ANTIQUITY OF COMMUNAL PRONGHORN HUNTING IN THE NORTH-CENTRAL GREAT BASIN

Bryan Hockett and Timothy W. Murphy

Communal hunting of small game such as hares has probably occurred for 10,000 years in the Great Basin. Ethnohistoric accounts of the nineteenth century indicate that indigenous peoples communally hunted large game (e.g., pronghorn, mountain sheep, deer, bison) across much of western North America including the Plains, desert Southwest, California, and Great Basin subregions, during and immediately preceding the contact era. Research in the Plains subregion suggests that communal large game hunting occurred there prior to the adoption of the bow-and-arrow between ca. 1,500 and 2,000 years ago, and in fact may have occurred as early as 9,000 to 10,000 years ago. Nineteenth- and early twentieth-century ethnohistoric accounts suggest that communal pronghorn (Antilocapra americana) hunts involving the construction of a corral with associated wings were utilized by many Great Basin peoples at the time of historic contact. This paper asks: (1) did communal pronghorn hunts occur prior to the Protohistoric Period (before ca. 600 ^{14}C B.P.) in the north-central Great Basin? (2) if so, how ancient is this practice? and (3) did the methods or behaviors of the participants of these communal hunts vary through time? Detailed analysis of sites containing dozens, and in many cases, hundreds of projectile points that predate ca. 600 ^{14}C B.P. found in or near existing juniper branch corrals and wings suggest that communal pronghorn hunting has occurred for at least 4,000 to 5,000 years in the north-central Great Basin. Further, behavioral variability is seen through time in the material remains of these communal hunts, with earlier (Middle Archaic) communal kills characterized by greater use of local toolstone sources, gearing-up just prior to the kill, and perhaps a greater reliance on shooting the trapped pronghorn rather than clubbing compared to Protohistoric communal kills.

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Old and New World ethnographies both record examples of communal trapping of large game animals by indigenous societies (e.g., Curtis 1924; Hill 1938, 1982; Kluckhohn et al. 1971; Legge and Rowley-Conwy 1987; Lindblom 1935; Saad 2005; Stephen 1936; Steward 1938). In western North America, and in particular the Plains subregion, archaeologists have extended the communal capture of multiple large game animals by various forms of trapping into the Early Holocene, perhaps as early as 9,000–10,000 years ago (Frison 1987; 2004; Frison et al. 1986; Lubinski 1999, 2000; Miller et al. 1999). In the Great Basin subregion, there is ample archaeological evidence for the communal capture of pronghorn (*Antilocapra americana*), deer (*Odocoileus hemionus*), and mountain sheep (*Ovis canadensis*) during Protohistoric times (ca. 600–150 years ago) (e.g., Arkush 1986, 2007; Hockett 2005; McGuire and Hatoff 1988; Murphey 1980; Murphy and Frampton 1986; Raymond 1982).

The origin of communal large game hunting in the Great Basin, however, remains uncertain. One of the primary hurdles archaeologists face is identifying distinctive archaeological traces that distinguish ancient communal trapping behaviors from other forms of hunting such as ambushing by lone hunters. For the North American Plains,

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Lubinski (1997, 1999, 2000) investigated a number of culturally and naturally accumulated pronghorn bonebed assemblages. He concluded that sites containing > 5 MNI pronghorn with evidence for human-caused mortality, a single depositional episode, and a single mortality event suggested a communal kill (Lubinski 2000). At the Trappers Point site located in southwestern Wyoming, Francis and Widman (1999) noted that in addition to the discovery of numerous projectile points (N = 258) and butchered pronghorn bone, this site is located within a topographically constricted zone along a major pronghorn migration route. A combination of large numbers of projectile points and topographic context has also factored in previous discussions of ancient large game trapping sites in the Great Basin (McGuire and Hatoff 1988).

Following the discovery of numerous pronghorn traps or corrals in the north-central Great Basin (Murphy and Frampton 1986), Petersen and Stearns (1992) reported on the Clover Valley site located in northeastern Nevada. Similar to the Trappers Point Site and associated survey, the Clover Valley site was discovered during a CRM-driven survey along an existing paved highway. Most sites recorded during this survey were relatively small and ephemeral in nature. But the Clover Valley site was unique—more than 250 projectile points were concentrated in a relatively small area (approximately 50 m by 50 m). The majority of these consisted of Humboldt points manufactured prior to 3,000 years ago. Petersen and Stearns (1992:92) relied on projectile point damage patterns and the site's overall uniqueness to argue "that the point scatter probably represents the site of the 'corral' or killing area of a corral-and-wings antelope trap of the kind known to have existed in Clover Valley and elsewhere in the Great Basin during ethnohistoric times."

Despite this evidence, Zeanah and Elston (1997:90) suggested that sites with large numbers of projectile points such as Clover Valley may represent time-averaged "lithic scatters . . . produced by a mobile hunting strategy, in which hunter-gatherer bands took advantage of hunting opportunities as they encountered them on a foraging round." At the same time, they still acknowledged the potential of equifinality, or the fact that these projectile point clusters may indeed represent ancient communal kills. One issue that Zeanah and Elston (1997) found particularly troubling about sites such as Clover Valley was the fact that projectile point manufacture and repair occurred there, and if, as the Great Basin ethnographic record indicates, communal hunts involved long-range planning and "fandangos" following the kill, then hunters should have been fully geared-up prior to the hunt, making on-the-spot point manufacture unlikely.

Unknown to both Petersen and Stearns (1992) and Zeanah and Elston (1997), however, the Clover Valley site is situated near the center of the greatest concentration of juniper branch corrals and large projectile point concentrations (defined as more than 20 points each) known from the entire Great Basin subregion (Hockett 2005). In addition, similar to Trappers Point these sites (collectively called the Spruce Mountain Trap Complex area [SMTC area]) are located along a north-south migration corridor for pronghorn. The Clover Valley site is also located within a topographic constriction along this route. As discussed in further detail below, however, both existing wooden corrals and chronologically earlier Middle Archaic-aged projectile point concentrations are directly associated with one another to the north and south of this constriction. Importantly, a major source of artifact-quality chert outcrops less than one mile from the center of the constricted killing zone, and artifact quality basalts, rhyolites, siltstones, and argilites can be procured within a few hours walk. Finally, our reading of the ethnographic literature on communal pronghorn trapping suggests that there was in fact a variety of methods and personnel used in the communal trapping of pronghorn by different societies, such that a single archaeological signature resulting from behavioral decisions about whether or not to gear-up before the hunt or to manufacture projectile points next to the killing place cannot be assumed. In other words, different methods and motivations behind the decision to communally trap pronghorn may result in different archaeological signatures of material remains. Given the relatively large number of existing corrals, projectile point concentrations, and the time depth involved at the SMTC area (5,000–6,000 years), these data are prime for the exploration of issues related to the origins and methods of communal large game trapping in the Great Basin.

Hockett (2005) previously reported on the

SMTC area corrals and point concentrations in a general discussion of the possible time-depth of communal pronghorn trapping or surrounding in the north-central Great Basin. Below we provide the details necessary to expand and further refine this issue, as well as to suggest that a variety of methods and motivations may have been employed through time in communally capturing pronghorn in this region. As any good scientific investigation in the historical sciences should, we utilize a combination of inductive and deductive methods to approach the problem.

Communal Pronghorn Trapping: The Ethnographic Evidence

Lubinski (1997, 1999) previously reported on ethnographic evidence for communal pronghorn hunts in western North America. Here we wish to highlight two facts: (1) human behavior associated with communal pronghorn hunts varied between societies, and (2) there is no reason to believe *a priori* that the behaviors recorded ethnographically also guided the motivations and behaviors of similar communal hunting episodes recorded in the archaeological record. The ethnographic record is replete with accounts of pronghorn procurement by both individuals and groups of hunters. These demonstrate not only that there were a number of methods employed to successfully hunt pronghorn, but also that these variations in hunting methodologies could have resulted in very similar archaeological traces (equifinality).

