ARCHAEOLOGY AND HOLOCENE STRATIGRAPHY AT THE FOOT OF THE FRONT RANGE

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INTRODUCTION

The archaeological investigations of the Dutch Creek site (5JF463) were conducted by the Colorado Department of Highways (CDOH) Archaeology Unit in conjunction with the proposed impacts associated with the construction of a bridge over Dutch Creek for State Highway C-470 (Fig. 1).

The C-470 right-of-way was surveyed for archaeological resources between January 20 and February 27, 1976, as part of the original survey for I-470 (Martin 1976). At the time of the survey, no cultural materials were observed on the surface in the area of the site. On February 8, 1985, a monitor discovered a bone exposed in the cut bank at Massey Draw, 3 kilometers south of Dutch Creek. Subsurface testing uncovered an extensive archaeological site which was subsequently excavated by CDOH Archaeological Unit personnel (CDOH 1989).

Consideration of the geomorphological and topographical similarity between Massey Draw and Dutch Creek led to subsurface testing at Dutch Creek. On June 10, 1985, CDOH Archaeological Unit personnel recovered a series of core samples from seven auger borings made at various depths in the area of interest. Two charcoal samples were recovered from test core boring No. 7. The sample located 191-206 centimeters (cm) below ground surface (bgs) returned a radiocarbon age of 3260 ± 80 years B.P., 1310 B.C. (Beta 13324), and another from 247 cm bgs returned a radiocarbon age of 2830 ± 70 years B.P., 880 B.C. (Beta 13325). All dates given throughout this report are uncalibrated. Although these ages were inverted according to their respective stratigraphic positions, it was believed that this information indicated that further subsurface investigation was required to determine the nature and possible cultural association of the charcoal. On May 27 and 28, 1987, four backhoe trenches (BHT) were excavated in the potential site area. BHT-1 and BHT-3 revealed *in situ* subsurface cultural remains consisting of a piece of flaked lithic debitage 127 cm bgs and a rock-lined hearth (Feature 1) 85-100 cm bgs. A sample of charcoal from Feature 1 was submitted for analysis, and a radiocarbon age of 1980 ± 50 years B.P., 30 B.C. (Beta 21192) was returned. The presence of *in situ* dated cultural remains warranted the initiation of a stratigraphically controlled test excavation of the hearth.

On July 16, and between July 21-24, 1987, Highway Department archaeologists excavated one 2 m x 2 m test unit (TU-1) centered directly over Feature 1 (Gilmore and Baugh 1987). The test unit was excavated in one meter quadrants, and vertical control was maintained by excavating in arbitrary 10 cm levels. All matrix was dry screened through 1/4-inch mesh screen. This excavation resulted in the recovery of a diagnostic Late Archaic projectile point (Fig. 4), an additional hearth (Feature 2) which yielded a radiocarbon age of 2700 ± 90 years B.P., 750 B.C. (Beta 22217), flaked lithic tools and debitage,

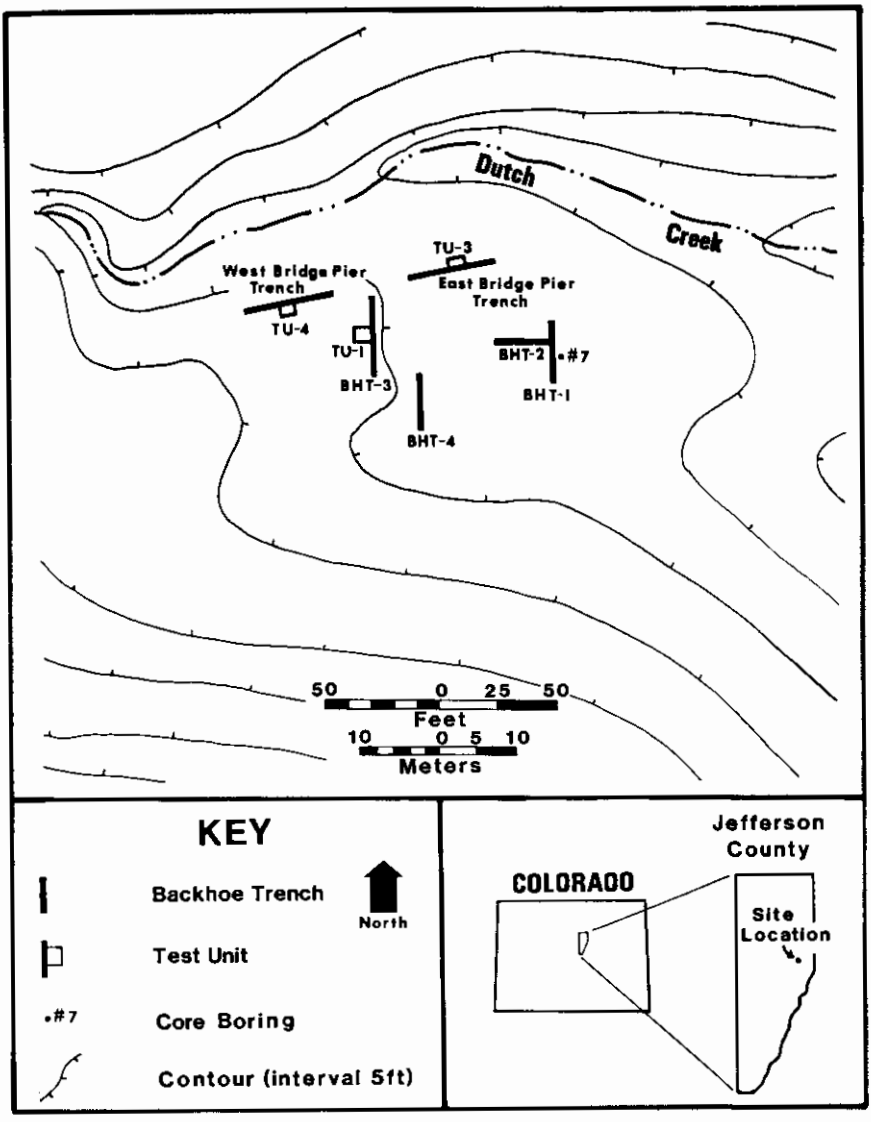

FIGURE 1. Map of the Dutch Creek site, 5JF463.

groundstone fragments, and bone fragments from game species, some exhibiting evidence of burning and butchering.

