THE SPREEN CACHE: A CASE STUDY OF A PREHISTORIC CURATED COLLECTION OF BROKEN TOOLS FROM 41RN108, RUNNELS COUNTY, TEXAS

by

Christopher Lintz
and
John Dockall

ABSTRACT

Testing at the Spreen Site, 41RN108, in west-central Texas, located a cache of 31 thin bifaces, 6 scrapers 1 point/knife base, and 1 core. All were made from locally available gravels. Eighty percent of the implements were broken. The types of breakage suggest that many, although not all, failed during manufacture. The context of the tools, the occurrence of heat-spalled tools, wear on edges of broken implements, temporally distinct resharpening episodes, and the absence of refittable pieces suggest that these implements were prehistorically collected. The recovery and caching of potentially serviceable tool fragments from a relatively chert-rich region is interpreted as representing labor-saving opportunities too good to ignore. The cache suggests that prehistoric scavenging of discarded tools and late stage manufacturing rejects may have been a common practice. The cache example provides a cautionary lesson about the value of broken implements and the reuse of generalized preforms.

INTRODUCTION

Caches are typically regarded as accumulation of goods placed in storage or hiding for future recovery or utilization (Tunnell 1978; Kay 1985; Miller 1993). Caches can include food reserves, raw materials, partially reduced bifaces/preforms, finished tools, containers, or treasures. The long-term storage of specialized tool kits or generalized tool chests on sites constitutes part of the site furniture that is fundamentally different from

the storage of raw or partially reduced resources, which constitute logistical reserves. In contrast to manufacturing debitage or lost/discarded materials, caches are interesting insofar as they contribute insights into the prehistoric selection behavior of valuable goods accumulated at one point in time that were regarded as being worthy of future retrieval and reuse. Thus the study of archaeologically cached materials offers rare opportunities to identify goods that were prehistorically regarded as serviceable and important.

CACHES AND STORAGE IMPLICATIONS

Curatorial behaviors, such as caching, have been viewed as a means to lessen inequalities among raw material availability, time stress, and location of specific resources (Nelson 1991: 63). In this capacity, caches and caching behaviors also have been considered strategies for risk reduction (Binford 1979). Caching has been identified as a key strategy among logistically oriented hunter-gatherer groups in environments where significant temporal/spatial differences exist in the distribution of necessary resources (Binford 1980: 12). Such behaviors have been attributed to collector-oriented hunter-gatherer groups, which deploy special organized task groups as a means of acquiring food and other resources.

In the context of viewing caches as strategies designed to minimize risk or reduce time stress in critical situations, caches have also been interpreted as evidence of anticipatory behaviors. Anticipatory behaviors are indicative of a certain degree of planning depth and tactical depth in operation within the strategic framework of the settlement/subsistence system (cf. Binford 1989: 19-20). Planning depth is indicative of a variable length of time between the moment that anticipated needs are perceived and the instant that actions are taken to meet those needs. The concept of planning depth also includes the degree of investment in anticipatory behaviors and the proportion of these behaviors within the total behavioral repertoire of a group. Tactical depth is the capacity to meet anticipated needs based upon stored knowledge about the environmental, mechanical, and locational opportunities of the region.

Binford (1979:257) has identified insurance gear as equipment or objects that are normally cached within a region. Such caches are designed to meet needs that are anticipated to develop at future visits to the cache locality. Caches of personal gear are often located at stream/river crossings, caves, and rock crevices, or in specially constructed caching facilities that are easy to locate

and retrieve.

Most studies that include a discussion or caching behavior have distinguished between subsistence and implement caches as a means of overcoming discontinuities in the spatio-temporal availability of resources. Caches of implements and raw materials have been considered a means of providing tools or resources where none are available or for controlling the specific distribution of those resources (Bamforth 1986, Kornfeld *et al.* 1990:301).

Among nomadic hunter-gatherers, caching decisions within their primary and peripheral use-area depend on several economically-based factors. These include: 1) degree of mobility/rate of site abandonment; 2) anticipated return to the vicinity (also known as insurance gear caches); 3) distance to next campsite; 4) anticipated activities to be performed at the next camp (possibly involving the storage of "passive gear caches" during off-season periods; 5) resource bulk or artifact size and weight; 6) time or labor investment involved with material replacement costs; and 7) remnant use-life of the implements (Binford 1979; Schiffer 1987:91). Furthermore, if inter-group exchange occurs, then the preparation and movement of goods beyond the primary territory may reflect investment decisions involving long-distance transport costs. The form of trade material and packaging considerations may also influence the nature of the cache. An often overlooked aspect of caching behavior relates to the prehistoric strategy of mining sites or merely collecting usable implements to supplement personal tool chests or tool kits.

Accumulations of goods may also legitimately reflect ritual behaviors. However, the degree of ritual storage for future use could arguably segregate ritual caches from the economic reasons for creating caches, as listed above. Also, mortuary objects and burial goods are not herein regarded as caches, since their contexts clearly indicate that the objects were removed from further social contexts and were not stored for future retrieval and use (cf. Binford 1963).

The aforementioned types of caches indicate a range of variables that determine when storage or caching of goods is apt to occur. Significant factors among the variables used in making inferences about prehistoric caches include: 1) diversity and condition of the cached implements; 2) context of the cache relative to the landscape; 3) distance from the raw material procurement area; 4) proximity to villages/base camps; 5) proximity to other resource areas; and 6) position of the cache location in relation to the general subsistence/settlement pattern.

The present study challenges previous ideas of caching behavior in that, even in raw material-rich areas, replacement costs might be sufficiently onerous to cause site scavenging for serviceable implement resources. The present case study consists of a cache of mostly broken implements from site 41RN108, found during evaluative testing of prehistoric sites within the proposed O. H. Ivie Reservoir, Runnels County, Texas. This paper relates the site setting and context of the cache; describes form, principal breakage patterns and use-wear for items in the collection; and offers interpretations about the function of this group of selected artifacts.

