between Northern and Southern Plains Paleoindian cultural groups (such as points styles and technology, reuse of points as knives), and season of a communal kill may be one more variation.

A reconstruction of the site’s environs interprets the area as a marshy-edged pond in the valley of the draw, surrounded by a mixed grasslands. The setting may have been similar for the Plainview site, as Sellards et al. (1947) mention that the bone bed occurred in a pond deposit within Running Water Draw. However, extent and nature of the pond and surrounding area is unknown. Bryant (1968) assigned Bone Bed 2 of Bonfire Shelter to a Late Glacial period based on the pollen record. This period was characterized by a regional parkland while which Bryan (1969:112) defines as “... a grassland interrupted by isolated trees and clumps of trees.” This reconstruction is similar to that seen for Lubbock Lake and the draw. Although differences exist in topography and other geographical factors, similar reconstructions for such distant localities suggest the possibility of widespread grasslands and suitable bison habitat throughout this portion of the Southern Plains (Rolling Plains and Edwards Plateau). Such a reconstruction has recently been proposed by Bryant (Bryant and Shafer 1977). However, both palynological and faunal data are necessary for interpretation and reconstruction of paleoenvironments. At present, pollen appears unobtainable from Lubbock Lake sediments (Bryant 1977) and microfaunal data were not actively sought at other localities. Localities actively sought in this time period in order to attempt such a reconstruction.

SUMMARY

The Plainview period bison kill/butchering locale (FA6-11) occurred around the marshy edge of a pond. It is a small kill of six animals that may have taken place in the fall months. Several bone concentrations exist, each representing an individual bison. Bone piling occurs within the concentrations. Butchering tool kit consists of both lithic and bone items, several of which served dual purposes. Projectile points were used as weapons and then resharpened into butchering (cutting and disjointing) tools. Distribution of tools and spaces in the locale also suggested the possibility of hide-working occurring in the activity area. Although little marrow processing took place, each carcass was defleshed and almost totally disarticulated, with most butchering evidence in the form of blow marks, breakage, and crushing.

The activity area appears to be the result of a small group of people. This residential unit may have acquired a local territory and joined together with other similar residential units for such band-level activity as the communal hunt. A more equitable climate existed which permitted northern animals to range into the Lubbock area. Grasslands surrounded the draw. This marshy, ponded areas of the draw may have mixed grasslands of the draw may have mirrored conditions over most of the Southern Plains.

The locale at Lubbock Lake represents only a segment of the Plainview lifeway on the Llano Estacado and Southern Plains in...
genera. It is a glimpse of a behavior pattern on a level of organization different than that seen at other excavated Plainview localities. Both differences and similarities exist between these localities which link the behavior pattern represented. It is this linkage or overview that begins to form a sketchy pattern of a complex economic aspect of the Plainview lifeway system.

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