In March 1988, two additional hearths (Features 3 and 4) were uncovered during the excavation of backhoe trenches associated with bridge construction activities at Dutch Creek. On March 25, 28 and 29, 1988, Highway Department archaeologists excavated two 1 m x 2 m test units, one centered over Feature 3 and one centered over Feature 4 (McNees 1989). As with TU-1,

these test units (designated TU-3 and TU-4 based on the features each contained) were excavated using arbitrary 10 cm levels and all matrix was dry screened using 1/4-inch mesh screen. These excavations resulted in the recovery of two diagnostic Woodland projectile points (Fig. 4b-c), flaked lithic tools and debitage, one cord-marked potsherd, groundstone, and bone fragments from game species, some exhibiting evidence of burning and butchering. A sample of charcoal recovered from Feature 3 returned a radiocarbon age of 1220 ± 60 years B.P., A.D. 730 (Beta 25579), and a sample of charcoal recovered from Feature 4 returned a radiocarbon age of 1430 ± 90 years B.P., A.D. 520 (Beta 25578). All features are summarized in Table 1.

SITE LOCATION AND SETTING

The site is located southwest of Denver at the transition zone between the mountains and plains, in one of the structurally controlled hogback valleys common along the Front Range. These valleys are formed by stream erosion of tectonically upthrust beds of shale bedrock bounded above and below by equally upthrust formations of more resistant sandstone and limestone. These resistant formations eventually form hogbacks that restrict lateral migration of the streams, resulting in relatively narrow valleys oriented along the strike of the bedrock units. The site is located on the south side of the drainage of Dutch Creek, just east of where it exits the Dakota hogback. This location is protected on four sides; a high terrace of Slocum alluvium to the north, the Fort Hays limestone hogback to the east, a hillslope consisting of colluvium derived from the Dakota sandstone and Graneros shale to the south, and the Dakota hogback to the west (Bryant et al. 1973). At this point, Dutch Creek flows south for 1.5 kilometers through a valley eroded into the softer Graneros shale before exiting through a gap in the Fort Hays limestone and flowing east into the South Platte River. The location of the site also affords access to three environmental zones in the immediate vicinity; the short grass prairie at the lower

TABLE 1. Summary of features.

Feature Number	Depth Below Surface	Dimensions (cm)	Radiocarbon Age (B.P.)	Feature Type	Diagnostic Artifacts from Same Component
1	70-85 cm	75x(75)x13	1980±50 Hearth	Rock-filled	___
2	108-120 cm	44x(40)x12	2700±90 Hearth	Unlined Basin dart point	Corner-notched
3	40-82 cm	84x(80)x42	1220±60 Hearth	Rock-filled arrow points; cordmarked sherd	Two corner-notched
4	80-105 cm	80x(80)x25	1430±90 Hearth	Rock-filled	___

Dimensions in parentheses are estimates for features truncated by trenches. Modified from McNees (1989).

elevations, giving way to the lower mountain zone as elevation increases, with riparian species occurring along the creek.

STRATIGRAPHY

There are ten stratigraphic units that were recognized and described from the subsurface investigations at Dutch Creek, nine Holocene alluvial/colluvial stratigraphic units and one bedrock unit. Only the Holocene units were numbered.

The six upper units were described during the backhoe trenching and archaeological testing phase, and an additional three units below the first six were recognized in borings for the bridge pier foundations (CDOH 1986). In the interest of consistency, strata 1 through 6 of Gilmore and Baugh (1987, Fig. 3) have been renumbered 3 through 9 in order to include the deeper strata recognized from foundation borings. Strata 4a and 4b of Gilmore and Baugh (1987) are here given the separate designations of stratigraphic unit 6 and stratigraphic unit 7, based on the fact that it is now believed that they are separate geologic deposits and not soil horizons developed in the same deposit as was hypothesized in the previous work. Descriptions of Strata 1 through 3 are taken from the final foundation report (CDOH 1986), and are described using general engineering criteria less detailed than the strata descriptions of Strata 4 through 9, which were described during the archaeological excavations using the criteria for soils outlined in Birkeland (1984). Depths and descriptions for strata 4 through 9 are taken from the TU-1 profile description; depths and parenthetical descriptions for bedrock and strata 1 and 2 are from foundation boring No. 4.

Unit 9, 0 cm-30 cm: Dark brown (10YR 3/3, moist) fine loamy sand; single grain structure; loose, nonsticky, very slightly plastic; less than 1% gravel; abrupt, smooth boundary.

Unit 8, 30 cm-45 cm: Very dark grayish brown (10YR 3/2, moist) sandy clay loam; slightly hard, sticky, plastic; massive structure; 5-10% gravel, consisting of small, angular pieces of shale and sandstone; clear, smooth boundary.