THE SPREEN SITE SETTING AND CACHE LOCATION

The O. H. Ivie Reservoir was built by the Colorado River Municipal Water District below the confluence of the Concho and Colorado Rivers, about 96 km east of San Angelo, Texas. Bedrock chert rarely occurs in the Permian-age limestones within the region. However, abundant Cretaceous-age blue-gray to tan chert nodules (Edwards Plateau chert) occur as secondary gravels on Pleistocene-age high terraces flanking the modern floodplain, and as reworked deposits in gravel bars within the Holocene-age terraces and modern stream channel within the reservoir basin. Most of the chert gravels were originally derived from upstream bedrock deposits either from the Fort Terrett and Segovia Formations (Edwards Group) exposed in the Callahan Divide,

32 km north, or the rolling hills of Sterling County, 115 km west (Barnes 1974, 1976; Douthitt 1978:89, 179; Treece *et al.* 1992:94, 1994; Frederick and Ringstaff 1994).

Within the O. H. Ivie Reservoir Basin, a series of collection experiments was conducted to test the availability of knappable-sized chert cobbles from local gravel deposits. Using a five-minute search limit at various locations, an average of 69 usable chert cobbles was obtained from four Pleistocene upland settings. In contrast, an average of 54 usable chert cobbles was gathered from three modern river point bars. The average cobble size occurring at these seven locations measured ca. 125 x 95 x 58 mm, and weighed 1 kg (Bailey *et al.* 1989: B-4, Table B-2). Thus even though local bedrock chert deposits are rare-to-nonexistent, chert resources are relatively abundant within the river valley and readily accessible from any place containing primary or reworked Pleistocene gravels within the reservoir basin.

Site 41RN108 is at the confluence of the Colorado River and Rocky Branch Creek, in the upper portions of the O. H. Ivie Reservoir, Runnels County, Texas (Figure 1). More than 450 cultural resource sites were found during the survey of this 19,200-acre reservoir basin. The cultural remains at 41RN108 consisted of scattered fire-cracked rock, lithic debitage, and fresh water mussel shell fragments extending some 770 m (N-S) along two alluvial terraces on the right bank of Rocky Branch Creek, and at least 140 m (E-W) perpendicular to the creek. Eolian dunes on the higher portions of the hillside may cover some of the site.

The site area was subdivided along minor lateral gullies into three spatially distinct analytical units during the testing phase to assist in delineating horizontal variability of artifacts. The southeastern site area, closest to the Colorado River, contained no temporally diagnostic artifacts. The northwestern area along Rocky Branch Creek contained leached white sand deposits indicative of an ancient spring; three projectile points surface collected from this area were iden-

Figure 1. Topographic setting of the Sreen Site Cache.

tified as Clovis, Pandale and Palmillas, which are indicative of Paleoindian to Middle-Late Archaic periods (Turner and Hester 1985). The intermediate or middle site area, which contained the cache, also yielded portions of 13 projectile points. Seven projectile points surface collected from this area were identified as Travis, Marcos, Lange, Frio, Edgewood, Fairland, and Darl types, manufactured during the Middle Archaic through Transitional Archaic periods (Lintz *et al.* 1993; 251-252).

Testing at 42RN108 involved the excavation of seven geomorphological backhoe trenches and 27 1 x 1 units. These excavations recorded two angular rock-filled hearths, one slab-lined hearth, and the lithic cache. The entire site assemblage consisted of 17 cores, 7 thick bifaces, 138 thin bifaces/implements, 16 projectile points, 33 formally shaped scrapers, 37 informally made unifaces, 2,329 pieces of flake debitage, 4 manos, 13 bones, and 1,116 mussel shell fragments (Lintz *et al.* 1993:198). The very low incidence of recognized bifacial flakes (ca. 5.2%) and thick bifaces indicate that most bifaces were brought to the site in finished or near-finished condition.

CACHE CONTEXT

The lithic cache was found at an approximate elevation of 467 m above sea level and about 4.9 m above Rocky Branch Creek at a point 250 m northwest of the Colorado River terrace edge in the middle site area. This subarea yielded about 72% of the lithic materials and two of the three rock hearth features from the site. Geomorphic studies indicate that chert-rich Pleistocene gravel deposits occur within 1 km of the mouth of Rocky Branch (Blum and Lintz 1993:295). The tools occurred west of the first pronounced bend in Rocky Branch Creek upstream from the confluence and at a locus where the moderately dissected slopes of the higher uplands drop steeply towards the creek bottom. The major stream meander and an abrupt change in the hill slope might have been demarcating features for recovering the cache.

The artifacts were mostly surficially exposed at the base of a 32 cm tall, erosional remnant sediment pedestal stabilized by grass and brush. Thirty-six bifacial and unifacial tools were clustered adjacent to a very large chert core. Two other biface fragments found 20 and 85 cms southeast and east of the cluster are also considered part of the cache. None of the objects represented flake debitage. Thirty-two of the 36 tools in the cluster were touching other implements within a compact area measuring 23 x 27 x 9 cm.

Pre- and post-excavation photographs (Figures 2A, 2B) show most tools stacked in an arcuate pile with little space between individual artifacts. Few seem to be embedded in sediment, although one biface appearing on edge is protruding from the earthen pedestal. Two of the five visible scrapers are displaced from the stack and extend towards the large core. The absence of grass or other vegetation beneath the implements indicated that the tools do not represent culled artifacts from recent artifact hunting activities. An examination of the matrices around the cluster of tools shows a series of compact sediments that may represent a series of rain-washed deposits.

ANALYTICAL PROCEDURES

The artifacts were classified according to their morphological tool type. The tool types include bifaces, unifacial scrapers, and a core. The bifaces in the cache were compared against Callahan's (1979: 36-37, 1996) proposed manufacturing stages which rely on attributes of shaping/symmetry, edge sinuosity, width-to-thickness ratios, cross-section form, and extent of flake scars relative to the midline of the implement.

