EARLY HOLOCENE TURKEY (MELEAGRIS GALLOPAVO) REMAINS FROM SOUTHERN UTAH

IMPLICATIONS FOR THE ORIGINS OF THE PUEBLOAN DOMESTIC TURKEYS

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ABSTRACT
Archaeological studies have demonstrated the increasingly important role of turkeys in the lives of ancient Puebloan peoples of the American Southwest. The origin of domesticated turkeys, however, remains an unanswered question especially given the absence of turkey (Meleagris gallopavo) in early and middle Holocene contexts prior to the arrival of maize agriculture. This paper reports turkey remains from very early Holocene deposits in North Creek Shelter in southern Utah and reviews extant literature for early turkey remains in the Southwest. These data provide tentative support for an autochthonous population of turkeys in portions of the greater Southwest.

RESUMEN
Estudios arqueológicos han demostrado la creciente importancia del rol de los pavos, en las vidas de las comunidades Puebloanas del sudoeste Norteamericano. Sin embargo, el origen del pavo domesticado es una pregunta pendiente, especialmente dada la ausencia de pavos (Meleagris gallopavo) en contextos del Holoceno temprano antes del arribo de la agricultura de maíz cultivado. Este ensayo informa sobre restos de pavos (Meleagris gallopavo) en depósitos provenientes de Holoceno muy temprano, en el North Creek Shelter al sur de Utah, y evalúa la literatura existente sobre restos tempranos de pavos en el sudoeste. Estos datos proveen apoyo inicial hacia una población autóctona de pavos en áreas del sudoeste mayor.

As one of the few animals domesticated in native North America, the turkey (Meleagris gallopavo Linnaeus) has garnered considerable attention in the literature of the American Southwest and beyond (see Munro 2006 for a recent summary). These large birds were clearly important at certain times in
the northern Southwest where they served both as a source of feathers for rituals and robes and, later on, for food (Driver 2002; Munro 1994). Several issues regarding turkeys are still unresolved, however, including the origins of the turkeys that became important in this region as well as the timing of domestication (various, but see Munro 2006, 1994; McKusick 1980; Mock et al. 2002; Speller et al. 2010). This paper focuses on the former topic and brings new data to bear: the discovery of turkey bones in very early Holocene archaeological deposits in southern Utah.

**ORIGINS OF DOMESTIC TURKEYS IN THE SOUTHWEST**

Natalie Munro (2006) has provided an excellent review of current thinking on the origins for the Southwest domestic turkey: 1) they came into the region from elsewhere along with agricultural products (corn, beans, squashes) and the associated farming strategy, or 2) turkeys were indigenous to the Southwest during the Holocene and therefore available for eventual domestication. The former view has been championed by Charmion McKusick (1980, 1986) who has considered several possibilities for the origin of the domestic Southwest turkey but concluded they were brought or diffused into the Southwest along with tropical plant domesticates. She rejected the notion that domestic turkeys derived from wild forms, cogently argued that turkeys came into the Southwest from outside the region, and has favored the eastern United States as the source area (McKusick 2007; see also Shaw 2002:70). Her position is buttressed by the fact that maize and turkeys seem to arrive together in numerous contexts (McKusick 1980) and that, until recently, the earliest date on Southwest turkeys has been 300 BC on a desiccated specimen from Tularosa Cave in New Mexico (Martin et al. 1952:483; Schorger 1966:20). In addition, turkey feather cordage and other evidences are present in Basketmaker II burials from Canyon del Muerto and in Basketmaker deposits at the Turkey Pen site in Grand Gulch (Morris 1939:18; Aason 1984 respectively), although turkey remains seem to be rare at the Marsh Pass Basketmaker sites (Kidder and Guernsey 1919:174). All of these finds are associated with abundant evidence of maize use as numerous studies show that Basketmaker II peoples were heavily committed to maize by at least 400 BC (Matson 1990; Matson and Chisolm 1991; Coltrain et al. 2007), although maize is present in the region much earlier (e.g., Smiley 2002; Miljour and Huber 2005; Huckell 1995).

The genetic studies of Mock et al. (2002), on the other hand, appear to support the indigenous position. Their research has shown that the Eastern wild turkey (*M. g. silvestris*), including the Florida subspecies (*M. g. osceola*) are likely a single genetic variant distinct from the three western subspecies: Merriam’s (*M. g. merriami*), Rio Grande (*M. g. intermedia*), and Gould’s turkey (*M. g. mexicana*). The current geographic distribution of the western subspecies as presented by Schorger (1966; see also Mock et al. 2002) shows these populations as geographi-
Early Holocene Turkey

Merriam’s, the subspecies generally thought to be the strain found in Anasazi sites, is restricted to portions of Colorado, Arizona, and New Mexico, while the Rio Grande distribution includes much of Texas as well as northeastern Mexico. Gould’s, on the other hand, is found in northwestern Mexico and is considered the most isolated and least diverse of the five subspecies (Mock et al. 2002; Munro 2006). Although Mock et al. are primarily focused on the genetic relationships among subspecies rather than the issue of the origin of the domestic turkey in the Southwest, they do confront the introduction hypothesis and tend to favor either the Eastern or Gould’s subspecies as the logical donor for the Southwestern domestic turkey. They conclude that Merriam’s is not strongly related to either the Eastern or Gould’s but “has been more recently associated with the Rio Grande subspecies” (Mock et al. 2002:653). The Mock et al. study did not include the South Mexican domesticated turkey (M. g. gallopavo) which is known to be the ancestor of the modern commercial breeds (Speller et al. 2010).