Unit 7, 45 cm-70 cm: Very dark gray (10YR 3/1, moist) sandy loam; friable, slightly sticky, slightly plastic; massive structure; less than 1% gravel; clear, wavy boundary.

Unit 6, 70 cm-120 cm: Very dark grayish brown to dark brown (10YR 3/2.5, moist) loam; hard, slightly sticky, slightly plastic; massive structure; less than 1% gravel; clear, wavy boundary.

Unit 5, 120 cm-138 cm: Dark brown (10YR 3/3, moist) loamy sand; hard, very slightly sticky, very slightly plastic; massive structure; less than 1% gravel; clear, smooth boundary.

Unit 4, 138 cm-248 cm: Very dark grayish brown (10YR 3/2, moist) loam; very hard, sticky, plastic; moderate coarse prismatic parting to moderate coarse angular blocky structure; 5-10% gravel; Stage I carbonate morphology; clear, wavy boundary.

Unit 3, 248 cm-300 cm: Gravel; sandy, dense.

Unit 2, 300 cm-500 cm: Clay; sandy, plastic, moist, stiff, maroon.

Unit 1, 500 cm-720 cm: Gravel; sandy, subrounded, with thin sand layers, wet, dense, mottled colors.

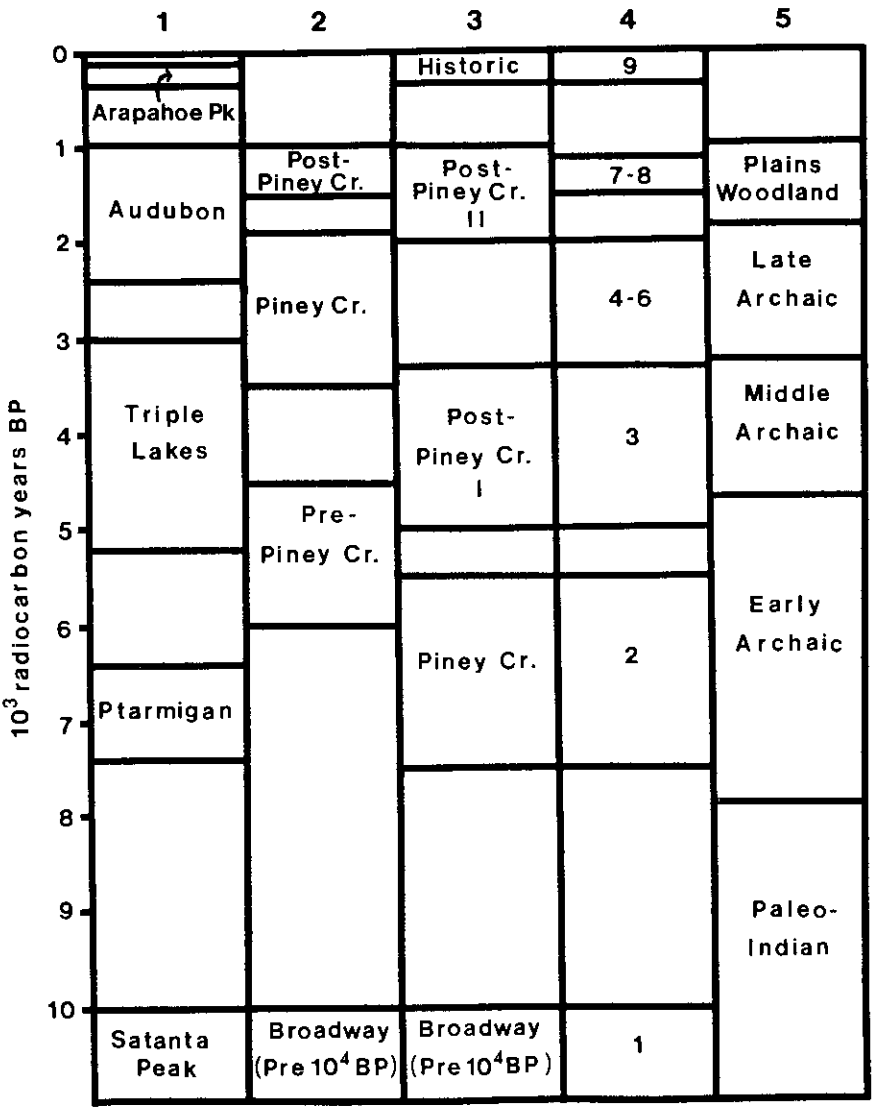

FIGURE 2. Relationship of Front Range Holocene stratigraphic units mentioned in the text. 1. Cirque glacier chronology, Indian Peaks area (Benedict 1984); 2. Alluvial chronology, adapted from Scott (1963) and Buckles (1980); 3. Modified alluvial chronology, adapted from Madole (1976) and Madole and Rubin (1984); 4. Stratigraphy of the Dutch Creek site, this report; 5. Prehistoric cultural chronology used on the Front Range, adapted from Cassells (1983).

Bedrock, 720 cm: Shale; clayey, moist, hard, dark brown. Bedrock is presumed to be Graneros shale.

Interpretation of the Stratigraphic Units

For a graphic representation of the stratigraphic relationships mentioned in the text, the reader is referred to Figures 2 and 3.