The shape of broken implements was inferred on the basis of their projected symmetry. Five idealized forms were employed: triangular, ovate/ovoid, bipointed, irregular, and unknown. Five conditional states were used to document the completeness of the bifaces based on an assumption that the more pointed end was distally lo-

Figure 2.A The Spreen Cache in situ. Close-up showing implement stacking before excavation .

Figure 2 B. The Spreen Site Cache in situ after excavation.

TABLE 1. Characteristics of fracture types.

Fracture Type	Characteristics	Cause	References
Lateral Flake Fracture/ "lateral snap"	A rather flat transverse fracture surface intersecting a large flake scar originating through the tool from a lateral or basal edge. Remnant of bulb present on edge of implement.	Application of excessive force during flake removal from the lateral margin of a tool or during basal thinning during pressure or percussion biface manufacture.	Johnson 1979:25; Ahler 1992:42-43; Rondeau 1981.
Bending Break	A non-twisted fracture plane that may show pronounced lipping without evidence of initiation along a lateral or basal edge.	Application of excessive force by bending the biface beyond tensile strength during manufacture, use, or trampling after discard.	Frison and Bradley 1980:43
End Shock Fracture	A special kind of bending break occurring during manufacture. A non-twisted fracture plane that may show pronounced lipping without evidence of initiation along a lateral or basal edge.	Application of excessive force during percussion manufacture generating rebounding shock waves throughout the tool's geometry, that if improperly supported, combines to exceed the elastic limits of the material and initiates a lateral fracture in areas away from the striking platform.	Crabtree 1972:60
Perverse Fracture	A twisted fracture plane often propagated at an angle oblique to the long or edge axis through the body of the tool.	Excessive load application to the lateral edge of bifaces during percussion flaking or misapplied load during pressure flaking. Often associated with irregularity in platform at point of applied force that produces fracture on two planes.	Ahler 1992:43; Crabtree 1972:82-83; Johnson 1979:25; Frison and Bradley 1980:43.
Outrepassé or Overshot Fracture/ "Reverse Fracture."	A fracture path that travels through the body of the tool and removes part of the tool margin opposite the point of initiation. Overshot fracture never truncates the tool; otherwise, it would result in a perverse fracture.	Excessive load application during flake removal and striking too far into the mass of the tool; common during later stages of percussion biface manufacture.	Ahler 1992:43; Johnson 1979: 25.
Simple Transverse	A single flattened, untwisted, mostly un-lipped and featureless fracture surface oriented perpendicular to the tool edge/long axis. No direct association of the fracture exists with a flake scar and no direct link between fracture propagation and pressure or percussion flaking.	Application of bending forces across the tool; can occur during manufacture, use, rejuvenation, or resharpening episodes.	Ahler 1992:44.
Radial Fracture	Multiple converging, flattened, untwisted, usually un-lipped and featureless fractures oriented perpendicular to the tool face without direct association with the bulbs near flake scar edges. Fracture initiation in the middle of tool face with breakage extending to margins in radial pattern.	Caused by an intentional blow to the flat face of the tool to achieve broken pieces with sharp and/or burin-like edges.	Frison and Bradley 1980:44
Longitudinal impact Fracture	The initiation of a simple transverse fracture from the tip of a point due to bending with or without the removal of one or more large flake scars from either or both faces sometimes extends the entire length of the implement.	A direct impact or penetration force and is potentially subjected to many different angles and kinds of resistances encountered. Not apt to occur during implement manufacture, but rather during use, as the tool impacts hard substances.	Odell 1981:206
Thermal Fracture	A rough, uneven and irregular fracture due to heat shock often associated with crazing, pot lidding and/or marked color changes in the chert.	A rapid, differential expansion or contraction of lithic material that exceeds elastic limits of the stone resulting from uncontrolled firings of chert during failed heat treatment attempts accidental loss of stone tools/debitage in fire, or post-abandonnement burning of archaeological materials.	Purdy 1974, 1981; Luedtke 1992.

cated. These states are complete, basal proximal, medial, distal, lateral corner.

Two observations on heat treatment, based on the presence/absence of glossy or waxy appearing chert and the occurrence of thermal fractures and pot lids, were recorded (Crabtree 1972:84). The only thermally discolored reddish pieces of chert in the cache were those associated with specimens containing pot lids. The confidence in correctly identifying heat treatment of Edwards Plateau chert based only on glossy luster is questionable, because many freshly knapped cobbles from west Texas have glossy or waxy appearing flake scars without having been heat treated (Phil Shelley, personal communication, 1988). The range of cortex on the dorsal surface was recorded using 25 percentile coverage intervals.

As most of the cached implements were broken, additional notes were taken on the kinds of breaks and presence of modifications along broken edges. A series of attributes and metric variables was obtained from the artifacts in the cache. The measured variables for each complete and fragmentary specimen included extant maximum length, maximum width, maximum thickness, length of serviceable bifacial edges (all measured in millimeters) and weight in grams.

An analysis of breakage patterns delineated a range of diverse causes that underlie the condition of the tool assemblage. Nine types of breaks were delineated (Johnson 1979, 1981; Frison and Bradley 1980; Odell 1981; Rondeau 1981; Ahler 1992: 42-44; Luedtke 1992). These consist of: 1) Lateral Flake Fracture, 2) Bending Break/End Shock, 3) Perverse Fracture, 4) Outrepasé or Overshot Fracture, 5) Simple Transverse Fracture, 6) Radial Fracture, 7) Longitudinal Impact Fracture, 8) Thermal Fracture, and 9) Percussion Rejuvenation (Table 1).