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**FIGURE 1.** Map of wild turkey distributions in North American (after Schoerger 1966).
Most recently, a genetic study by Camilla Speller and her colleagues (2010) has found clear distinctions between Southwestern archaeological turkeys and contemporary domestic breeds. This important finding discounts *M. g. gallopavo* as being linked to the Southwestern domestic turkey so important to ancestral Puebloans. Speller et al. were able to sort Southwestern archaeological turkeys into two haplogroups (H1 and H2) with the modern domestic and South Mexican turkeys falling into a third group, H3. H1 is the dominant haplogroup within the archaeological sample, and it is more closely related to present-day Eastern and Rio Grande subspecies of haplogroup H3 than to modern Merriam’s (H2) (Speller et al. 2010:3). This finding reinforces the position that South Mexican turkeys were not imported into the Southwest, yet it diverges from the received wisdom that Merriam’s was the primary Southwest domestic form (McKusick 1986; Munro 2006). The authors state, however, that “it is not possible to assign the wild progenitor of the H1 Southwest domestic turkey to either *M. g. silvestris* or *M. g. intermedia*” (Speller et al. 2010:3). Rather both display a noticeable genetic affinity with haplogroup H1. They conclude that Merriam’s is a wild form that was exploited by Puebloan peoples as nearly 15 percent of archaeological turkeys sampled were identified as Merriam’s (Speller et al. 2010:5). This suggests that ancient Southwestern farmers were raising turkeys possibly derived from eastern stock and hunting indigenous wild forms.

The genetic models proposing domestic turkeys were derived from the east rather than from Mexico are supported thus far by the absence of turkey in the earliest horticultural occupations in the extreme southern Southwest such as the several cerros de trincheros sites in northern Chihuahua dating between 1200 and 1500 BC (Roney and Hard 2002) as well as the Matty Canyon sites in southern Arizona (Huckell 1995). The latter produced no turkey remains, although some large birds (*Ardea* sp., heron or egret) and smaller avian remains were present. Huckell (1995:102) speculates that these birds may have been used for food or perhaps for personal decoration or ceremonies. Nor are there turkeys at the Old Corn Site in west central New Mexico where abundant corn and storage facilities date between 1890 and 2450 BC (Miljour and Huber 2005). Logic would dictate that if turkeys were introduced along with maize farming from the south, they should show up in these early sites, especially if the site occupants were already using bird feathers or other body parts for non-food purposes.

But there are also problems with the mixed model proposed by Speller et al. (2010). Scholars weighing in on this issue have noted that turkeys have not been reported in Holocene archaeological assemblages in the Southwest (Rea 1980; Munro 2006:466; Shaw 2002). It seems counterintuitive that Archaic hunters would have ignored a prey as large as turkeys if they were present in any numbers. The pitfalls of arguing from the absence of data are acknowledged, however, and a real concern here is the paucity of Archaic research in the region (e.g., Huckell 1996). Clearly, we need more early to middle Holocene research. Shaw
(2002:76), for example, states: “A finding of an early to mid-Holocene turkey from either source [paleontological or archaeological] could place the ITH (Indian Transplant Hypothesis) in doubt.”

A fortuitous find of several turkey (*Meleagris gallopavo*) elements in early Holocene deposits at North Creek Shelter in southern Utah (Janetski et al. 2010) combined with recent research by Brasso and Emslie (2006) as well as excavations at High Rolls Cave in southern New Mexico (Lentz 2006) bring new archaeological and paleontological data to bear on this interesting topic in the American Southwest.

**NORTH CREEK SHELTER**

North Creek Shelter lies on the west edge of Escalante Valley, a small basin surrounded on the north, west, and southwest by highlands and well watered by several streams. Upland elevations vary from 11,300 ft on the Aquarius Plateau on the north to 10,111 ft on Table Cliff Plateau to the west, and 7200 to 8000 ft on the Kaiparowits Plateau on the southwest. Three streams—Upper Valley Creek, Birch Creek, and North Creek—come together within a quarter mile of North Creek Shelter to form the Escalante River (Figure 2). North Creek is perennial and by far the largest of these streams. Modern Escalante Valley vegetation is Upper...
Sonoran with greasewood and sage/grasslands on the flats and pinyon/juniper woodland on hills surrounding the valley. Cottonwoods (Populus sp.), willows (Salix sp.), and Russian olive (Elaeagnus angustifolia), an exotic species, border the Escalante River and North Creek. Rising elevations characterize all the contributing drainages and within a few miles up these streams are scattered ponderosa (Pinus ponderosa) with some Douglas fir (Pseudotsuga menziesii) on north-facing slopes. Higher elevations contain dense stands of aspen and blue spruce.