There are no associated radiocarbon ages from Unit 1 at Dutch Creek. However, it is believed to correlate with a similar stratum of coarse alluvium that is also deposited on shale bedrock at Massey Draw, a perennially flowing stream similar in drainage basin size and characteristics to that of Dutch Creek. According to the foundation boring logs for the Ken Caryl Road overpass at State Highway C-470 (CDOH 1983), this unit of coarse alluvium was encountered between 0.6 meter (m) and 4.0 m bgs. A sample of noncultural organic material from a stratum approximately 2.5 m bgs and above the coarse alluvium returned an age of 8620 ± 120 B.P., 6670 B.C. (Beta 12802). This date

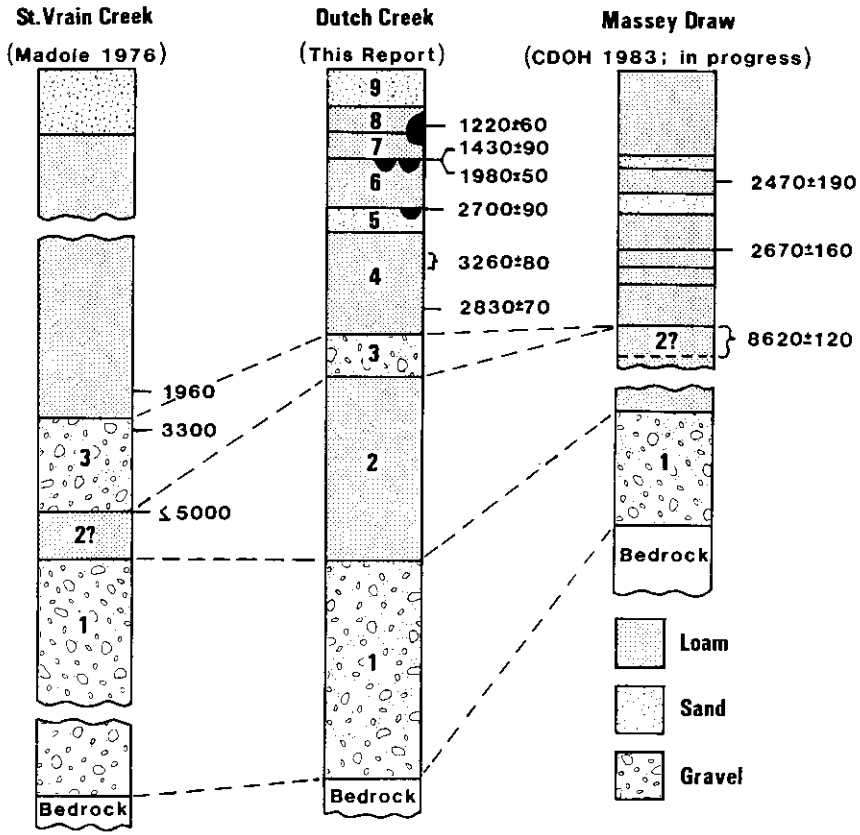

FIGURE 3. Comparison of stratigraphic columns from St. Vrain Creek, Dutch Creek and Massey Draw. Dotted lines indicate hypothesized correlations.

provides a minimum age for the deposition of the coarse alluvium. The early Holocene age for the deposit above it would seem to indicate a late or terminal Pleistocene age for Unit 1. It may in fact correlate with either the Broadway alluvium or the Louviers alluvium, which Bryant et al. (1973) observed directly below upper Holocene alluvium (mapped as Piney Creek) in an arroyo 1 kilometer north of the site. This deposit represents a period of high runoff possibly associated with deglaciation, which resulted in an increase in stream transport capability. The coarse alluvium was deposited as Dutch Creek and Massey Draw both experienced a decrease in gradient and velocity as they exited their constricted bedrock valleys and flowed into the wider hogback valley.

Unit 2 is hypothesized to have been deposited during a period of reduced effective moisture during the Altithermal, conditions that would have resulted in less vegetation cover within the drainage basin and a concomitant increase in sediment yield. This increase in sediment yield coupled with a decrease in runoff would have resulted in the deposition of fine-grained sediments derived from local slopes (Schumm 1965). The stratigraphic unit deposited on top of the basal coarse alluvium at Massey Draw is described as a very pale brown clay (10YR 7/4). This unit may correlate with Unit 2 at Dutch Creek, and the age associated with this unit gives a minimum date for the onset of its deposition. Madole and Rubin (1984) cite evidence from St. Vrain Creek that indicates that the Piney Creek alluvium (Hunt 1954; Scott 1963), estimated to have been deposited between 2000 and 4000 years B.P., may in fact have been deposited during the Altithermal (c.a. 5500-7500 B.P.) as a result of the environmental factors described above. Although the date of 8620 B.P. is older than Madole and Rubin's estimate, it still falls within the boundaries of the Altithermal (Benedict 1981).

There are no associated dates for Unit 3 at Dutch Creek, and a second unit of coarse alluvium was not observed at Massey Draw. A possible correlation is found once again in the valley of St. Vrain Creek, where Madole (1976) describes two superimposed gravel units separated by a discontinuous organic-rich sediment zone. The lower coarse alluvium corresponds to the Broadway Alluvium and the upper coarse alluvium assigned to a period between 1960 B.P., the oldest date within the overlying fine-grained silty-sand deposit, and 3770 years B.P., the age returned for the organic-rich sediment between the two gravels. This stratigraphic relationship agrees with that of Units 1-3 at Dutch Creek. The charcoal sample from core boring No. 7 provides a minimum age for Unit 3 of 3260 radiocarbon years B.P. Even if the radiocarbon ages of the samples recovered from core No. 7 are rejected due to their inversion (hypothesized to be the result of a methodological error in collection or labeling), a minimum age of 2700 radiocarbon years B.P. is provided for both Unit 4 and Unit 5 by Feature 2. Unit 3 may correlate with the basal gravel unit of the Post-Piney Creek Alluvium (Post-Piney Creek I) as described by Madole and Rubin (1984), which is thought to have accumulated between 3300 and 5000 radiocarbon years B.P., a range that agrees with radiocarbon ages recovered from Dutch Creek. Madole hypothesizes that this basal coarse alluvium of the Post-Piney Creek was deposited during a period of peak discharge associated with the Triple Lakes advances of cirque glaciers in the Colorado Front Range (Benedict 1981, 1985).