The specimens were examined under an ultraviolet light to identify varying degrees of fluorescence indicative of differential patination and varying periods of implement resharpening

(Hofman *et al.* 1991; Hillsman 1992). Finally, the edges and faces of each piece were examined under 100x magnification with a Nikon SMZ 1B microscope to search for use-wear. The attributes and inferred causes of use-wear are based on studies by Ahler (1992), Keeley and Newcomer (1977), Keeley (1980), Tringham *et al.* (1974), and Vaughan (1985).

ARTIFACT DESCRIPTIONS

The 39 artifacts in the cache were classified as 31 triangular/ovate thin bifaces, one concave base bifacial knife or large projectile point, 6 unifacial scrapers, and one large core. The weight of the core, 1,266 g., is more than half the total weight of the entire cache (2,007.4 g.). Cortical surfaces are common on scrapers (5 of 6, 83.3%) but less common (7 of 31, 22.6%) on bifaces.

The most unusual aspect of this cache is the high frequency of broken implements and absence of any refit pieces. Only the core and 7 of the other implements are regarded as complete. The broken specimens include 27 bifaces (87% of bifaces), one (100%) concave-base bifacial dart point/knife, and 2 (33%) unifaces.

All implements in the cache were made of Edwards Chert. The diversity in semitranslucency, blue-gray and tan-gray values, mottled dots, and small cortical remnants suggest that these cached specimens were manufactured from locally available cobbles derived from secondary terrace deposits. Minor amounts of cobble cortex were present on five scrapers, seven thin bifaces, and the core; the presence of cobble cortex lends support to the notion that the lithic resources were not obtained from bedrock quarries.

Moderate amounts of patina were present on two specimens and minor patina was tentatively identified on 10 specimens. The different degrees of patination on flaked surfaces suggest that some specimens were surficially exposed longer than others. No patination was thought to be

present on the remaining 27 items.

Examination of the specimens under ultraviolet light revealed relative homogeneity of fluorescence brightness within any single specimen, but some heterogeneity of fluorescence among these Edwards Plateau chert specimens. Some variation among artifacts might relate to 1) differential rates of patination; 2) the range of natural characteristics in chert gravels derived from various deposits within the Fort Terrett and Segovia Members of the Edwards Formation; 3) differential amount of exposure to light/weathering; or 4) various degrees of thermal alteration (Hofman *et al.* 1991). The different amounts of patination and ultraviolet response may have been largely caused by different ages of the artifacts. However, the absence of calcium carbonate incrustation, which usually occurs on Early Archaic and Paleoindian period artifacts in this portion of Texas, suggests that the cached artifacts are not that ancient.

Only two artifacts (biface FS-93.22 and scraper FS-93.36) showed differential ultraviolet fluorescence corresponding to specific flake scars. These items were sharpened long after they were manufactured. Overall, fluorescence analysis results suggest that most of the implements in the cache were probably collected and cached within a few decades to a few thousand years after initial manufacture. The following section describes each artifact class.

Thin bifaces

(N=31; Figure 3A-3K, 4A-4J, 5A-5H, 7B, 7C).

All the bifaces represent the latter stages of reduction, based on their well-defined, symmetrical geomorphic shapes, overall thinness (mean = 8.6 ± 1.8 mm), high width-to-thickness ratios (mean = 4.68; range 3.02 - 6.75, n=10), medium to small size of the flake scars on both faces, and scarcity of cortex (Tables 2 and 3). Tool edges are straight-to-slightly sinuous. They are regarded as nearly completed implements or preforms made from large flakes. The mean dimensions of the extant portions of the bifaces are length =

42.4 ± 13.2 mm; width = 38.3 ± 8.4 mm; thickness = 8.6 ± 1.9 mm; and weight = 16.2 ± 9.6 g.

Based on outline and symmetry, only 10 of the 31 bifaces retained the maximum widths useful in ascertaining the ratio of width-to-thickness. Three specimens had ratios between 3.0 and 4.0, four had ratios of 4.0 to 5.0, and three others had ratios between 5.0 and 6.75. The bifaces thus correspond to Callahan's Stages 3 and 4 and represent his (1996:56) secondary or final preform stages of biface reduction. However, because of the high percentage of broken implements, these ratios were not useful in classification. Instead, the specimens were regarded merely as thin bifaces with some pieces exhibiting minute retouch and/or use wear.

Three of the 31 thin bifaces (FS-93.13, 30, and 38) are complete. Twelve fragments have broad, curved, ovoid or squared ends, and are regarded as the base or proximal portion of the implements. Ten relatively pointed or triangular pieces are regarded as distal fragments. Other specimens are either midsections (n=3) or lateral edge fragments (n=3) and derive either from irregularly-shaped bifaces or bifaces of unidentified shape based on the small remnant present.

All but one of the bifaces possess overlapping flake scar patterns on both faces that reach or exceed the midline of the implement. The single exception (FS-93.34) has long flake scars on the dorsal face but retains significant portions of the remnant ventral surface from the original flake blank. Most flake scar patterns on the bifaces (n=17) are multidirectional, although some have flake scars systematically originating from opposing lateral edges (n=12).

A total of 23 thin bifaces has a glossy appearance and may have been made from heat treated flakes. One of these glossy-appearing bifaces also displays extensive pot lid fracture spalls and apparently was excessively heated after manufacture. Its presence among the cached items attests to the accumulation of bifaces from different sources.