Vegetation on site consists of scattered pinyon (Pinus edulis) and juniper (Juniperus utahensis), shrubs such as Fremont barberry (Berberis fremontii), big sage (Artemesia tridentata), service berry (Amelanchier utahensis), skunkbush (Rhus trilobata), and stands of Gambel's oak (Quercus gambelii) at the bottom of the slope. Clumps of prickly pear cactus (Opuntia sp.) and various grasses are common on the slope as well. On the alluvial flats are rather dense communities of rabbitbrush (Chrysothamnus nauseosus) and greasewood (Sarcobatus vermiculatus). There were common sightings of rock squirrels (Spermophilus variegatus) and woodrats (Neotoma sp.) on site, and cottontail rabbits (Sylvilagus sp.), black-tailed jack rabbits (Lepus californicus), and introduced turkeys were often seen on the flats adjacent to the streams.

The stratigraphy at North Creek Shelter is dramatic due to the sharp contrast between lower (pre-8000 BP) and upper (post-8000 BP) deposits (Figure 3). The upper one or so meters of sediments are darkly stained from human activities over the 8000 years during which those sediments were deposited; the nearly two-and-a-half meters constituting the lower levels consist of discrete, largely horizontal bands of tan sands and silts deposited over 2000 years. The
upper sediments are heavily bioturbated by rodent burrowing and human activity, while the lower sediments consist of well-preserved, fine-grained horizontal layers of sands and silts with minimal disturbance. All sediments, early and late, derived primarily from colluvial action that has carried silts and sands down vertical cracks in the cliff face to the west and east of the primary occupation area (Morris and Hicks 2009). Runoff repeatedly flowed over the site and deposited a sediment load resulting in horizontal bedding that sealed in the numerous occupation levels. These levels are marked by spikes in material remains and charcoal staining. As a consequence of these stratigraphic characteristics, excavators were able to separate and document 15 occupation surfaces dating prior to 8000 BP. These early sealed deposits are divided into Early Archaic (8000 to 9000 BP) and Paleoarchaic (9000 to 10,000 BP) based on changes in projectile point types, the presence or absence of ground stone, pit abundance, and radiocarbon dates (Yoder et al. 2010).

The 20 radiometric dates from North Creek Shelter span the past 10,000 years and, in general, are in proper sequence from the bottom to the top (Table 1). The exception is Beta sample 195226 (890 ± 40 BP) from Stratum IVi which is clearly out of sequence. This sample, obtained in 2004, likely represents an unfortunate choice of charcoal that had fallen into the excavation from a higher level during initial testing of the site by field school students. That preliminary excavation was a one by one meter test that extended to at least two meters deep. By the time excavators had reached that depth, the size of the test was roughly 70 cm square making sediment removal as well as exiting the test difficult without brushing the walls. We prevented subsequent contamination by expanding our excavation and maintaining absolutely vertical profiles.

**NORTH CREEK SHELTER TURKEY REMAINS**

The Paleoarchaic and Early Archaic faunal assemblage is massive with thousands of specimens recovered (Newbold 2009). Analysis found that the Paleoarchaic fauna was more diverse than the later Early Archaic with relatively more mesic-loving species (e.g., beaver, ducks, dusky grouse, etc.) in the early period. Both occupations were dominated by small artiodactyls, primarily deer, although mountain sheep remains become more abundant in the Early Archaic.

A surprising find in this assemblage are three bones positively identified as *Meleagris gallopavo* from Paleoarchaic-aged Stratum IVd (Figure 4): matching left and right coracoids and a large rostral portion of a sternum. All three specimens are more than likely from a single individual, as the sternum is of comparable size to that of the coracoids. The coracoidal articular facets of the sternum were not present, however, rendering any attempt at re-articulation impossible. In addition, a fragment from Level IVf may be from a scapula or rib of a turkey. Two dates bracket these turkey remains: a date of 9510 ± 80 BP from just below Level
### TABLE 1. Radiocarbon Dates from North Creek Shelter