An erosional contact between Unit 3 and Unit 4 is indicated by features ex-

posed in BHT-1, in which a large boulder at the top of Unit 3 has preserved a thicker section of the gravel. On either side of the boulder, the gravel has been eroded.

Unit 4 is a fine-grained unit with a relatively high percentage of clay. It also contains 5-10% gravel, and does not appear to be as well sorted as the units that overlie it. It is believed that the clay content of this unit is due to parent material composition and not a result of pedogenesis. The combination of fine and coarse materials and the poorly sorted nature is thought to be representative of colluvial processes. This could indicate a period of reduced effective moisture and an associated reduction of plant cover leading to an increase in sediment yield that correlates with the Triple Lakes-Audubon interglacial. The radiocarbon ages recovered by coring from Unit 4 are consistent with this interval, although the earlier radiocarbon age (3260 B.P.) does overlap the terminal Triple Lakes advance by 200 years (Benedict 1985). Unit 4 does not have a correlate within the stratigraphy of St. Vrain Creek; the oldest radiocarbon age for organic material recovered from the upper silty-sand unit of the Post-Piney Creek Alluvium (Post Piney Creek II) overlying the basal gravel unit (Post-Piney Creek I) is 1960 radiocarbon years B.P. (Madole and Rubin 1984). This indicates a period of stability for St. Vrain Creek during a time when sediment was aggrading relatively rapidly at Dutch Creek. Radiocarbon ages for charcoal samples recovered from hearths at Massey Draw close to the channel indicate that fine-grained sediments were aggrading between 2670 $\pm$ 160 (Beta 12276) and 2470 $\pm$ 190 (Beta 12011) radiocarbon years B.P.; but not as rapidly as at Dutch Creek.

Unit 5 is a thin (15 cm) layer of well sorted loamy sand that overlies Unit 4. The higher percentage of sand indicates this unit was deposited in a slightly higher energy environment than the units above or below it, but the interpretation of a unit of such limited thickness is problematic. Feature 2, an unlined basin hearth excavated into the top of Unit 5, provides a minimum age of 2700 radiocarbon years B.P.

Units 6 and 7 represent similar depositional units. These units correspond to stratigraphic units 4a and 4b of Gilmore and Baugh (1987) and were thought to represent the A and Bw horizons of the Late Recent soil of Scott (1963), indicating correlation with the Piney Creek Alluvium. However, the location of Feature 1, with an associated radiocarbon age of 1980 B.P., and Feature 4, with an associated radiocarbon age of 1430 B.P., indicates a 550-year hiatus in deposition between Unit 6 and Unit 7. This evidence suggests that the differences between Unit 6 and Unit 7 are the result of different episodes of deposition and not the result of pedogenesis as was originally thought.

Unit 8 is thought to represent two episodes of catastrophic flooding that occurred within a fairly restricted time frame. The local derivation of the gravels within this deposit and the relatively well sorted nature of the gravel suggest that materials were picked up from the colluvial slope adjoining the site by high-energy flood waters upon exiting the confined valley through the Dakota Hogback. Almost immediately after exiting the mouth of the confined valley, the flood waters spread out and lost some transport energy, leaving the shale and sandstone colluvium as a thin, stratified deposit of alluvium over the site. The absence of this unit downstream in BHT-1 indicates that Unit 8 is spatially limited in distribution. In TU-1 and TU-4, Unit 8 can be divided into

two coarse strata with a fine-grained stratum occurring between. Feature 3, a rock-filled basin hearth with an associated radiocarbon age of 1220 years B.P., is almost entirely contained within the body of Unit 8, which also supports the hypothesis of two episodes of deposition.

Flooding of the type described above could be the result of heavy downpour associated with a thunderstorm over a small drainage basin such as that of Dutch Creek. Thunderstorms are a common occurrence along the Front Range during the late spring and summer, and can cause local flooding in one drainage while adjoining drainages receive little or no precipitation from the same storm. It is possible that the type of episode described above would create deposits that might not have correlates between adjoining drainages, let alone regional correlates. Units 7 and 8 may correlate with the upper silty sand unit of the Post-Piney Creek Alluvium (Post-Piney Creek II) at St. Vrain Creek, deposited between 1000 and 2000 years B.P. (Madole and Rubin 1984).

Unit 9 is composed of fine sand and is culturally sterile, so there are no associated ages for this deposit. It is thought that this deposit is fairly recent, due to the lack of A horizon development and its loose consistence, in addition to its stratigraphic position. Similar young alluviums have elsewhere been correlated with the Historic Alluvium of Hunt (1954).

ARTIFACTS

All retouched flaked lithic artifacts were examined for indications of use-wear using a 20 power binocular microscope, and any wear observed was evaluated following the method outlined in Ahler (1979). A summary of all tool measurements and material types is found in Table 2.