Pronghorn habitually congregate into larger herds and migrate between summer and winter pastures (Sundstrom et al. 1973). This makes them susceptible to predation along migration routes that are predictable in both space and time. In the Great Basin, modern and ancient migration routes can be expected to primarily occur north-south rather than east-west due to the abundance of north-south trending mountain ranges.

Individuals or small groups of hunters usually practiced methods such as stalking, ambushing, and luring animals to the hunter. Disguises made of brush or pronghorn hides with the head and horns attached were often used in stalking (Steward 1941, 1943). Hunters sometimes lured animals within bow range by waving a flag or other object that caught the animals' curiosity. Ambushes involved hunters hidden along game trails, at water sources, or at other locations frequented by the animals. Hunters might be hidden in blinds, pits in the ground, or be wearing disguises. V-fences were at times employed to funnel the game to a hidden hunter. Ambushing could be done by individuals or involve both a hidden hunter and drivers. Hunters also used nooses, disguised deadfall pits, or spears placed in trails to catch pronghorn (Steward 1943). All of these methods could have resulted in the loss of a relatively small number of projectile points at individual locales, masking the potential variability in hunting behaviors employed.

The preceding methods usually resulted in the acquisition of one or a few animals. Taking of large numbers of pronghorn required multiple participants and typically was a communal affair. The term "communal" will be used here to simply refer to the aggregation of multiple families or groups of individuals in the procurement of specific resources in space and time. These aggregations may have included all family members working cooperatively (men, women, children, grandparents etc.), and have taken many forms such as adult men only, adult men and women only, and the like.

The context within which communal pronghorn hunts took place suggests that these events may have led to the creation of different archaeological traces from those briefly described above. One of the most obvious differences is the greater number of projectile points that may have been lost or discarded at communal kill spots compared to individuals stalking or ambushing game. As noted, communal hunts could have involved the gathering of entire bands or family groups in which all members participated in the hunt in some manner. In these circumstances, all members of individual groups would move near the location of the communal hunt. Individual members may have played a variety of roles in the communal hunt based on age, sex, and status, such as serving as shaman or leader, participating in constructing the corral and wings, serving as a scout, assisting in driving the animals toward the enclosure, ensuring the animals did not escape through the sides of the wings or back through the corral entrance, and being designated as a shooter or clubber. Carcasses likely would have been processed and probably consumed at or near the kill, particularly if the groups stayed for an extended period of time to complete impor-

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In other cases, communal hunts could have involved only adult men. In these cases shorter-term, task-specific locales may have been created near the kill location, with all or part of the carcasses being transported back to "base camps" where the remainder of the group members resided. In these circumstances only adult men would have completed the tasks listed above. If toolstone sources were located along the journey or at the trap site itself, many of the projectile points may have been manufactured just prior to the kill, and made of locally available materials.

These two simple examples (and there are many others that could be derived) highlight the potential variability related to social organization, human relations, toolstone procurement, and tool manufacturing patterns and the subsequent creation of an archaeological record resulting from a similar subsistence-related task: the communal corralling of multiple large game animals. It is therefore not surprising to find that behavioral variability in communal pronghorn hunting has been documented ethnographically. This literature suggests that communal pronghorn hunts consisted of at least three types: relay, surrounding, and corralling. Relays, where hunters would take turns pursuing the animals until they reached a point of exhaustion, occurred on foot, and postcontact on horseback. The Achomawi of California used the relay method to chase down herds of pronghorn on snowshoes (Curtis 1924:140).

Surrounding generally involved multiple individuals encircling a herd of pronghorn until they were isolated or concentrated within a restricted space, and then shooting the animals when they were within the hunters range. Most ethnographic accounts of surrounds mention the use of horses, so it is possible that this method was used more frequently during postcontact times in North America. William of Rubruck gave one of the earliest accounts of a surround in the 1250s. William was a Franciscan monk who travelled through Mongol territory between 1253–1255, and upon his return trip wrote an ethnography of the peoples he encountered. He described the Mongol's use of the communal surrounding technique:

> So it is that they procure a large part of their food by the chase. When they want to chase wild animals, they gather together in a great multitude and surround the district in which they know the game to be, and gradually they come closer to each other till they have shut up the game in among them as in an enclosure, and then they shoot them with their arrows [Saad 2005:20].

Hill (1938) specifically notes the use of a surround by the Navajo, but he notes that surrounds were less common, less ritualistic, and may have occurred more commonly after the adoption of horses during the contact era. In a surround, the pronghorn

> were surrounded on horseback . . . at least twenty men were necessary. The circle was contracted to a diameter of a hundred to a hundred and fifty yards, then the hunters began shooting the antelope with bows and arrows [Hill 1938:145].

Given this latter scenario, we might expect to find a number of complete and broken projectile points within a 50–100 m zone at the surround or kill spot.

Egan (1917) and the *New York Times* (1895) represent two accounts in which communal pronghorn corralling were witnessed firsthand or described shortly after they occurred. Egan witnessed a successful communal pronghorn corralling by the Goshute of eastern Nevada/western Utah, and the *New York Times* reported on a similar event for the Navajo in Arizona. Steward (1938) and Hill (1938) provide some of the more detailed secondhand accounts of communal pronghorn corralling. The following summary is based primarily on these four works.

Most, but not all, of the ethnographic accounts we reviewed report the use of a "leader" or "shaman" to guide a successful communal pronghorn corralling. In all cases, this leader was male. The descriptions of communal pronghorn corralling in the Great Basin by Howard Egan and Julian Steward suggest that, in some cases, both

men and women participated in the construction of the corral and wings, as well as in maintaining the herd inside the structure. Men were generally sent out as scouts, to begin the driving of the herd toward the corral-and-wing structure, and in shooting the animals.

W. W. Hill's (1938) and the *New York Times'* (1895) descriptions of communal pronghorn drives conducted by the Navajo are two of the most detailed ever written. These descriptions differ from those of Egan and Steward in that only men participated in the initial journey to the trap site and the actual construction of the corral itself. If women were present they participated in cooking and camp duties but were excluded from the actual preparation and construction of the corral and wings, as well as in the drive itself. Hill specifically notes that 20–50 men were required to complete a successful communal pronghorn drive. Hill (1938:149) states that several days of travel and ceremony would commence before construction began. A corral took an average of five days to complete, and construction of the wings took an additional 2–3 days. This is potentially significant information because it suggests that a communal pronghorn hunt took up to two weeks to complete. This suggests that prior gearing-up in terms of projectile point manufacture was probably not critical if sources of artifact-quality raw material were located along the journey from the base camp to the trap site or if a quarry was located near the trap itself.

Additional information provided by these latter two accounts that are not found in sources such as Steward (1938) includes: (1) the juniper and pine trees used in the construction of the corral were burned down prior to their use as construction material; (2) if horses were used to drive the pronghorn into the corral, men immediately shot the animals as they entered the structure; if the pronghorn were driven on foot, then the men rested before shooting the animals inside the corral; (3) the animals were not skinned inside the corral where they had been killed; they were taken outside of the structure to be butchered; (4) following skinning, the meat was taken to the various camps or structures built by the hunting party prior to the drive; (5) if insufficient numbers of animals were captured during the first drive, then another drive took place the following day; (6) the meat was carried back to base camps on wooden frames—each man could carry three dismembered pronghorn carcasses; and (7) heads and horns were ceremonially left behind at the kill site in the crotch and base of trees.