<table>
<thead>
<tr>
<th>Sample No</th>
<th>Stratum</th>
<th>Material</th>
<th>Conventional Age $^{14}$C ± $\sigma$ yrs B.P.</th>
<th>$^{13}$C/$^{12}$C Ratio</th>
<th>Cal yrs ± 2$\sigma$/A.D./B.C</th>
<th>Cal yrs ± 2$\sigma$ B.P.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta 197358</td>
<td>VIIa</td>
<td><em>Zea mays</em>‡</td>
<td>940 ± 40</td>
<td>−15.0</td>
<td>A.D. 1010–1190</td>
<td>760–940</td>
</tr>
<tr>
<td>Beta 221411</td>
<td>VIIb</td>
<td><em>Zea mays</em>‡</td>
<td>1050 ± 40</td>
<td>−11.6</td>
<td>A.D. 900–1030</td>
<td>920–1050</td>
</tr>
<tr>
<td>Beta 261676</td>
<td>VIIa</td>
<td><em>Zea mays</em>‡</td>
<td>1130 ± 40</td>
<td>−10.3</td>
<td>A.D. 780–1000</td>
<td>1160–950</td>
</tr>
<tr>
<td>Beta 261677</td>
<td>VIIa</td>
<td><em>Zea mays</em>‡</td>
<td>1130 ± 40</td>
<td>−10.2</td>
<td>A.D. 780–1000</td>
<td>1160–950</td>
</tr>
<tr>
<td>Beta 261678</td>
<td>VIc</td>
<td><em>Zea mays</em>‡</td>
<td>1030 ± 40</td>
<td>−10.5</td>
<td>A.D. 900–1040</td>
<td>1050–910</td>
</tr>
<tr>
<td>Beta 221414</td>
<td>VId</td>
<td><em>Juniperus</em></td>
<td>6020 ± 60</td>
<td>−22.2</td>
<td>5050–4760 B.C.</td>
<td>7000–6710</td>
</tr>
<tr>
<td>Beta 221412</td>
<td>Vu</td>
<td><em>Acer, Pseudotsuga, Pinus</em></td>
<td>7670 ± 80</td>
<td>−20.2</td>
<td>6650–6400 B.C.</td>
<td>8600–8350</td>
</tr>
<tr>
<td>Beta 239024</td>
<td>Vu</td>
<td><em>Juniperus</em>‡</td>
<td>7700 ± 50</td>
<td>−21.9</td>
<td>6640–6450 B.C.</td>
<td>8590–8400</td>
</tr>
<tr>
<td>UCIAMS 44190*</td>
<td>Vu</td>
<td><em>Juniperus</em></td>
<td>7990 ± 30</td>
<td>n/a</td>
<td>7049–6776 B.C.</td>
<td>9000–8720</td>
</tr>
<tr>
<td>Beta 207167</td>
<td>Vt</td>
<td><em>Juniperus</em></td>
<td>7970 ± 80</td>
<td>−20.9</td>
<td>7080–6640 B.C.</td>
<td>9030–8590</td>
</tr>
<tr>
<td>Beta 210253</td>
<td>Vt</td>
<td><em>Juniperus/ Pinus</em></td>
<td>8320 ± 120</td>
<td>−21.4</td>
<td>7580–7060 B.C.</td>
<td>9530–9010</td>
</tr>
<tr>
<td>Beta 197359</td>
<td>Vq</td>
<td><em>Pinus</em></td>
<td>8310 ± 70</td>
<td>−22.8</td>
<td>7540–7140 B.C.</td>
<td>9490–9100</td>
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<tr>
<td>Beta 239023</td>
<td>Vh</td>
<td><em>Juniperus</em>‡</td>
<td>8310 ± 40</td>
<td>−20.9</td>
<td>7220–7190 B.C.</td>
<td>9170–9140</td>
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<tr>
<td>UCIAMS 44189*</td>
<td>Vh</td>
<td><em>Juniperus</em>‡</td>
<td>8860 ± 25</td>
<td>n/a</td>
<td>8208–7840 B.C.</td>
<td>10,160–9860</td>
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<tr>
<td>Beta 194030</td>
<td>Vc</td>
<td><em>Pinus</em></td>
<td>9020 ± 70</td>
<td>−23.2</td>
<td>8300–8170 B.C.</td>
<td>10,250–10,120</td>
</tr>
<tr>
<td>Beta 195226</td>
<td>VIi</td>
<td><em>Atriplex‡</em></td>
<td>890 ± 40</td>
<td>−10.9</td>
<td>A.D. 1030–1124</td>
<td>710–920</td>
</tr>
<tr>
<td>Beta 207168</td>
<td>IVa</td>
<td><em>Pinus</em></td>
<td>9510 ± 80</td>
<td>−22.6</td>
<td>9190–8610 B.C.</td>
<td>11,140–10,560</td>
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<tr>
<td>Beta 221415</td>
<td>IIIa</td>
<td><em>Juniperus/ Pinus‡</em></td>
<td>9690 ± 60</td>
<td>−23.7</td>
<td>9250–9110 B.C.</td>
<td>11,200–11,060</td>
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<tr>
<td>Beta 239022</td>
<td>IIa</td>
<td><em>Salicacea</em>‡</td>
<td>9800 ± 50</td>
<td>−23.4</td>
<td>9310–9220 B.C.</td>
<td>11,260–11,170</td>
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<tr>
<td>UCIAMS 44188*</td>
<td>IIa</td>
<td><em>Salicacea</em>‡</td>
<td>9960 ± 30</td>
<td>n/a</td>
<td>9653–9310 B.C.</td>
<td>11,420–11,260</td>
</tr>
</tbody>
</table>

‡AMS dates  
*Paleo Research Institute date
IVa and a date from Level Vc of 9020 ± 70 BP which overlies Stratum IV, the uppermost Paleoarchaic level. These dates securely place the turkey remains between 9000 and 9500 years ago.