Projectile Points

5JF463.14 (Fig. 4a) is biconvex in cross-section, and has an expanding stem with corner notches and a slightly convex to straight base. The base exhibits evidence of grinding and the removal of basal thinning flakes from both sides. Blade edges are straight with no evidence of use-wear. The width:length ratio is low, possibly due to resharpening, although the cross-section does not exhibit the characteristic double "S" curve associated with resharpened hafted bifaces; however, the blade edges do exhibit multiple step fractures which could indicate platform preparation. Material is Flat Top Butte chert (opaque dark purple). This artifact was recovered from Stratum 6 in the screened matrix of arbitrary level 11, 100 cm to 110 cm bgs in TU-1. The point is morphologically similar to MM 23 in the Magic Mountain typology (Irwin-Williams and Irwin 1966), which contains material believed to be affiliated with the Middle to Late Archaic Apex Complex habitation at Magic Mountain. This specimen is also morphologically similar to the Large Corner Notched type at Vail Pass Camp, attributed to a time span overlapping the Late Archaic and the early Woodland periods (Gooding 1981). Artifact 5JF463.14 was recovered from a level stratigraphically intermediate between Feature 1, dated 1980 B.P., and Feature 2, dated 2700 B.P. This range is consistent with the accepted chronological boundaries for the Late Archaic occupation of the Colorado foothills and mountains (Cassells 1983:202; Guthrie et al. 1984).

Specimens 5JF463.52 and 5JF463.68 (Figs. 4b and 4c) are biconvex in cross-

TABLE 2. Tool measurements (in millimeters) and material type.

	Length	Width	Thick	Haft Width	Material, Color
Projectile Points					
5JF463.14	19	21	4	12	Chert, dark purple, opaque
5JF463.52	20	—	2	4	pw, gold, opaque
5JF463.68	18	—	3	6	pw, dark gold, opaque
Bifaces					
5JF463.9	—	19	3	—	pw, dark gold w/ translucent bands
5JF463.11	—	28	8	—	pw, gold, opaque
5JF463.16	—	—	6	—	pw, dark red/brown, opaque possible heat treatment
5JF463.80	—	—	6	—	pw, gold, opaque
5JF463.84	39	44	14	—	FT, Chert, milky white w/ thin translucent bands
Unifaces					
5JF463.12	39	28	12	—	pw, gold, opaque w/thin translucent bands
5JF463.69	31	25	19	—	pw, gold, opaque
Flake Tool					
5JF463.83	26	19	6	—	chert, olive green, opaque

pw = petrified wood; FT = Flat Top

section, and have expanding stems with deep corner notches (5JF463.52) and convex bases that do not exhibit evidence of grinding. Blade edges are convex or recurvate and do not exhibit use-wear. Material is petrified wood. Specimen 5JF463.52 was recovered from Stratum 8 in the screened matrix of arbitrary Level 4, 40 cm to 50 cm bgs in TU-3. Specimen 5JF463.68 was also recovered from Stratum 8, in the screened matrix of arbitrary Level 6, 60 cm to 70 cm bgs in TU-3. Both projectile points are believed to be associated with the component containing Feature 3, with an associated date of 1220 B.P.

The artifacts are morphologically similar to type MM 35, which is associated with the Woodland occupation at Magic Mountain. These two points also resemble points associated with undated Woodland occupations at sites along the Front Range (Breternitz 1971; Irwin and Irwin 1959; Nelson 1971, 1981). Dated examples include Type II from the Willowbrook site, dated to 1290 B.P. (Leach 1966), and points from Zone A at Van Bibber Creek, dated 1050 B.P. (Nelson 1969).

Bifaces

A total of five bifaces and biface fragments were recovered from the excavations at Dutch Creek. Of these, two (5JF463.11 and .84) exhibited signs of use-wear associated with the scraping of hard materials such as bone or wood, as defined by Ahler (1979). Of the three bifaces that did not exhibit any signs of use, two (5JF463.16 and .80) were small edge fragments that were presumed to have been broken during manufacture. The third nonutilized biface,