Table 3. Metric data on tools from the Spreen Cache, 4IRN108

Specimen No.	Figure	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)	Biface Edge Length
Thin Biface						
93.1	3E	(37.9)	<35.4>	8	(9.7)	77.0
93.2	5B	(60.0)	<47.8>	9	(23.7)	117.3
93.6	5E	(56.6)	44.4	9.8	(27.6)	114.5
93.7	4J	(42.3)	43.6	7.8	(14.4)	40.0
93.8	3G	(42.8)	<33.7>	10.2	(13.6)	87.5
93.9	4E	(38.4)	<51.4>	10.1	(26.2)	98.0
93.10	7B	(36.2)	<32.7>	8.1	(8.5)	45.0
93.12	4B	52.7	<37.0>	8.5	(15.9)	108.3
93.13	5F	86.1	39.2	13	43.2	187.2
93.14	4H	(36.2)	<31.2>	6	(7.8)	79.5
93.15	4F	(34.4)	41.2	6.1	(12.1)	89.0
93.16	4C	(29.0)	<50.6>	8.3	(16.9)	88.7
93.18	4I	(39.6)	<40.4>	10.3	(15.0)	49.0
93.19	4D	(38.0)	38	7.9	(11.6)	93.8
93.20	3D	(32.8)	<34.2>	7.9	(8.9)	78.0
93.21	3J	(27.8)	(49.4)	8.1	(10.6)	74.5
93.22	4A	(43.6)	43.2	8	(18.3)	107.5
93.23	3B	(43.6)	<30.9>	<5.9>	(7.8)	80.5
93.24	3K	(49.4)	<57.2>	9	(27.7)	120.0
93.25	5C	(68.5)	41.4	9.6	(26.1)	130.0
93.36	5D	(53.7)	48.4	10.5	(30.5)	151.3
93.27	3C	(38.8)	<29.9>	7.9	(9.9)	65.5
93.28	3I	(32.4)	<23.8>	7.1	(4.6)	67.0
93.29	7C	(26.8)	<21.1>	6.3	(4.7)	27.0
93.30	5H	41.2	35.8	10	18.4	121.3
93.31	4G	(34.6)	<48.3>	9	(12.6)	77.5
93.32	3F	(32.3)	<38.1>	6.3	(4.7)	78.0
93.33	5A	(46.2)	(45.7)	11.6	(30.8)	82.0
93.34	3H	(47.8)	37.9	6.3	(10.4)	85.0
93.37	3A	(18.8)	<30.0>	6.8	(4.3)	55.7
93.38	5G	45.1	43.7	11.6	25.7	104.0
Sum		1313.1 mm	1187.7 mm	265.0 mm	502.2 g	2779.3 mm
Mean		42.4 ± 13.2 mm	38.3 ± 8.4 mm	8.6 ± 1.8 mm	16.2 ± 9.6 g	89.7 mm
Scrapers						
93.3	6E	53.8	49.6	16.6	42.7	77.0
93.4	6D	68.7	38.3	16.1	55	86.0
93.5	6G	60.1	4.3	16.7	46.9	36.0
93.11	6F	73.9	40.8	24	64.8	96.0
93.17	6C	(33.1) ^b	49.3	14.3	(27.6)	76.5
93.36	6B	(54.2)	(16.8) ^b	<10.4>	(9.9) ^b	66.5
Sum		310.7 mm ^a	222.3 mm ^a	98.1 mm	237.0 g ^a	438.0 mm
Mean		62.1 ± 8.9 mm ^a	44.5 ± 5.0 mm ^a	16.4 ± 4.4 mm	47.4 ± 8.9 g ^a	73.0 mm
Point Base						
93.35	6A	Concave (22.7) mm	24.4 mm	3.9 mm	(2.2) g	35.5 mm
Core						
93.39	7A	177.6 mm	94.4 mm	74.5 mm	1,266.0 g	NA

^a summary statistics of scrapers based on complete dimension (n = 5).
^b scraper dimension excluded from summary statistic.
 Parentheses "()" broken dimension -- not included in averages.
 Brackets "< >" possibly not the widest dimension on the implement.

Figure 3. Thin biface - distal sections. Use-wear symbols: P = polish, HP = hide polish, PW = prehension wear, R/MS = rounding and micro-scarring, OS/MP = oblique striations and matte polish.

Figure 4. Thin biface - proximal and medial sections. Use-wear symbols: ED&B = edge dulling and blunting.

Figure 5. Thin biface - complete and proximal sections. Use-wear symbols: WP = wood polish, HP = hide polish, PBR = post-break retouch, R/MS = rounding and micro scarring.

Figure 6. Scrapers. Use-wear symbols. HT = haft trace, RP/HW = polishes on ridge and haft wear.

A small amount of cortex, judged to be less than a quarter of one face, is present on seven (23%) specimens. One specimen (FS-93.6) has cortex near the edge on one face; 4 specimens (FS-93.21, 28, 32, 34) have cortex at the sharp tip end; 1 bipointed tool (FS-93.13) displays a small patch of cortex at the blunter end and another (FS-93.26) has cortex along the oval end. The four bifaces with cortex on the extreme end of the pointed tip support the notion that the preforms were fashioned from flake blanks and that reduction had probably not reached the stage of a completed implement.

Twenty specimens have single fracture plane breaks, 6 are broken in two places, and 2 are broken in three places. Most fractures appear to have been caused by knapping errors. These include 8 specimens with one or more lateral flake fractures (FS-93.2, 6, 14, 15, 24, 26, 27, and 37); and 6 items with perverse fractures (FS-93.12, 19, 21, 28, 31, and 34). Many of the 7 specimens with simple transverse fractures also might have been broken during manufacture or use; these include FS-93.8, 9, 16, 20, 22, 32, and 38. One specimen with a simple transverse fracture also has an earlier overshot flake scar (FS-93.33). However, one thin biface, FS-93.23, has been thermally fractured, presumably during post-manufacture activities. Several bifaces have multiple kinds of fractures, including combinations of perverse and lateral fractures ($n=1$; FS-93.1); perverse and simple transverse fractures ($n=4$; FS-93.7, 10, 18, and 25); or lateral flake and simple transverse fractures ($n=1$; FS-93.29). Four bifaces have flake scars or wear on the broken edge and reflect incidental damage, retouch, or use to the implements after they were broken.

The combined thin biface implements had a total of 2,779.3 mm of non-broken, usable bifacial cutting or scraping edges. The occurrence of thermally fractured and pot-lidded specimens, breaks indicative of manufacturing errors, flake scars on broken edges, and differential ultraviolet responses on flake scars of two implements indicate that some items were collected from different sources for reuse.