The presence of the late Holocene date from Stratum IVi, just above the level at which the turkey bones were found, complicates the dating issue and demands further discussion as it raises the possibility that the turkey bones may be intrusive from much later occupations. First of all, we point out that the initial test pit and the intrusive date came from grid 109N 100E which, as noted, was excavated by the 2004 Field School. The turkey remains described were recovered by a professional crew four years later from three grids: 110N 99E, 111N 99E, and 112N 99E and are therefore spatially and temporally distanced from the initial test area and the intrusive date. Secondly, no turkey remains have been found in later deposits at North Creek Shelter (although analysis is ongoing), and turkey is unknown at other late Holocene sites in the Escalante Valley and at the Anasazi affiliated Coombs site in nearby Boulder Valley (Jacklin 2000).

We identified the recovered elements using comparative osteological collections at the Museum of Peoples and Cultures and the Earth Science Museum at Brigham Young University and consulted the comparative material in the Zooarchaeology Lab at the University of Utah. The morphology of both the coracoid and sternum matched that of modern adult turkey and ruled out any other large bird of the region (i.e., raptors, cranes, and waterfowl), as features of the elements in question differ remarkably between these avian orders. Also, neither of these

**FIGURE 4.** *Meleagris gallopavo* elements recovered from North Creek Shelter compared with modern remains: a) NCS and modern coracoids b) NCS and modern sternum.
two elements was described by Hargrave and Emslie (1979) as being easily confused between turkey and cranes in their discussion on such within zooarchaeological assemblages.

Well aware of Grayson’s (1977) work in resolving the misidentification of large male sage grouse as small female turkey in the northern Great Basin, we noted that the North Creek Shelter specimens were significantly larger than any of the male sage grouse within the comparative collections. More importantly, the sage grouse possessed slightly dissimilar but pronounced morphological characteristics to those of the turkey and our specimens, such as differing articular processes and facets. Such features were especially prominent along the coracoidal head. These comparisons confirmed the identification of the North Creek Shelter specimens as turkey.

With such an early date for the specimens, we next sought to differentiate between the various species of turkey extant in western North America during the Late Pleistocene-Early Holocene transition. Previous work by Steadman (1980) and Bochenski and Campbell (2006) on the morpho-metric distinctions between *M. gallopavo* and the two late Pleistocene species, *M. californica* and *M. crassipes*, was critical in the identification of the North Creek Shelter specimens. In both studies, the tropical ocellated turkey (*M. ocellata*) was shown to be too small, too skeletally unique, and too geographically distant to be relevant to any discussion on the former three species; it was thus not included in our comparisons. Both publications also describe *M. californica* as specific to southern California and slightly smaller than *M. gallopavo*, though similar morphologically. *M. crassipes*, on the other hand, is known primarily from cave sites in southern New Mexico and Arizona; however, it is significantly smaller than and morphologically distinct from either *M. gallopavo* or *M. californica*.

This being said, one could reasonably rule out *M. californica* based on geographic range and *M. crassipes* on size, but a more confident identification of the North Creek Shelter specimens as *M. gallopavo* necessitated a more thorough investigation. Fortunately, Bochenski and Campbell describe both the sternum and coracoid as two “of the best elements for differentiating the three species studied, with many reliable characters” (2006:15). The inherent difficulties of bone identification via verbal description and photographs aside, the combined morphological characteristics of the specimens ruled out *M. crassipes* and trended more toward *M. gallopavo* than *M. californica*, but not significantly (see Bochenski and Campbell 2006:11–19 for descriptions of distinguishing characters).

Following the methods of both Steadman and Bochenski and Campbell, several measurements were taken on the more complete of the two coracoids (Figure 5) and compared to the same measurements from *M. crassipes*, *M. californica*, and modern and ancient specimens of *M. gallopavo* gleaned from tables within the aforementioned publications. Measurements of the head (depth: 11.8 mm; height: 31.7 mm), shaft (width: 10.2 mm), and base (depth: 7.2 mm) of the
North Creek Shelter coracoid fit best within the range of female *M. gallopavo* (Tables 2 and 3; Figures 6–8). Metrically speaking, the North Creek Shelter turkey was probably an average-sized, adult *M. gallopavo*.

Given the evidence regarding geographical range and morpho-metric analysis, we are confident in assigning the North Creek Shelter specimens to *M. gallopavo*. If one had to guess which subspecies is represented, we would favor...
Merriam’s (*M. g. merriami*) seeing as it is the only subspecies known to have naturally occupied the northern Colorado Plateau in the distant past (Shaw and Mollohan 1992; Schorger 1966; see also Mock et al. 2002 and Speller et al. 2010). However, these early North Creek Shelter specimens may predate subspeciation of *M. gallopavo* altogether or even represent a separate unknown or extinct branch. Ongoing genetic assays conducted by the primary author will hopefully resolve this question. The fact that the bones are few in number in our assemblage from North Creek Shelter is evidence that either our sample is not representative or that few turkeys were present in the region 9000-plus years ago.