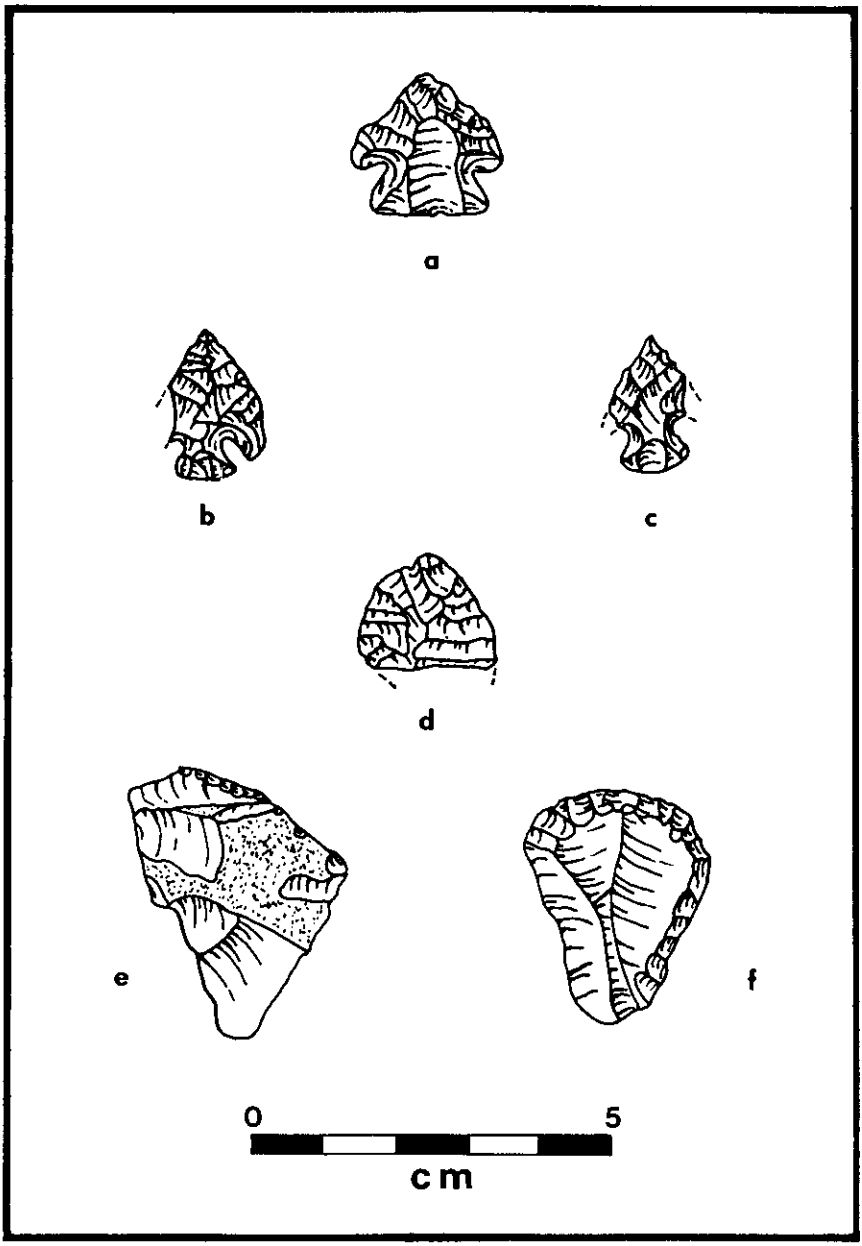

FIGURE 4. Flaked lithic artifacts from the Dutch Creek site. a. 5JF463.14; b. 5JF463.52; c. 5JF463.68; d. 5JF463.9; e. 5JF463.12; f. 5JF463.69.

5JF463.9 (Fig. 4d), is a thin, finely flaked fragment truncated by a transverse fracture that could possibly have been a projectile point preform. Specimen

5JF463.9 was recovered from Stratum 7 in the screened matrix of arbitrary Level 7, 60-70 cm bgs in TU-1. Four of the bifaces and biface fragments are manufactured from opaque gold petrified wood, and one is manufactured from Flat Top Butte Chert (milky white with thin, clear bands).

Unifaces

Two unifaces, 5JF463.12 and 5JF463.69 (Figs. 4e and 4f), exhibit use-wear associated with scraping hard materials such as bone or wood. This could indicate that unifaces were being used for the manufacture of other tools from wood or bone in addition to or instead of the hide processing activities usually associated with unifaces of this type. Specimen 5JF463.12 was recovered from Stratum 7 in the screened matrix from arbitrary Level 8 in TU-1, and is from the component associated with Feature 1 dated 1980 B.P. Specimen 5JF463.69 was recovered from Stratum 6 in the screened matrix of arbitrary Level 9 in TU-4, and is from the component associated with Feature 4, dated 1430 B.P. Both are petrified wood.

Flake Tool

The flake tool, 5JF463.83, is a multi-use tool. Several facets exhibit use-wear associated with both cutting and scraping activities, and one concave facet that was used extensively as a spokeshave. This artifact was recovered from Stratum 7 in the screened matrix of arbitrary Level 7 in TU-4, and is olive green chert.

Debitage

A total of 46 pieces of debitage were recovered from the stratigraphically controlled excavations at Dutch Creek. Debitage attributes are summarized in Table 3. The high percentage of small interior flakes in the assemblage would seem to indicate that tool manufacture and maintenance were the main activities. In addition to the more commonly utilized microcrystalline and cryptocrystalline materials, there was a high frequency of quartz debitage in the assemblage (Table 3). Quartz is available as alluvial cobbles derived from pegmatite intrusions found in the Precambrian metamorphic rocks upstream from the site. The coarse-grained nature of the material makes it impossible to detect indications of use-wear. However, the frequency of this material within

TABLE 3. Total debitage by material and flake type. (All units).

	Petrified Wood	Quartzite	Misc. Chert	Chalcedony	Quartz	Total
Primary	1	1	—	—	—	2
Secondary	2	4	4	2	2	14
Interior	4	7	3	6	2	22
Shatter	1	—	1	—	6	8
Total	**8**	**12**	**8**	**8**	**10**	**46**

Modified from McNees (1989)

the site and the flake characteristics observed on some of the specimens indicate that the material was deliberately fractured, most likely for use as expedient tools.

Ceramics

One thick brown cord-marked ceramic body sherd (5JF463.62) was recovered from within the fill of Feature 3, dated 1220 B.P., in the screened matrix of arbitrary Level 5, 50-60 cm bgs, in TU-3. This component also contains the two diagnostic Woodland projectile points. A more complete discussion of this artifact is contained in Appendix I.

Groundstone

The majority of the groundstone recovered were single-sided slab metate fragments manufactured from fine-grained sandstone that had been incorporated into Features 1 and 4, both rock-filled hearths. A metate fragment and a mano fragment ground on both sides were recovered from Stratum 8 in TU-3, from Levels 5 and 6 respectively. Although the presence of groundstone in prehistoric context is usually associated with the processing of vegetal material for food, it has been demonstrated elsewhere that groundstone also has been used for the processing of animal products for food, as well as preparing and processing nonfood materials such as animal hides and pigments (Zier 1981). However, the presence of groundstone at a short-term campsite such as Dutch Creek in all likelihood does represent the processing of gathered vegetal material for food.