Dart Point or Bifacial Knife Base ($N=1$, Figure 6A).

A thin fragmentary biface (FS-93.35) has slightly expanding lateral edges, pointed edge-base junctures, and a moderately concave base. No edge grinding is evident. The width of the base is 24.4 mm, thickness is 3.9 mm, and the specimen weighs 2.2 grams. The length of the incomplete specimen is at least 22.7 mm. This specimen has been thermally spalled and has pot lids, reflecting post-manufacture damage. It appears to be the broad stem portion of a dart point without evidence of shoulder or blade morphology. Even though the specimen vaguely resembles the shoulderless Kinney dart point (Turner and Hester 1985:111), it also might be a thin, triangular knife comparable to forms from Late Archaic contexts found at the Smith Rockshelter near Austin (Suhm 1957).

The specimen is broken in three areas. The main fracture is a longitudinal impact fracture, represented by a long flake scar that removed a small portion of the lateral stem edge. In addition, one corner is missing and the upper middle blade has a perverse complex break. These fractures and potlids suggest that this implement was recycled from a finished tool. It has 35.5 mm of remaining usable bifacial cutting edge.

Unifaces/End Scrapers ($N=6$; Figure 6B-6G).

This type consist of four complete end scrapers, the distal portion of another end scraper, and the lateral edge of a probable end-side scraper. One specimen is a double-bit end scraper (FS-93.4) with unifacially worked edges on both the proximal and distal ends and a prominent lateral spur next to one end. All of the scrapers are relatively large. Mean dimensions are: length = 62.1 ± 8.9 mm ($n=5$), width = 44.5 ± 5.0 mm ($n=5$), thickness = 16.4 ± 4.4 mm ($n=6$), and weight = 47.4 ± 8.9 g ($n=5$).

The scrapers are technologically interesting because most were made on large cortication

flakes without extensive effort to prepare the dorsal surface. Five of six uniface with cortex remnants show little consistency in the amount of cortex present. One specimen each is represented by the 1-25%, 26-50%, and 51-75% interval coverage of cortex, and two specimens have more than 76% cortex on their dorsal surfaces. This suggests that large secondary cortication flakes were primarily selected for unifacial scraper manufacture. The few examples showing efforts of cortex removal prior to flake detachment have flake scars originating from multiple directions and multiple platforms, rather than from a single source, as found with single platform cores.

The two incomplete specimens consist of relatively narrow spalls retaining large segments of the unifacially worked scraping edges that were intentionally removed as edge rejuvenation spalls. One of these uniface (FS-93.17, Figure 6C) was the bit end that has a deliberate percussion blow originating from the lateral edge of the specimen. A second unifacial specimen (FS-93.36, Figure 6B) is a lateral scraper edge, which also was removed by a percussion blow from the platform. Similar rejuvenation scraper edge and bit fragments have been recovered from the Robert Lee and Mitchell County Reservoirs within 150 km of the Spreen site in west-central Texas (Shafer 1970; Quigg *et al.* 1993).

The occurrence among cached items of the two percussion-removed scraping edges further suggests that they were selectively recovered from expended debris. The six scrapers retained a total of 438 mm of unifacial edge; the lack of significant overhanging edges along the bit end suggests that these items could have been readily resharpened.

Core (N=1; Figure 7A)

The core is a relatively large cobble of stream-rolled Edwards chert that has retained most of its original irregular rock morphology. Cortex dominates most surfaces. Flakes have been re-

moved uniaxially from around one relatively pointed end, and uniaxially from both lateral margins on the opposite face. It measures 177.6 mm long, 94.4 mm wide, and 74.5 mm thick, and it weighs 1,266 grams.

Technologically, the knapper focused flake removal efforts along naturally occurring acute angles of the original core geometry from unground, cortically covered striking platforms. The relatively pointed, knapped end of the cobble shows edge stabilization as indicated by the presence of a continuous series of relatively small flake scars. The abundance of cortex remaining on the cobble suggests that most, if not all, flakes removed from it so far probably would have been primary or secondary decortication debris.

Although a few flake scars terminated in step or hinge fractures, most of them had feather terminations. As no internal fissures or flaws were evident and no serious knapping errors were present, the core was regarded as an unexpended nodule suitable for further flake detachments. Because the core was considerably larger than other items in the cache and was slightly displaced from the implement cluster, it may once have capped the cache and served as a possible marker to assist in the recovery of these implements. However, it was only slightly larger than the average chert cobble available in the local Pleistocene gravel terraces or in the recent stream channel gravel sources (Bailey *et al.* 1989).

MICROWEAR DESCRIPTIONS

Microscopic examination of the entire cache identified use-wear on 9 of the 31 thin bifaces, and all six of the scrapers (Table 4). Among the thin bifaces, use-wear occurred along knapped edges (n=4; FS-93.2, 6, 22, 30), broken edges (n=4; FS-93.10, 27, 34), and a combination of knapped and broken edges (n=2; FS-93.24, 33). Use-wear occurred along edges involving the full range of configurations (concave, straight, convex) without any predominance of form. Two specimens (FS-93.22, 34) had smoothing on flake scar ridges

Table 4. Characteristics of use-wear on artifacts from the Spreen Site Cache.