The *New York Times'* description, as well as more recent twentieth-century accounts of the corralling of pronghorn by various wildlife agencies for transplanting purposes, provide additional information for studying the archaeological remains of communal corrals. For examples, recent photos of corralled pronghorn show that they bunch together in a tight circle within the confines of the larger corral (e.g., Yellowstone Digital Slide, File http://www.nps.gov/archive/yell/slidefile/mammals/pronghornantelope/Page-2.htm). Indeed, the *New York Times* (1895) reported that "The shouts and yells of the Indians at length so completely terrify the poor animals that they stand trembling and apparently unconscious of the Indians, who now approach and kill them with clubs, hatchets, stones, or anything at hand."

Furthermore, these accounts help explain the topographic position of existing corrals and projectile point concentrations (or possible ancient, now-degraded corrals) on the landscape. A common feature noted by archaeologists who have recorded a number of corrals in the Great Basin is the fact that the corral walls often sharply angle at the point of contact between the beginning of the wing and the corral entrance. In addition, the backside of the corral itself (opposite the entrance) is often located on the opposite side of a hill or ridge. Standing at the entrance, this gives the impression that the narrow passageway into the corral "opens-up" into wide open space, rather than the impression of an enclosed structure. Corrals constructed in this manner represent carefully planned use of the landscape in general and micro-topography in particular based on prior knowledge of pronghorn behavior because these animals become "spooked" if they can see the walls and backside of the structure while being coaxed through the entrance. Note the references to the Navajo's use of the landscape in constructing a corral in the following passages from the *New York Times:*

> This corral was built in 1890 by the order of the old chief, Gano Mumcho, and his son, Many Horses. A place was selected where a slight hill was found upon the border of a wide prairie.

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> A close pen, circular in form, about 100 feet across, was first built against the steep side of the hill so that the tops of the posts used could not be seen from the opposite side.
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> After being closed in upon they [pronghorn] cannot turn back, as the drivers are in hot pursuit, and they make a dash for the top of the hill, which to them appears to be the only opening between the horrid lines of brush fence. But, alas! for them, they find themselves enclosed in a stout pen, around which they run in a circle, never trying to jump over [*New York Times* 1895].

In the late 1930s and early 1940s, State Game and Fish departments learned through trial and error appropriate methods of communally capturing pronghorn using wing and corral structures similar to what Native Americans had known and used many millennia earlier:

> In 1937, Paul Russell, a wildlife biologist with the New Mexico Department of Game and Fish, invented a method of trapping to transplant herds of pronghorn. Using a wild horse trapping method, he set up a winged trap along regular pronghorn routes and used cars and cowboys on horseback to ease the herds into the trap. The first few attempts ended in a wild west rodeo scene with the terrified herds rebounding off the back of the trap, sprinting back into the drivers, wrecking on cars, cowboys roping them, and general melee resulting in few if any captures. The system was revised by a hidden trap door to be closed behind the herd once past and the walls of the trap being covered with tarps for sight proof and padding [Santa Fe Guiding Company 2004].

Archaeological Ramifications of the Ethnohistoric Literature: Building Working Hypotheses

Ethnographic accounts of communal pronghorn hunting suggest that ancient corrals or kill spots may or may not contain large numbers of projectile points. Few or no lithic artifacts may have been lost within the confines of corrals in which the animals were clubbed. Nevertheless, ethnographic accounts suggest that the animals were sometimes shot, and in these cases both complete and broken projectile points probably would have been deposited and lost inside a corral or within the confines of a surround. Concentrations of broken projectile points should be located primarily within the corral itself; it is unlikely pronghorn were shot while being driven between the wings toward the enclosure. These projectile points may be located at the entrance to a corral if the hunters chose to shoot the animals as they entered, or if the animals were shot as they attempted to escape back through the entrance once within the corral. Projectile points may also encompass a much broader area within the corral. Given the fact that individual corrals measure between 100–500 m in diameter, and the fact that pronghorn bunch together when trapped inside a corral, broken projectile points could be expected to be concentrated at the spot where the herd was bunched together, as well as additional spots where individuals or smaller bunches may have stood. Indeed, clusters of Protohistoric-aged Desert Side-Notched points associated with existing corrals in the SMTC area are sometimes located at the entrance, while other times they are spread throughout the inside of the enclosure (see below for details).

Depending on where the animals were shot inside a corral, projectile point concentrations may be located in different micro-topographic zones. Projectile points may be clustered in a relatively flat topographic zone or at the base of a hill, ridge, or knoll if the animals were shot at or near the entrance. Alternatively, they may be located atop a hill, ridge, or knoll if the animals were dispatched toward the back of the enclosure.

There may be no definitive characteristics that distinguish surrounds from ancient corrals. Both may contain large numbers of similar-styled projectile points concentrated either at the base or atop a ridge, hill, or knoll. However, if the majority of ancient kill spots in the SMTC area represent surrounds rather than corrals, then we might expect them to have a rather random distribution throughout the research area. This is the case because the herds of pronghorn would not have been directed to a single, predetermined place on the landscape, as would be the case for corral construction. Thus, there would be no reason to expect a tendency of association between existing corrals and kill spots resulting from surrounding events.

Alternatively, if specific places on the landscape have served for millennia as appropriate locations

for corralling herds of pronghorn due to their topographic position, then we may indeed find an association between existing corrals and more ancient projectile point concentrations. Given the fact that wing and corral structures need to be designed to accommodate specific pronghorn behaviors, we might expect corrals to have been constructed in similar places on the landscape through time providing that migration routes remained relatively consistent. Put another way, consistency in pronghorn migration routes and a primary concern for utilizing appropriate topography to ensure a successful hunt should lead to similar distributions among existing corrals that have survived due to their relatively young age (along with age-appropriate projectile points if the animals were shot rather than clubbed) and ancient corrals in which the only remaining traces would be projectile point concentrations, associated lithic artifacts, and perhaps bonebeds.

If the pronghorn carcasses were taken outside of the corral for butchering, then campsites containing burned and butchered bone would be located some distance away from the actual kill site. However, these campsites are not likely to have been located far from the kill. If the carcasses were butchered and/or cooked inside the corral, then this would suggest behavior different from that described ethnographically for groups such as the Navajo, where this behavior was forbidden on symbolic grounds.

If pronghorn were shot inside a corral, kill spots should be dominated by high tool to flake ratios, clusters of single-type points, and relatively large numbers of broken points in the form of midsections and tips, although both complete and basal point fragments should also occur. Equifinality is often an issue in the analysis of archaeological patterns, and the study of potential ancient communal pronghorn corrals is no exception. Nevertheless, as others have previously suggested (e.g., Petersen and Stearns 1992), sites created away from the actual kill spots where broken projectile points were unbound and discarded from retrieved foreshafts should be heavily dominated by point bases, with far fewer tips, midsections, and complete points compared to the kill spots themselves. Thus, our analysis of the SMTC point clusters includes percentages of complete, basal, midsection, and tip portions. In addition, the location of the SMTC point clusters were mapped in relation to existing corrals to determine if they were associated on the same or similar landform features.

Finally, we also analyzed the raw material used to manufacture the projectile points recovered from the corrals and point concentrations. We compared these data with the known distribution of toolstone quarries in the region to help determine the degree to which hunters geared-up prior to entering the SMTC area to hunt pronghorn.

Corrals and Point Concentrations in the SMTC Area—General Introduction

A general description of the location, topography, and vegetation found within the SMTC area can be found in Hockett (2005). Here we note that the SMTC area currently encompasses approximately 15,000 acres of land surveyed at < 30 m spacing (Figure 1). The area is characterized by flat valley floors dissected by dozens of ephemeral drainages. These drainages create dozens of low-lying finger ridges. These ridges tend to run north-south in the southern zone of the SMTC area, and east-west in the central and northern regions. The area is relatively open, but it constricts near the northern end of the surveyed zone just west of a steep bluff (Figure 1). This zone is known as the "hourglass" because the ground flattens out, or "opens up" to the north and south of the constriction. It is bounded on the west and east by the uplands of Valley Mountain and Spruce Mountain, respectively. The lowest elevations are covered by a near-monoculture of big sagebrush, while the remainder is covered mainly by big sagebrush-Utah juniper habitat. The juniper trees served as the primary building material for the corrals. Some of the existing corral walls run directly into standing live juniper trees, suggesting that these were alive when the corrals were built.