### Table 2. Coracoid measurements (mm) of male *Meleagris* specimens, with observed range, mean, and standard deviation. Modern *M. gallopavo* and *M. Californica* measurements from Bochenski and Campbell 2006, Table A5; ancient *M. gallopavo* and *M. crassipes* measurements from Steadman 1980, Table 4. **Bold** indicates the NCS specimen measurement falls within 1σ; **italics**, within 2σ.

<table>
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<th>Measurement</th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>SD</th>
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<td><strong>Modern <em>M. gallopavo</em></strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Head depth</td>
<td>26</td>
<td>13.6</td>
<td>17.4</td>
<td>15.25</td>
<td>0.84</td>
</tr>
<tr>
<td>Head height</td>
<td>26</td>
<td>36.5</td>
<td>43.2</td>
<td>39.83</td>
<td>1.74</td>
</tr>
<tr>
<td>Shaft width</td>
<td>26</td>
<td>10.9</td>
<td>13.4</td>
<td>12.31</td>
<td>0.68</td>
</tr>
<tr>
<td>Base depth</td>
<td>24</td>
<td>7.9</td>
<td>10.3</td>
<td>8.83</td>
<td>0.60</td>
</tr>
<tr>
<td><strong>Ancient <em>M. gallopavo</em></strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head depth</td>
<td>39</td>
<td>13.3</td>
<td>17.2</td>
<td>15.60</td>
<td>0.89</td>
</tr>
<tr>
<td>Head height</td>
<td>40</td>
<td>35.2</td>
<td>43.1</td>
<td>40.00</td>
<td>1.74</td>
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<tr>
<td>Shaft width</td>
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<td>10.0</td>
<td>12.5</td>
<td>11.15</td>
<td>0.57</td>
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<tr>
<td>Base depth</td>
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Although turkeys are common in southern Utah today, including the Boulder Mountain and Escalante Valley regions, all are recent introductions. Excavation crews saw and heard turkeys nearly every day during the 2008 field season. These introduced populations are doing well, although the modern vegetative community is not prime habitat for turkeys. In fact, a wildlife biologist suggested that without the introduced Russian olive trees turkeys would not do well in these valley settings (Norman McKee, personal communication 2007). Prime habitat descriptions are provided by Shaw (2002), Shaw and Mollohan (1992), Schorger (1966), and others who have noted that Merriam’s turkeys have rather specific

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**HABITAT**

Although turkeys are common in southern Utah today, including the Boulder Mountain and Escalante Valley regions, all are recent introductions. Excavation crews saw and heard turkeys nearly every day during the 2008 field season. These introduced populations are doing well, although the modern vegetative community is not prime habitat for turkeys. In fact, a wildlife biologist suggested that without the introduced Russian olive trees turkeys would not do well in these valley settings (Norman McKee, personal communication 2007). Prime habitat descriptions are provided by Shaw (2002), Shaw and Mollohan (1992), Schorger (1966), and others who have noted that Merriam’s turkeys have rather specific
**FIGURE 6.** Observed minimum, maximum, and mean coracoid head depth and height of modern and ancient *M. gallopavo*, *M. californica*, *M. crassipes*, and the NCS specimen. Filled markers represent males; open markers represent females.

**FIGURE 7.** Observed minimum, maximum, and mean coracoid shaft width and head depth of modern and ancient *M. gallopavo*, *M. californica*, *M. crassipes*, and the NCS specimen. Filled markers represent males; open markers represent females.
habitat requirements including “winter feeding, loafing, and roosting habitats; spring migration corridors to summer range; spring and early summer breeding habitat; nesting habitats; brood-rearing habitat; and late summer and fall feeding, loafing and roosting habitats” (Shaw 2002:73). In brief, however, Merriam’s prefer “Southwestern ponderosa pine forests” (Shaw 2002:76), although adequate moisture is a must. Merriam’s “historic range” at the time of European incursion, therefore, is the ponderosa pine forests of New Mexico, northern Arizona, and Colorado (Shaw and Mollohan 1992:331; see also Schorger 1966:43).