Specimen No.	Artifact Type	Breakage Type	Use-Wear Location	Use Wear Shape	Use Wear Description	Inferred Function
	Thin Biface					
FS-93.2	Proximal end	Lateral flake removal failure	Lateral edge	Larger concavity	Well developed polish with localized surface smoothing, slightly pitted polish with smooth margins. Microscars with step and feather terminations.	Scrape and plane wood
FS-93.6	Proximal end	Lateral flake removal failure	Both lateral and basal edges	Straight to slightly convex	Bright polish, rough but not smooth nor pitted. Edge rounding extends to lateral fracture. Unifacial edge microscarring with step terminations overlapping retouch scars.	Scrape wet or dry hides
FS-93.10	Medial segment	Perverse and simple transverse fractures	Broken edge	Straight	Highly smoothed with pitted bright polish and fine striations oblique to fracture face.	Scrape and plane wood.
FS-93.22	Proximal end	Simple transverse fracture and haft break	Both lateral and basal edges	All slightly convex	Biface surfaces have bright polish that dulls near edges; lateral edge dulling, blunting smoothing of flake scar ridges.	Wrapped haft break
FS-93.24	Distal end	Lateral flake removal failure	Both sides of point tip and broken edge	Both sides straight; slight convex broken edge	Tip has zone of polish smoothing and rounding; bright/reflective polish with grainy and rough topography but no striations. Microscarring with feather terminations on alternate surfaces. Broken edge has moderately developed polish, non-pitted and bright along fracture edges with oblique surface scratches.	Lateral flake fracture to scrape or plane hard materials; distal tip wear used to work hides.
FS-93.27	Distal end	Transverse break with subsequent retouch	Broken edge	Undulating, slightly concave	Edge blunting and smooth, bright polish near modified transverse fracture; polish overlaps microscarring on underside of edge. Microscars have step and hinge terminations that are rounded and smoothed.	Scrape hard material
FS-93.30	Complete	Unbroken	One lateral edge	Slightly concave retouched area	Slight edge rounding and unifacial microscarring with step/feather terminations	Scrape/shave unknown substance.
FS-93.33	Basal end/lateral edge	Perverse fracture	Intersection of fracture and subsequent longitudinal flakes	Straight edge of fracture	Fracture edge has continuous overlapping microscars with hinge/step terminations developed into slight bevel with bright smooth polish that is more pronounced on biface surface.	Scrape or plane hard material
FS-93.34	Distal end	Perverse fracture	Two areas of break and face	Slightly convex; slightly concave; on face	One fracture edge has oblique striations and matte gloss; opposite fracture edge has light rounding and feather terminated microscarring; matte polish and random scratches on ventral surface.	Scrape and shave/plane unknown material; Haft wear

Table 4. (continued) Characteristics of use-wear on artifacts from the Spreen Site Cache.

Specimen No.	Artifact Type Portion	Breakage Type	Use-Wear Location	Use Wear Shape	Use Wear Description	Inferred Function
FS-93.3	Unifacial Scraper Complete	Unbroken	Distal end/lateral side and lateral side/proximal end.	Convex to slightly convex	Subparallel to scalar percussion retouch on dorso-lateral edge. Bit wear is edge rounding, abrasion and unifacial micro-scaring into slight bevel; bright roughened polish on dorsal edge; Haft wear is smoothed and blunted flake scar ridges and matte polish; same polish with random striations on bulbar region and lateral edges.	Scrape skins or hides.
FS-93.4	Complete	Unbroken	Proximal and distal ends	Convex; convex with break on spur	Very light edge rounding and blunting on each end; unifacial microscars in discrete clusters with feather and step terminations. Light matte polish on edges of both ends.	Scrape hard materials.
FS-93.5	Complete	Unbroken	Distal end and dorsal ridge/ventral face	Convex end; dorsal and ventral faces	Wear in two discrete zones on edge. Highly rounded wear with abundant striations and matte, grainy polish over microscarring on end. Haft wear is light polish on dorsal ridges and ventral surfaces.	Hafted tool used to scrape dry hides with adhering grit.
FS-93.11	Complete	Unbroken	One lateral edge and distal end	Convex	Edges are modified with continuous overlapping, small scalar flake scars with step and feather terminations. Minimal edge rounding and no polish.	Scrape unknown hard, smooth material.
FS-93.17	Distal end	Transverse blow truncated tool for rejuvenation	Distal end	Convex	Distal end has moderate edge rounding on dorsal side and bright, grainy/roughened polish. Microscars with step fractures and feather terminations. No striations evident.	Scrape hides.
FS-93.36	Lateral side/distal end	Longitudinal fracture truncated by transverse break	Lateral edge to distal end	Slightly convex edge to convex bit	Haft polish truncated by edge flake scars from retouch. Small isolated cluster of hinge flakes next to longitudinal fracture. Unifacial microscars with step and feather terminations on bit; no rounding, polish or striations.	Scrape unknown materials.

Figure 7. Core and thin biface medial sections. Use-wear symbol: WP = wood polish.

in the middle of one or more faces that indicate haft wear.

Use-wear often occurs in multiple forms, the most common involving micro-scarring ($n=7$), bright smooth polish ($n=6$), and edge rounding and dulling ($n=6$). Three thin bifaces have fine striations or scratches, two have smoothing of flake scar ridges, and one specimen each has wear characterized as pitted polish, rough polish, matte gloss, or retouch (but no use-wear) along a broken ridge. The inferred use of the thin bifaces relates to scraping or planing of unspecified hard materials ($n=4$), wood ($n=2$), hides ($n=2$), and an unknown substance ($n=1$). Other types of modification relate to probable haft wear ($n=2$) and retouch along a broken edge.

All six unifacial scrapers have signs of wear on convex or slightly convex edges. Half show use-wear on lateral and distal ends; the other half have wear only on the distal ends. One scraper (FS-93.4) has been used at both ends; a prominent beak or spur occurs next to the distal end of this specimen, but no evidence of wear was observed on it.

As with bifaces, the scrapers typically show multiple forms of wear on a single tool. The most common forms consist of edge rounding and blunting ($n=5$) and micro-scarring ($n=5$), followed by retouched edges ($n=3$), bright polish ($n=3$), and matte polish ($n=3$). Two specimens have striations or abrasions and one artifact each exhibited smoothing of dorsal flake scar ridges and bright grainy polish along the edge. The wear was attributed to scraping hides ($n=3$), some form of hard material ($n=2$), and some unknown kind of material ($n=1$). One specimen (FS-93.5) shows haft wear on the dorsal and ventral surfaces.