Petersen and Stearns (1992) recorded the first point concentration (Clover Valley) in the SMTC area. Subsequent to this survey, we (Hockett and Murphy 1993) recorded the first corral and the second projectile point concentration (Knoll site) 15 years ago. The remainder of the corrals and point concentrations were recorded between 2000 and 2004 during a series of surveys overseen by Hockett. Approximately two dozen corrals have been recorded outside of the SMTC area as well, but no

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Table 1. Middle and Late Archaic Projectile Point Chronology from the North-Central Great Basin.

Phase	Date (^{14}C BP)	Point Style (s)
Eagle Rock	600 – 150 BP	Desert Side-Notched; Cottonwood
Maggie Creek	1,400 – 600 BP	Eastgate; Rose Spring
James Creek	3,500 – 1,400 BP	Elko
South Fork	5,000 – 3,500 BP	Gatecliff; Humboldt

other place in the entire north-central Great Basin is known to have a similar concentration of corrals and point concentrations within a relatively small geographic location.

Hockett (2005) defined a kill spot in the SMTC area as a site containing 20 or more points or point fragments. This is a very conservative definition because the three clusters of Desert Side-Notched (DSN) points that postdate 600 ^{14}C B.P. and were found directly associated with three separate existing corrals, only number between 12 and 14 points. However, 66 DSN points have been found at the Cobre Trap located to the north of the study area. This definition, therefore, would exclude three of these four clusters of DSN points as places of ancient communal pronghorn corrals if the wood had decayed or burned prior to discovery. Nevertheless, it must be emphasized that the number of DSN points recorded at these corrals is a minimum number because many more points are undoubtedly buried and remain unrecorded. Additionally, while the SMTC kill spots defined below all contain between 20 and 256 projectile points, these totals also represent minimum values because test excavation at four of these has demonstrated buried cultural deposits including projectile points. Sites with fewer than 20 surface points may in fact represent ancient communal kills. Nevertheless we adhere to the conservative figure of 20 points in our analysis that follows, recognizing that additional kill spots may be discerned in the future.

Previous attempts to tree ring date the existing corrals have not been successful. The corrals in the SMTC area are made of juniper branches and logs, and juniper has not been shown to produce consistent and reliable tree ring dates. Old wood problems become especially significant in features such as these that may not be more than a few centuries old. As a result, we assume that most of the existing corrals are no older than 600–700 years, which represents the final (Eagle Rock) cultural phase of the north-central Great Basin prior to Euroamerican contact (Table 1). Pre-600 ^{14}C B.P. point concentrations that may represent more ancient, now-degraded corrals contain Gatecliff/Humboldt (ca. 5,000–3,500 ^{14}C B.P.), Elko (ca. 3,500–1,400 ^{14}C B.P.), and Eastgate/Rose Spring (ca. 1,400–600 ^{14}C B.P.) projectile points (Table 1).

The SMTC area contains at least 13 juniper branch corrals and 13 projectile point concentrations (Tables 2 and 3). Hockett (2005) referred to all point concentrations as "kill spots," and these clusters of projectile points could indeed represent the actual place where pronghorn were shot. Alternatively, some of these could be places near the actual kill site where point rehafting/repair took place. Below we distinguish between the two by providing details of point breakage patterns. These 13 point concentrations are therefore interpreted as either the place where the animals were killed (kill spots) or as places where rehafting/retooling was the primary activity (point clusters).

The majority of the point concentrations in the SMTC area are located within or next to existing corrals. These sites are not only located on the same finger ridges as existing corrals, but also on the same spot on these ridges. This is discussed and illustrated in further detail below.

In addition to the 13 point concentrations, two other sites (Hourglass Overlook and Hourglass Ambush) in the SMTC area contain relatively large numbers of points, although their geographic position on the landscape and/or debitage analysis all but preclude them from representing ancient corrals (Table 3). These latter two sites are used as comparisons to the 13 point concentrations that may represent ancient corrals.

In order to further enhance our comparisons between sites, projectile point fragment data are presented for an additional six sites that contain large numbers of projectile points but are located outside the SMTC area proper (Table 4). These sites include: (1) The Cobre Trap is another existing corral associated with numerous projectile points north of the SMTC area; (2) Town Creek is a site in which foreshafts were retrieved from a kill

Table 2. The Corrals of the SMTC Area.

Site/Feature	Type	Notes
Wiseman Trap	corral	no points associated
Spruce Well Trap	corral	no points associated
Sprucemont Trap	corral	no points associated
Spruce Ridge Trap	corral/kill spot	16 DSN points
Spruce Pond Trap	corral/kill spots	14 DSN, 6 Elko, 1 Eastgate
Liza Jane North Trap	corral/kill spots	12 DSN and 23 Elko points
Valley Mountain Trap	corral/kill spots	118 Humboldt and 50 Elko points
Hill Trap	corral/kill spot	21 Elko and 1 DSN
Storey Trap	corral	no points associated
Gallegos Trap	corral	1 Elko point
Spruce Knoll Trap	corral	1 Gatecliff, 1 Humboldt, 2 Elko, 1 Eastgate, 1 DSN
Mizpah Trap Complex	corrals	1 DSN
Pygmy Rabbit Trap	corral	no points associated

spot and subsequently unhafted and dropped there. Located directly north of the SMTC area, a South Fork Phase corral may have been built and successfully used nearby; (3) Ander Wright and Palisade Canyon are bluff sites overlooking major perennial streams (Marys River and Humboldt River, respectively). Both sites represent places where large game was probably ambushed below the bluff and foreshafts were retrieved and unhafted there. At Ander Wright (South Fork Phase), the game was probably deer or mountain sheep, although excavations failed to recover faunal remains. At Palisade Canyon (Maggie Creek Phase), bison were brought back to this base camp for processing; and (4) Point Blank Hill (Maggie Creek Phase) and Santa Fe (James Creek Phase) are sites located atop small hills or ridges about 60 miles north of the SMTC area. Mountain sheep were probably the targets, and these animals were probably either ambushed or trapped along established migration routes very close to these sites. No faunal remains were found at the Santa Fe site, but Point Blank Hill is a site in which points were unhafted from retrieved foreshafts, and mountain sheep were brought there for processing (Schroedl 1995).

Topographic Placement

Figures 1–3 show that the existing corrals and point concentrations are geographically associated with one another. Figure 1 illustrates that the corrals and point concentrations cluster in two regions within the survey block: a northern region, which consists of nine corrals and nine point concentrations, and a southern region consisting of four corrals and four point concentrations. The southern cluster is not located in any special topographic position such as a narrow constriction. Nevertheless, this cluster of corrals and point concentrations is located at the juncture of a flat valley that extends to the south and the beginning of numerous narrow finger ridges dissected by ephemeral drainages to the north. It is therefore likely that hunters took advantage of this terrain, as well as consistent pronghorn migrations across this spot to build south-facing corrals. Entrances and wings were constructed on the lower terrain, and the back-ends were concealed on the opposite sides of finger ridges. Hunters probably have taken advantage of this place to corral or surround pronghorn since the South Fork Phase (ca. 3,500–5,000 ^{14}C B.P.), as the Mizpah Chute, Mizpah Valley, and Spruce Knoll sites (Figure 2) all contain large concentrations of Gatecliff and Humboldt projectile points.

The "Hourglass Constriction" (Figure 1) only contains four of the 13 corrals and four of the 13 point concentrations. It is also here that the main source of artifact-quality chert (Valley Mountain chert) is located (Figure 3). During Protohistoric times pronghorn were primarily corralled as they migrated from the north to the south because all of the corral openings face northward within the constriction. Based on the presence of hundreds of Humboldt points at the Clover Valley and Valley Mountain B sites, pronghorn have been corralled or surrounded within this constriction since at least the South Fork Phase (ca. 5,000–3,500 ^{14}C B.P.).