The timing of ponderosa pine forest arrival within this historic range at the close of the Pleistocene is therefore seen as critical to understanding when turkeys may have been present regionally, and, more specifically, when and if that habitat was present outside North Creek Shelter. Betancourt’s (1990) analyses of packrat middens from the Colorado Plateau suggest that ponderosa pine was not present during the late Pleistocene; rather limber pine (*Pinus flexilis*) dominated until after 10,000 BP (see also Cole 1995, 1990; Cole and Arundel 2005). The wetter weather of the earliest Holocene, however, led to the expansion of ponderosa and oak forests beyond their present range (Betancourt 1990:286). Such an expansion could have provided appropriate habitat for wild turkeys. A logical question is what the habitat was at North Creek Shelter at the time the turkey bones were deposited.
Paleoenvironmental studies at North Creek Shelter include charcoal identification, pollen analysis, analysis of site faunal bone, and geological assessments of site sediments. Charcoal identification from the early levels include Douglas fir (*Pseudotsuga menziesii*), probable aspen (*Populus* sp.), netleaf hackberry (*Celtis reticulata*), mountain mahogany (*Cercocarpus* sp.), cliffrose (*Cowania mexicana*), and pine (*Pinus* spp.) (Puseman 2007). It is unlikely that the pine is Colorado pinyon (*P. edulis*) as packrat midden analysis from southeast Utah suggests *P. edulis* does not appear in southeast Utah until after 7200 BP (Betancourt 1984:28; see also discussion in Betancourt 1990). Pollen work by Chris Kiahtipes (2006) found that sage (*Artemisia* sp.) dominates the pollen spectrum in the lower levels with low spine Asteraceae, *Juniperus*, and *Pinus* pollen also present. He speculates that the pine is either limber pine (*P. flexilis*) or bristlecone (*P. longaeva*). Additional analysis of charcoal fragments, however, has tentatively identified several specimens from Stratum II and IV as ponderosa (*P. ponderosa*) (David Rhode, personal communication 2010). Faunal remains from Paleoarchaic levels are mentioned briefly above, and these support the conclusion that the vegetation community surrounding the site at this time was more like that found today at higher elevations on the Aquarius Plateau.

Sediment analysis has concluded that the primary source for site sediments is the mesa top above the cliff at the base of which the site occupants lived. Precipitation in the form of rain or snow melt washed sediments off the mesa via vertical cracks present both to the east and west of the primary area of site use. These water-borne sediments were then deposited over the site sealing in the last occupation—a process that continues today. This colluvial activity varied with the amount of precipitation which, in turn, is directly related to the rate of sediment deposition. These studies indicate that pre-8000 BP sediments were accumulating at rates more than 10 times more rapidly than after 8000 BP (Morris and Hicks 2009). Since deposition is tied directly to precipitation, this is evidence of a wetter period in the site history.

These preliminary environmental studies combine to suggest a more mesic regime existed at North Creek Shelter during the early Holocene. That regime resulted in an on-site environment not unlike that found today a few hundred feet higher in elevation and may have been favorable for turkey in that early period.

**REGIONAL AND COMPARATIVE DISCUSSION**

Turkey remains are absent in Utah except for the extreme southern and southeastern portions. No turkey remains have been identified in either Anasazi or Fremont archaeofaunas from Escalante or Boulder valleys or regions surrounding North Creek Shelter, for example. The closest remains may be those reported by Steward (1941:319) who found turkey feathers and bones in Site 2 and Site 4
respectively, both in Johnson’s Canyon east of Kanab, Utah, to the south and west of North Creek Shelter. Site 2 appears to be Basketmaker III in age; Site 4 is a masonry structure dating to the "late" period, perhaps late Pueblo II. Schroeder (1955:159) reports turkey feathers and droppings as well as possible turkey eggshell from a large dry cave (Site ZNP-21) in Zion National Park, also west and south of North Creek Shelter. Both Basketmaker and early and late Puebloan diagnostics were present, and Schroeder (1955:87) speculated that the feathers and droppings were affiliated with the Basketmaker; the eggshell, on the other hand, was associated with the late occupation and was perhaps evidence that the later cave occupants “imported and kept turkeys” (Schroeder 1955:159). Turkey droppings, eggshell, and feathers are also reported from a “cliff dwelling” near Kanab by Thomas (1957:5) who maintained they date to 1200 A.D. Frank (1998) also reports two articulated avian skeletons (presumed to be turkey) at 42WS3119, a Pueblo II site near St George, Utah, and Berg et al. (2003:97) recovered a disarticulated turkey on the floor of a Pueblo I to early Pueblo II pit house near Hildale, Utah. There was no mention of either cut marks or burning on those remains and it appears that almost the entire skeleton was present, suggesting other than dietary use. Turkey bones are common at the Arroyo Site, a Pueblo II/Pueblo III occupation in Kitchen Corral Wash east of Kanab, Utah (McFadden 2007). Of course, turkey is abundant in Basketmaker and Puebloan sites in southeastern Utah and the Four Corners area generally (Thompson 1990; Driver 2002; Munro 1994, 2006; various references in McKusick 1986).

Turkey is present in Puebloan sites just over the Utah border in northern Arizona as well. Three sites, NA8960, NA9069, and NA 9072, excavated by Wade (1967:viii) contained turkey remains, although no information beyond presence is provided. Turkey remains are also present in Pueblo II occupations at the Corngrower site, also on the Utah/Arizona border. Apparently at least one of the specimens was partially articulated and not considered a food item, although an arrow point found in association may suggest otherwise (Walling and Thompson 1994:17). Antelope Cave (NA 5507) on the Arizona Strip to the south yielded turkey feathers dating to either Basketmaker II or Pueblo I period, but no bones were recovered (Janetski et al. 2010).