FAUNAL REMAINS

In addition to bone fragments from indeterminate large and small mammals and small birds, identified species from the faunal assemblage recovered from Dutch Creek included *Bison bison, Odocoileus* sp. (deer), *Antilocapra americana (pronghorn) Cervus canadensis* (elk), *Sylvilagus* sp. (cottontail), *Lepus* sp. (jackrabbit), *Marmota* sp. (marmot) and *Microtus* sp. (rodent). Incised lines, indicative of butchering, were observed on several fragments of bone. Bnrned fragments of bone also were recovered, suggesting that the animals were being cooked. The wide range of species associated with both mountain and plains environments supports the conclusion that this site location was selected in part due to its position at the Plains/Montane ecotone, an advantageous location that allowed access to the faunal resources of two different ecozones.

DISCUSSION

The Dutch Creek site (5JF463) is a buried multi-component site with no observable surface manifestation. The archaeological materials recovered from all phases of investigation represent at least four prehistoric components representing Late Archaic through Woodland occupations.

The homogeneity of the data recovered from the different components would indicate that site activities and lifestyles practiced through time are quite similar. The evidence suggests that the site was periodically occupied by small bands of hunter/gatherers participating in a transhumant lifestyle based on seasonally available resources. Although Plains Woodland peoples were hypothesized to have an affiliation with midwestern sedentary horticulturists, there is little evidence in the archaeological record for horticulture at Woodland sites in Colorado (Cassells 1983). The multiple overlapping ecozones along the Front Range in general, and in the area surrounding the Dutch Creek site in particular, afforded access to a wide variety of floral and faunal resources and allowed for the continuation of a more generalized subsistence pattern.

This seeming continuity between Late Archaic and Woodland cultural patterns at the Dutch Creek site supports the pattern described elsewhere (Cassells 1983; Wood 1967), which suggests that the Woodland of eastern Colorado and the Front Range represents an influx of ideas and innovations (i.e., ceramics) from eastern groups as opposed to an actual migration of those groups into the area. The presence of artifacts made of the relatively exotic Flat Top Butte chert in both the oldest and most recent components tends to support the hypothesis of cultural continuity (McNees 1989). The absence of cultural materials postdating the Woodland occupations suggests that there was a more abrupt and significant cultural discontinuity in the transition between the Woodland and subsequent inhabitants of the Front Range than there was between the Late Archaic and Woodland inhabitants (McNees 1989).

The alluvial stratigraphy of Dutch Creek possesses sections that seem to correlate well chronologically with similar sections in the valleys of St. Vrain Creek, 70 kilometers north of Dutch Creek, and Massey Draw, 3 kilometers south of Dutch Creek (Fig. 3). Units 1 and 3 may correlate to the upper and lower gravel units of Madole (1976) in the valley of St. Vrain Creek. Data from St. Vrain Creek and other areas (Madole and Rubin 1984) indicate that St. Vrain Creek was stable during the period corresponding to the Triple Lakes-Audubon interglacial (ca. 3000-2400 B.P.), a period in which sediments were actively aggrading at Dutch Creek and Massey Draw. Correlation between the sections at Dutch Creek and Massey Draw is good, although a correlate to Unit 3 seems to be missing from the stratigraphic section at Massey Draw. An episode of erosion is indicated for the period following the deposition of Unit 3 at Dutch Creek, and a similar period of erosion may account for the lack of a correlate for this unit at Massey Draw.

There seem to be some similarities in the alluvial record that can be correlated between drainages along the Front Range. There are enough differences, however, to warrant a word of caution to workers who wish to generalize these similarities to include streams of all orders, origins, and drainage basin morphologies in an area as large and variable in climate as the Front Range. The evidence indicates that drainage basins can respond quite differently to

environmental change. Named regional alluvial stratigraphic units such as those described by Hunt (1954) and Scott (1963) are used frequently in archaeological and stratigraphic studies along the Front Range. Because of their generally descriptive nature and lack of solid chronologic control, they may gloss over the very real differences in the origins of deposits in different drainages that are correlated to the same stratigraphic unit. In fact, the deposits could be the result of completely different environmental factors and should not be correlated at all.

The manner in which both the Dutch Creek site and the Massey Draw site were discovered indicates the possibility of the existence of many more Archaic and Formative sites along the Front Range that have no surface manifestation. This suggests that a predictive model for buried site location could be designed utilizing geomorphological, topographical and stratigraphic data derived from the investigations at Dutch Creek and Massey Draw. In some situations, surface survey alone is not adequate for the location of prehistoric cultural resources, but survey programs utilizing shovel testing and bucket augering as a way to determine the presence of subsurface cultural materials may also be insufficient for the location of deeply buried prehistoric components. Certain areas can be identified as having been buried by deposits of relatively recent alluvium, such as Unit 9 at Dutch Creek. In these cases more intensive subsurface prospecting techniques such as deep coring and backhoe trenching may be necessary to determine the presence of deeply buried cultural materials. Identification of these areas of recent alluviation may be difficult due to the similarity of plant cover on deposits of different ages in the same area and it may be necessary to shovel test or bucket auger in these areas in order to evaluate the surficial deposits. Of course, the scope of any subsurface site prospecting would uecessarily depend on the scope of the proposed ground disturbance associated with the project for which a cultural resources inveutory is being prepared. A predictive model of the sort described above could contribute much to the mitigation and preservation of prehistoric cultural resources. In addition, it could make subsurface site prospectiug somewhat more economically feasible for both the archaeologist and the contracting agencies involved by narrowing down the possible areas requiring more intensive investigation. The archaeological investigations at Dutch Creek serve to demonstrate the utility and necessity of buried site prospecting techniques. Future investigators along the Front Range should consider the possibility of buried sites without surface components in similar locatious.

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