Interestingly, as the terrain opens to the north of the topographic constriction, nearly all of the existing corrals face southward, suggesting that prong-

Site/Feature	Ty
Antelope Ridge A	ki
Antelope Ridge B	ur
Spruce Ridge	ki
Spruce Pond	ki
Sir Spruce III	pc
Liza Jane North A	ki
Liza Jane North B	ki
Valley Mountain A	ki
Valley Mountain B	ki
Hill	ki
Spruce Knoll	ur
Mizpah Chute	ki
Mizpah Valley	ki
Hourglass Ambush	ar
Hourglass Overlook	to

Table 4.

Site/Feature	Type
Cobre A	corral/
Cobre B	corral/
Palisade Canyon	butche
Point Blank Hill	butche
Santa Fe	butche
Ander Wright	butche

Table 3. The Projectile Point Concentrations of the SMTC Area.

Site/Feature	Type	Notes
Antelope Ridge A	kill spot	108 points (51 Eastgate); located about 1,000m west of Spruce Well Trap near end of finger ridge; probable back-end spot of an ancient corral
Antelope Ridge B	unhafting	130 points (87 Elko); located 100m south of Antelope Ridge A site near end of finger ridge; probable place of unhafting from retrieved foreshafts shot at nearby corral
Spruce Ridge	kill spot	16 DSN points; located at the entrance to the Spruce Ridge Trap; animals shot as they entered or attempted to back-out of the corral
Spruce Pond	kill spot	14 DSN, 6 Elko, 1 Eastgate; located inside Spruce Pond Trap; animals shot inside corral
Sir Spruce III	possible kill spot	29 Gatecliff/Humboldt, 24 Elko, 18 point fragments; located between the Spruce Ridge and Spruce Pond traps; now-degraded corral probably was located at or near this spot
Liza Jane North A	kill spot	23 Elko, 6 dart point fragments; located at entrance to existing Liza Jane North Trap; animals were shot as they entered or attempted to back-out of the corral; location has served as a place to corral pronghorn since the James Creek Phase
Liza Jane North B	kill spot	12 DSN points; located at or near entrance to Liza Jane North Trap; animals were shot as they entered or attempted to escape through the entrance
Valley Mountain A	kill spot	50 Elko points; located within Valley Mountain Trap, and clustered 50m from Valley Mountain B kill spot and 200m from Clover Valley kill spot; location was spot of ancient corral built during the James Creek Phase
Valley Mountain B	kill spot	118 Humboldt points; located within Valley Mountain Trap, and clustered 50m from Valley Mountain A kill spot and 250m from Clover Valley kill spot; location of corral built during the South Fork Phase
Hill	kill spot	21 Elko, 11 dart point fragments; located directly alongside eastern edge of Spruce Hill Trap; corrals were built here since at least the James Creek Phase
Spruce Knoll	unhafting	60 Humboldt, 49 Elko, 44 point fragments; located about 400m south of Spruce Knoll Trap; Middle Archaic corrals probably built nearby
Mizpah Chute	kill spot	136 Gatecliff points; located 50m south of Mizpah Trap Complex, 300m east of Pygmy Rabbit Trap, and 200m north of Mizpah Valley kill spot; location of corral built during South Fork Phase
Mizpah Valley	kill spot	126 Gatecliff points; located 350m southeast of Mizpah Trap Complex and Pygmy Rabbit Trap, and 200m south of Mizpah Chute kill spot; location of corral built during South Fork phase
Hourglass Ambush	ambush	25 Elko points; located in foothills directly east of Valley Mountain Trap, and Valley Mountain and Clover Valley kill spots; animals (probably deer) ambushed along probable migration corridor
Hourglass Overlook	toolstone reduction	14 Elko points; located directly west of Valley Mountain Trap on lower slope of the Valley Mountain chert source area; location of the full range of tool production and unhafting of retrieved foreshafts shot nearby

Table 4. Additional Projectile Point Concentrations from the North-Central Great Basin.

Site/Feature	Type	Notes
Cobre A	corral/kill spot	66 DSN points; located within Cobre Trap
Cobre B	corral/kill spot	47 Elko points; located within and along edge of existing Cobre Trap; location of James Creek Phase corral
Palisade Canyon	butchery, tool	60 Rose Spring points and point production fragments; located on bluff above Humboldt River
Point Blank Hill	butchery, ambush;	224 Eastgate/Rose Spring points and corral/trap? point fragments; located atop small hill; mountain sheep probably ambushed nearby
Santa Fe	butchery, ambush	176 Elko points and point fragments; located on small ridge; deer or mountain sheep probably ambushed nearby
Ander Wright	butchery, ambush	141 Gatecliff points and point fragments; located on bluff above Marys River; game probably ambushed nearby

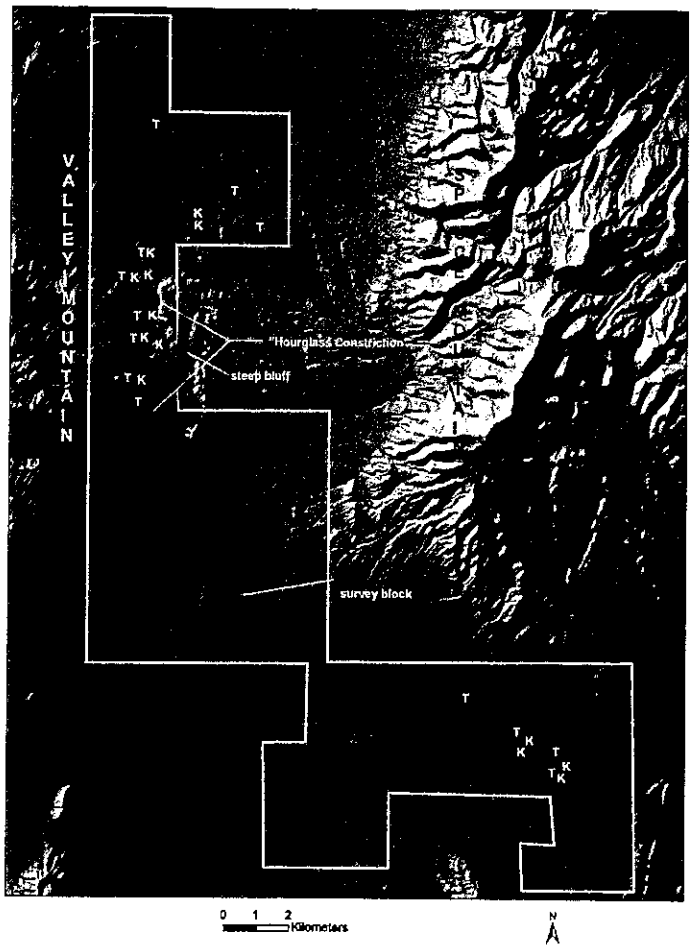

Figure 1. The 15,000-acre survey block that encompasses the SMTC area. Note the two concentrations of corrals/traps (T) and kill spots/point clusters (K), as well as the location of the topographic constriction.

horn were trapped as they migrated from the south to the north. In addition, clusters of South Fork Phase-aged projectile points (Gatecliff and Humboldt) are rarer, found only at the Sir Spruce III site. The point concentrations here primarily date to the James Creek Phase and later (ca. post–3,500 ^{14}C B.P.).

A closer look at the precise patterning of the point concentrations in relation to the existing corrals solidifies our proposition that the majority of them likely represent places of ancient corral construction. Figure 4 displays a close-up view of the Mizpah Chute and Mizpah Valley point concentrations in relation to the Mizpah Trap Complex and the Pygmy Rabbit Trap. Both of these point concentrations are located below the top of adjacent finger ridges, which are themselves located toward the backside of the existing corrals. Given their position on the landscape, these projectile points were probably shot at pronghorn as the animals entered the corrals or attempted to back out of them. Interestingly, both point concentrations contain almost exclusively Gatecliff points.