Recent critical data on late Holocene turkey comes from High Rolls Cave in the Sacramento Mountains of south central New Mexico a few miles north and east of Alamogordo (Lentz 2006). The site lies at 6220 feet elevation in a narrow canyon within the Transition life vegetative zone, which is characterized by ponderosa pine, Rocky Mountain juniper, Gambel’s oak and various shrubs such as chokecherry (see Lentz 2006:6 for more details). The modern habitat is appropriate for wild turkey and supports a modern population (Lentz 2006). The Office of Archaeological Studies at the Museum of New Mexico excavated the site between 2000 and 2001. Importantly, deposits here were dry and date back to about 1500 BC. Turkey bone is present in the earliest levels, and although an
exhaustive list of elements is not supplied, the analyst notes that all the bones are adults, all are fragmented, and there are cut marks on a distal tibiotarsus. In addition, some elements exhibited discoloration which Akins (2006:109) interpreted as evidence of thermal alteration (i.e., burning). These characteristics are evidence that the birds were not domestic but were wild birds hunted by site occupants. Akins identified the remains as (*Meleagris gallopavo merriami*), presumably based on geography and extant turkey literature (e.g., Schoerger 1966). Also present in the earliest deposits, however, is maize (Toll 2006:224), which reinforces the pattern of turkeys and maize occurring together very early in the Southwest. Turkey remains (feathers and bone) have also been recovered from Fresnal Shelter located just a few hundred meters from High Rolls Cave (Akins 2006:145; Tagg 1996:315), although the age of those remains is not clear.

Additional insights into *M. gallopavo* origins come from paleontological research that has found turkey remains in late Pleistocene contexts in southern New Mexico. For example, Howard (1962, 1971) and Howard and Miller (1933) report *M. gallopavo* from several southern New Mexico caves in putative association with Pleistocene fauna. These include Dark Canyon Cave, Conkling Cavern, Shelter Cave, and Rocky Arroyo (Burnet Cave). Rea (1980: 213) notes, however, that the two specimens from Dark Canyon are “questionable” and are now lost which precludes identification confirmation. On the other hand, he reports that there was at least one *M. gallopavo* humerus from the 20–23 ft level in Conkling Cavern (Rea 1980:212). Unfortunately, no absolute dates are associated with these finds, and, in some cases, Basketmaker remains are also present in the caves. Howard (1971:237), however, reports that the Aves specimens from Dark Canyon Cave were from well below the archaeological deposits. Unfortunately, it is not clear whether the turkey bones from Conkling Cavern, Shelter Cave, and Rocky Arroyo are paleontological or associated with Basketmaker-age archaeological deposits (Howard and Miller 1933). Better data are turkey bones reported from Sandia and Marmot caves, also in New Mexico. These remains are securely dated prior to 10,000 BP making them late Pleistocene in age (Brasso and Emslie 2006). Brasso and Emslie have labeled these remains *M. gallopavo*, rather than the smaller Pleistocene form *M. crassipes*.

These reports suggest that *M. gallopavo* was present in the Southwest in the late Pleistocene. Importantly, the several reports cited here draw attention to the growing evidence for early turkey from central and southern New Mexico. Taken together, these data suggest this area contained indigenous turkey populations in the late Pleistocene that may have persisted into the Holocene.

Additional support for an indigenous (i.e., American Southwest) origin of turkey comes from a linguistic study. Catherine Fowler (1983) has reconstructed Proto-Uto-Aztecan (PUA) and places these speakers in the southern Southwest (southeastern California, central and southern Arizona, southwestern New Mexico, and northern Mexico) by at least 5000 years ago (Fowler 1983:233). Her
insights are based on clues in the languages that allow the reconstruction of ecological characteristics of that homeland, including pine forests and various fauna found in such settings. She also found a word for turkey in PUA, but that word had disappeared by the time PUA split into northern and southern variants, an event that occurred perhaps as early as 3000 BP (Fowler 1983:239). Fowler interprets the absence of such a word as meaning the turkey had disappeared from the area sometime after that split.

CONCLUSIONS

The discovery of *Meleagris gallopavo* remains from southern Utah dating prior to 9000 years ago documents these birds in the northern Southwest in the earliest Holocene. The age of the North Creek Shelter turkey remains combined with that of those from High Rolls Cave in southern New Mexico provides some convergence in temporal placement of turkey in the Southwest. The specimens from North Creek Shelter and presumably High Rolls Cave are from wild birds hunted for food in the early and later Holocene. These data and the late Pleistocene finds from Marmot and Sandia Caves mentioned above support the likelihood of an indigenous wild turkey population in the Southwest during the Holocene. The absence of turkey in all subsequent deposits at North Creek Shelter and in archaeological sites in the region is evidence that this population was not successful in southern Utah following the more xeric conditions of the middle Holocene. Nonetheless, these archaeological and paleontological finds provide tentative support for genetic studies that have concluded that Merriam’s turkey was a wild subspecies present in the Southwest (Mock et al. 2002; Speller et al. 2010).

NOTE

1. All radiocarbon dates in the text are expressed in conventional ages. For calibrated ages see Table 1.

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