Use-wear evidence supports the contention that tools were reused after they were broken. Three thin bifaces (FS-93.10, 27, and 34) have smooth polish, edge rounding, striations and micro-scarring along broken edges indicative of scraping and planing activities on wood and other hard surfaces. These and the retouch observed

along the broken edge of thin biface FS-93.38 strongly indicate recycling of broken bifaces for reuse in prehistoric contexts.

INTERPRETATIONS

Biface caches made from Edwards Plateau chert are moderately common within 200 to 250 km of the geological source exposures. Studies of more than 50 such caches have shown that they contain from less than 5 to more than 140 bifaces and were probably maintained for a variety of reasons (Miller 1993). The contexts and inclusions of some features indicate that caching behaviors in Texas range primarily from Middle Archaic to Late Prehistoric in age. Even though 72% of the caches consist exclusively of thick to thin bifaces, about 8.5% of caches consist of predominantly bifaces associated with unifaces and cores/nodules / "hand axes," just like the components of the Spreen Cache. Differential patination on one or more specimens and among pieces within the cache provides evidence that some materials were collected from other sites (Miller 1993:142). Few studies have systematically documented the condition of bifaces in caches, but perusal of regional literature indicates that fragmentary bifaces are included in some caches from Central Texas (cf. Miller 1993:61, 78). More rigorous documentation of the condition of specimens is required to determine how often broken bifaces were retained in caches.

The antiquity of the Spreen cache implements is uncertain. Its minimal horizontal dispersal, along with the occurrence of a few specimens imbedded in sediments and the presence of patterned traces of use-wear, indicates that this collection of tools represents a prehistoric cache, rather than a recently discarded culling of broken artifacts by a modern relic collector. If the cluster of artifacts found along Rocky Branch Creek is not a cache, then it could certainly reflect an intact discard of a task-specific expedient tool kit.

The association of the concave base point/knife with the cache and the presence of seven identifiable projectile points from this portion of the site ranging from Middle to Transitional Archaic suggest that the cached items have been collected since ca. 2500 B.C. (Turner and Hester 1985). The absence of calcium carbonates further suggests that the items are from neither the Early Archaic nor Paleoindian periods. Nothing unique about the knapping technologies of the thin bifaces sheds light on the age of these specimens. The presence of end scrapers made mostly on cortical flakes with occasional dorsal flake scars originating from multiple directions is quite unlike the technology commonly employed during the Late Prehistoric (Toyah phase), in which end scrapers are frequently made on blades (Treece *et al.* 1993; Creel 1990). It is likely that the entire collection represents Archaic materials. Unfortunately, no means exists to absolutely date or firmly ascribe a cultural affiliation to the cache's context or the cache itself.

The lack of refittable fragments and the wide diversity of texture and colors suggest that the specimens were not made during a single knapping episode. The two heat-scarred (pot lid-ded) fragments indicate that thermal damage occurred after manufacture and initial implement discard, but prior to procurement. Other lines of evidence for artifact reuse include the different age of knapping on two specimens as indicated by differential ultraviolet fluorescence of flake scars, and the knapping and use-wear on the broken edges of four specimens. Thus the collection represents an accumulation of artifacts scavenged from one or more pre-existing archaeological sites, possibly as part of an imbedded collection strategy during daily foraging activities.

The locational context of this collection of mostly broken bifaces is unusual because of the cache's occurrence in a region with relatively abundant chert resources (cf. Bamforth 1986). The simplicity and small size of the thin biface forms relative to other complete biface caches in Texas (Miller 1993) do not intuitively ascribe

extraordinary value in replacement costs or high transport costs. Nor does the high incidence of broken tools imply that they represent a stash of trade goods from long distance transport. Broken condition and simple form also do not seem to support their use as off-season equipment storage of a specialized tool kit. However, their accumulation and care in storage clearly indicate that some kinds of fragmented thin bifaces and scrapers retained sufficient perceived value for maintenance as a generalized tool chest to meet anticipated needs.

The placement of the cache at a specific location in a distinctive landscape and geographical setting (river confluence, stream setting, hill slope location) and the presence of a large core slightly displaced downslope suggest that these implements were marked for easy recovery. From a functional or economic perspective, the value of the cache consists of the prepared core nodule, the occurrence of four complete or usable scrapers, and the presence of nearly 280 cm of potentially usable bifacial cutting/scraping edges available among the 32 bifaces, not including the lengths of the sharp, broken edges. Furthermore, the identification of use-wear on the broken faces and adjacent edges of some thin bifaces suggests that the steep angle at the fracture edge was regarded as a desirable attribute in selecting specimens for the cache (Crabtree 1973). Wear studies have identified some implements that were used on a variety of different kinds of materials. The Spreen cache probably represents an expedient accumulation of materials scavenged from 41RN108 or other near-by sites and saved for future use as a generalized tool chest. The recovery of serviceable tool fragments, even in a relatively chert-rich region, must have presented labor-saving opportunities too good to ignore.

The extent of tool scavenging from archaeological sites is often suspected, but prehistoric collection activities are difficult to document in site assemblages, especially among discarded non-diagnostic tools and tool fragments. The Spreen Site Cache suggests that prehistoric opportunistic collection activities may have frequently oc-

curred. Such behaviors may account for the presence of anomalously early artifacts in a discrete site assemblage or the direct association of relatively contemporaneous but culturally distinct projectile points in single component sites. Thus some caution should be exercised in inferring the number or age of components based only on the recovery of a few "temporally diagnostic" points in lieu of having absolute chronometric indicators, especially in assemblages of limited size. Caution is also advised in discussing cultural affiliations, trade networks, or regional interaction patterns based on small samples of diagnostic artifacts in site assemblages.

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