Figures 5 and 6 display the spatial relationships between existing corrals and point concentrations near the Valley Mountain and the Liza Jane North traps within the topographic constriction. As expected, the entrance to the Valley Mountain Trap (Figure 5) was built on flat terrain, with the backside of the structure located atop a finger ridge. Both the Valley Mountain A (James Creek Phase) and Valley Mountain B (South Fork Phase) point concentrations are located at the same place on the ridge that contains the Valley Mountain trap itself.

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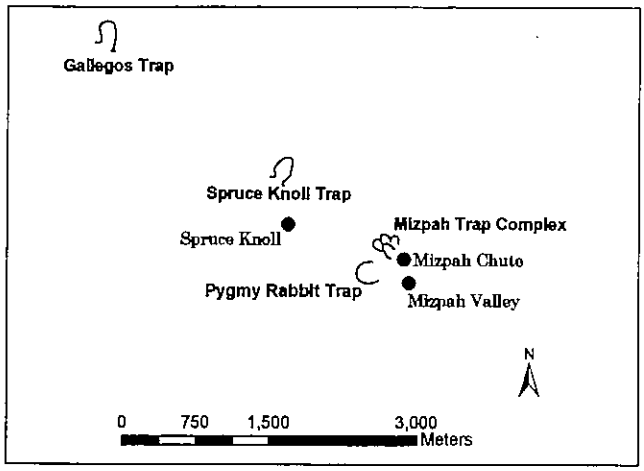

Figure 2. The southern cluster of corrals and point concentrations (dots) within the SMTC area.

While it is possible that the ancient, now-degraded corrals associated with these point concentrations faced southward instead of northward, these sites, together with the adjacent Clover Valley site, suggest that pronghorn were repeatedly dispatched near the back-ends of corrals since the South Fork Phase.

Figure 6 shows the Liza Jane A (Eagle Rock Phase) and Liza Jane B (James Creek Phase) point concentrations in relation to the Liza Jane North Trap. In both cases, the point concentrations here are located at or near the entrance to the existing corral on flat terrain rather than on top of the ridge (backside of the corral). This suggests that pronghorn have been repeatedly shot here as they entered corrals or attempted to back out of them since at least the James Creek Phase.

One difference between the Valley Mountain and Liza Jane North localities is that the backside of the corral at Valley Mountain was constructed atop a low-lying finger ridge, while the backside of the corral at Liza Jane North was constructed atop a much higher and steeper hill or knoll. The steepness of the hill at Liza Jane North might have been less conducive or less efficient at funneling pronghorn toward the back of the corral such that the animals were more likely to congregate near the entrance. This would account for the point concentrations representing both the James Creek and Eagle Rock phases being located on the valley floor near the entrance to the existing corral rather than atop the knoll.

Figures 7 and 8 display two point concentrations associated with the existing Spruce Ridge Trap and Spruce Pond Trap located north of the constriction. The DSN points associated with the Spruce Ridge Trap (Figure 7) are all located near its entrance, suggesting once again that pronghorn were shot as they entered or as they attempted to back out of the structure. Similar to Liza Jane North, the backside of this corral was built atop a fairly steep hill or knoll. All of the projectile points, regardless of age, associated with the Spruce Pond Trap were found scattered within the existing corral (Figure 8), suggesting that pronghorn were shot inside and near the center of the corral. Similar to Valley Mountain, the backside of this corral was constructed on a low-lying finger ridge.

Projectile Point Breakage Patterns

Topographic context strongly suggests that many of the point concentrations in the SMTC area represent ancient corrals. The next logical question to ask is: Do most of them contain relatively high percentages of midsections and tips in relation to bases? The answer is "yes." As noted previously, sites located some distance from the actual kill spot where projectile points were unhafted from retrieved forehsafts should contain relatively large numbers of basal point fragments. These types of sites previously analyzed from the north-central Great Basin include Town Creek (Petersen and Stearns 1992), Point Blank Hill (Schroedl 1995), and Ander Wright (Zeanah and Elston 1997). The

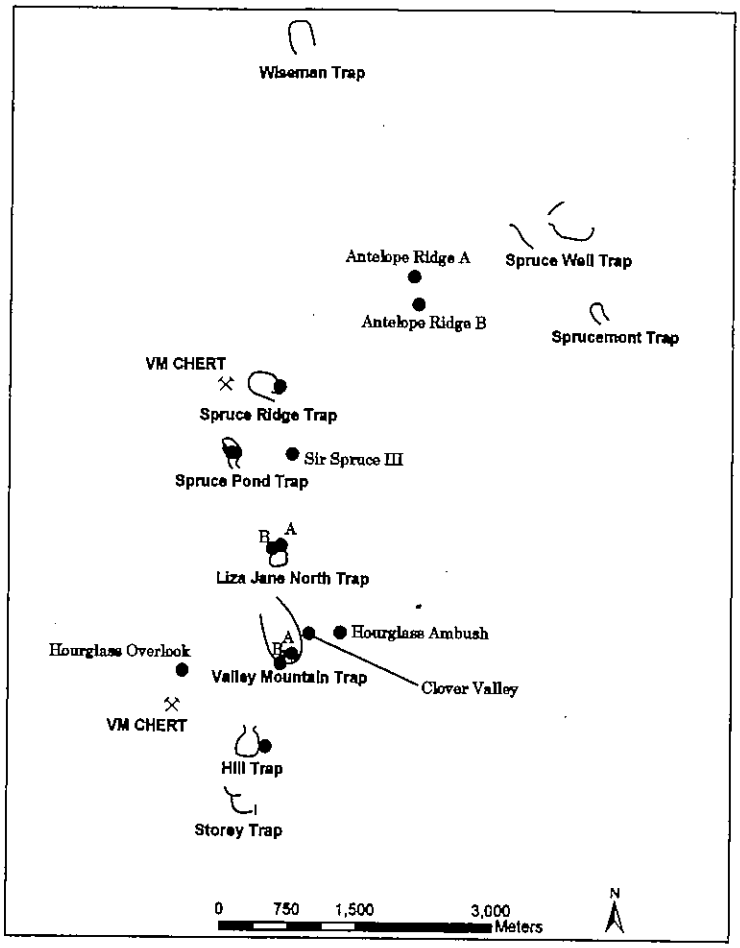

Figure 3. The northern cluster of corrals and point concentrations (dots) within the SMTC area. Two locations of the Valley Mountain chert source (VM chert) are also shown.

projectile point fragment assemblages from all three of these sites are comprised of approximately 50–60 percent basal fragments (Table 5). This percentage range can serve as a general guideline for interpreting similar localities in the SMTC area. It should also be noted, however, that sites located away from kills may also contain relatively large numbers of point tips if large game carcasses were also brought back to the campsite for butchering because tips can "ride" inside body cavities. This appears to be the case at the Palisade Canyon site located on a bluff overlooking the Humboldt River. Bison were brought to this site for processing during the Maggie Creek Phase (Hockett 2007a), and the largest percentage (nearly 50 percent) of projectile point fragments recovered were in the form of tips (Table 5). Point manufacture also occurred at this site, and nearly 50,000 pieces of debitage were recovered, so some tips there may simply represent points broken during the manufacturing process.

During the summer of 2007, we also completed test excavations at the Mizpah Chute, Antelope Ridge A, Antelope Ridge B, and Hourglass Overlook sites in order to augment the projectile point breakage pattern analysis. Our excavations not only recovered many more projectile points than were originally recorded on the surface of these sites, but also revealed broken and burned artiodactyl bones at the Mizpah Chute, Antelope Ridge A, and the Hourglass Overlook sites. In addition, charcoal was recovered in sufficient quantities at Antelope Ridge A, Antelope Ridge B, and Hourglass Overlook, which provide corresponding radiocarbon dates.

Figure 4. Aerial view of t the Mizpah Trap Compl

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Ridge B (Figure 9), S
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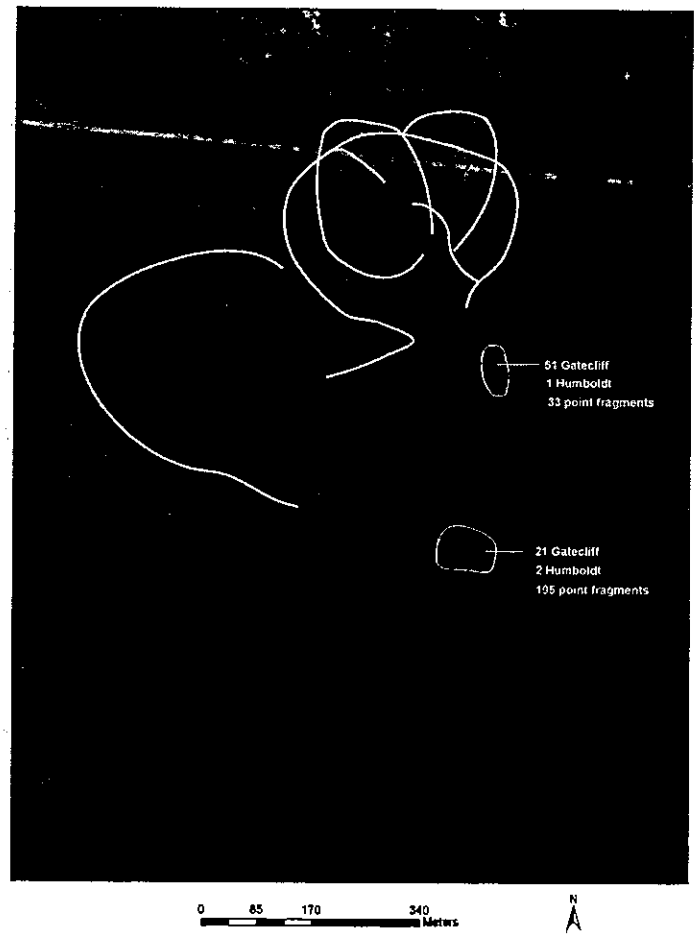

Figure 4. Aerial view of the Mizpah Chute (northern) and Mizpah Valley (southern) point concentrations in relation to the Mizpah Trap Complex and the Pygmy Rabbit Trap.

Debitage was also recovered from all four sites. These latter data are discussed in more detail in the sections that follow.

The values displayed in Table 5 show that only four of the 15 point concentrations—Antelope Ridge B (Figure 9), Sir Spruce III, Spruce Knoll, and Hourglass Overlook—exhibit percentages of basal fragments that approach those of the Town Creek, Ander Wright, and Point Blank Hill sites. This is particularly the case for Antelope Ridge B, which displays values almost identical to sites such as Town Creek. The point fragmentation patterns are rather unique at Sir Spruce III, however, which displays the highest percentage of complete points of any of the South Fork Phase-aged sites in the SMTC area. At the Spruce Knoll site, both the Humboldt ($N = 60$, basal fragments = 77 percent) and Elko ($N = 49$, basal fragments = 55 percent) points consist of relatively high percentages of basal fragments. Although there were 44 tips and midsections recovered from the Spruce Knoll site that could not be definitively classified as either Humboldt or Elko, 60 percent of all the points from the site represent basal fragments. This site is probably not the spot of an actual kill, but because it is sandwiched between the intensive corralling activity surrounding the Mizpah Trap Complex to the south and existing corrals to the north (Figure 2), it is likely related to earlier corralling events.

The Hourglass Overlook site is located near the base of the Valley Mountain chert source in the foothills of the Valley Mountain range. This site offers a broad lookout across the corrals and kill spots located on the valley bottom below within the constricted topographic zone. Its location alone would suggest that it was not the site of an ancient

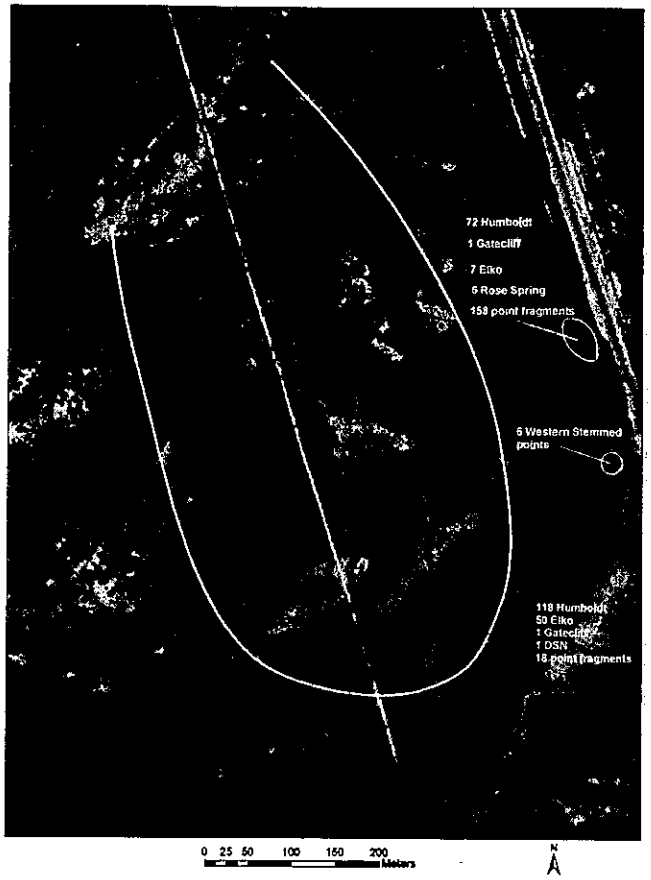

Figure 5. Aerial view of the Valley Mountain Trap and associated point concentrations. The location of the original Clover Valley site is shown near the eastern edge of the existing corral. The crosses (Humboldt points) and triangles (Elko points) show internal clustering at the back-end of the existing corral. The lone DSN point (D) is also shown.

corralling event, and the large percentage of basal projectile point fragments corroborates this interpretation.

The remainder of the point concentrations recorded in the SMTC area exhibit relatively large percentages of complete points and point midsections and tips, a pattern more consistent with kill spot localities (see also Figure 10). Their topographic context in relation to existing corrals solidifies this interpretation.

The DSN points associated with the corrals tend to exhibit far greater numbers of complete points compared to the other point styles (Table 5 and Figure 10). This simply may be due to their small size, which led to these points breaking less frequently on impact. In addition, it would have been more difficult to locate broken fragments of DSN points on the surfaces of these sites during recordation. Full-scale excavation at sites such as Spruce Ridge, Spruce Pond, and Liza Jane North may reveal many more broken DSN point fragments. In any case, between 60–80 percent of the DSN points recorded within existing corrals consisted of complete points and point midsections.

The only potential Maggie Creek Phase kill spot from the SMTC area is the Antelope Ridge A site. This site overwhelmingly consists of Eastgate points, but Elko points (which were exclusively found at the nearby Antelope Ridge B site) were also present. More than 60 percent of the points from Antelope Ridge A consisted of complete points and point midsections and tips. The site is located atop and near the end of a finger ridge that would have served as a prime trapping location. The now-degraded corral(s) that were probably constructed here would have faced to the north, with

Figure 6. Aerial view of the
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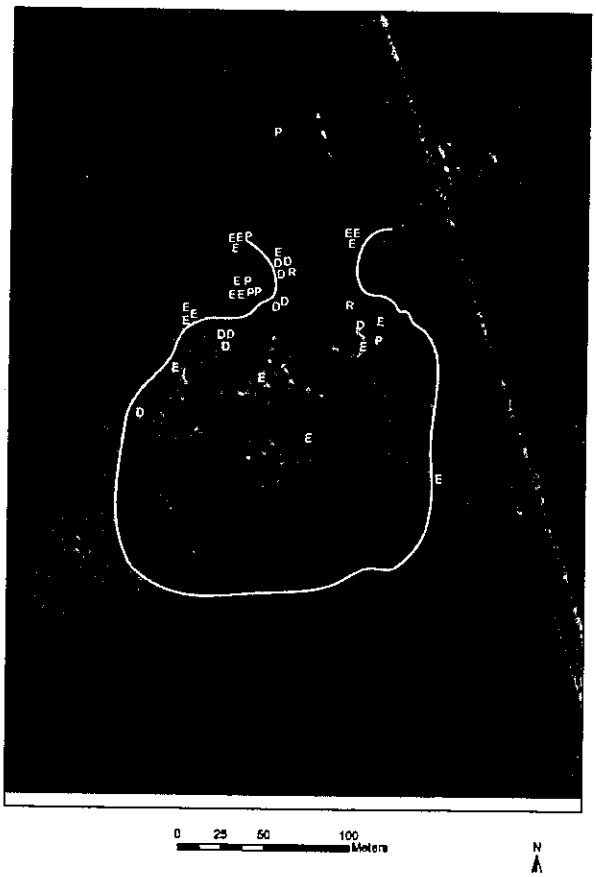

Figure 6. Aerial view of the Liza Jane North Trap and associated point concentrations located near its entrance. E = Elko points; D = DSN points; R = Rose Spring/Eastgate points; P = undetermined point fragment.

their entrances located on the valley floor below the ridgetop, with the back of the corrals located on top of the ridge where the points were discovered. Both the Antelope Ridge A and B sites are likely associated with ancient corral building at this location, with Antelope Ridge A representing a Maggie Creek Phase-James Creek Phase kill spot palimpsest located near the backside of a corral, and Antelope Ridge B representing a place 100m further up the ridge where points were unhafted from retrieved foreshafts outside of the corral walls during the James Creek Phase.

The Valley Mountain A, Hill, and Liza Jane A sites all appear to be James Creek Phase kill spots, while the Mizpah Chute (Figure 11), Mizpah Valley, Clover Valley, and Valley Mountain B sites are South Fork Phase kill spots. The projectile point assemblages from the three James Creek Phase sites exhibit between 62–74 percent complete points and point midsections and tips. The points from the four South Fork Phase sites exhibit between 60–84 percent complete points and point midsections and tips. As noted above, all seven of these Middle Archaic sites are directly associated with existing Protohistoric-aged corrals, suggesting that hunters intermittently utilized the same valley-and-ridge topography for corralling pronghorn at each of these locations for many millennia. The topographic position of the points below ridgetops on flat terrain at Mizpah Chute and Mizpah Valley suggest that these sites represent places where pronghorn were shot as they entered or attempted to back out of ancient, now-degraded corrals.

Additional Data Collected from the Kill Spots and Point Clusters–Radiocarbon Dating, Faunal Remains, and Debitage Analysis

In 2007, we excavated a total of 12 1-x-1-m units within the Mizpah Chute kill spot, seven units each

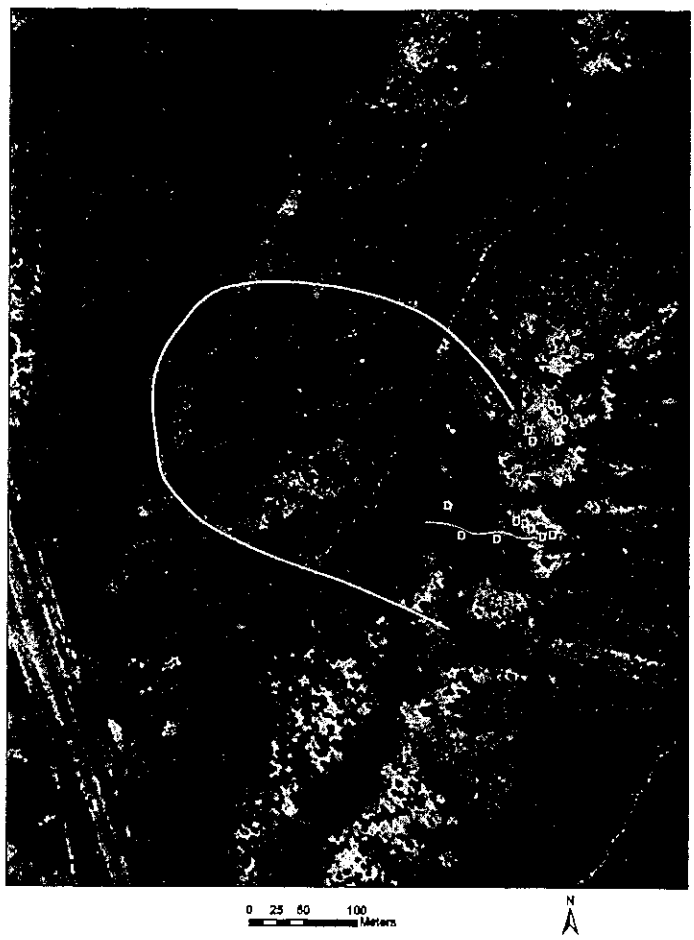

Figure 7. Aerial view of the Spruce Ridge Trap and associated DSN points located near its entrance.

within the Antelope Ridge A kill spot and B point cluster, and 10 units within the Hourglass Overlook point cluster (Table 6). At Mizpah Chute, in addition to buried Gatecliff points, we retrieved 62 large mammal shaft fragments, 12 (19 percent) of which were burned. Attempts at radiocarbon dating the faunal remains failed to retrieve enough collagen for an accurate date. This is not surprising given the fact that any organic remains there have been subjected to erosion in an open-air setting for at least 4,000 to 6,000 years. A total of 826 pieces of debitage was recovered from the Mizpah Chute excavations, averaging 43 per square meter. Of the diagnostic flakes, 81 percent were late stage biface thinning and finishing flakes. This includes three notching flakes. These data suggest that late stage biface manufacturing including projectile point production occurred at the site. Little use was made of the local Valley Mountain chert source area (approximately 2 percent). Instead, other cherts (44 percent) and the local argillite (25 percent) were most common. Obsidian (12 percent), mainly from the Browns Bench Obsidian Source Area, was more common than at any of the other excavated sites. Overall, debitage analysis suggests that effort was expended on point repair or manufacturing prior to the successful corralling event(s), just following the event(s), or both.

The Antelope Ridge A kill spot was significantly eroded and deflated, yet projectile point fragments were retrieved just under the gravelly surface of the site, as well as two burned artiodactyl bone fragments and 235 pieces of debitage. Debitage density was 34 pieces per square meter. Like Mizpah Chute, the focus was primarily on late-stage biface production, with 65 percent of the diagnostic debitage representing late-stage biface thinning and finishing flakes. However, early-stage biface reduc-

Figure 8. Aerial view of t
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Figure 8. Aerial view of the Spruce Pond Trap and associated projectile point scatter within the corral walls. E = Elko points; D = DSN points; R = Rose Spring/Eastgate points.

tion was relatively common and only one notching flake was present. Nonlocal chert was the dominant toolstone (63 percent), while Valley Mountain Chert was common (29 percent). Obsidian (Browns Bench) accounted for only one percent of the total.

At nearby Antelope Ridge B, one unit contained charcoal radiocarbon dated between ca. 2,900–3,400 ^{14}C B.P., confirming its James Creek Phase age. No faunal remains were recovered from this site. Excavation yielded 248 flakes, with an average density of 35 per square meter. Valley Mountain chert dominated the assemblage, consisting of 84 percent of the total. Other cherts made up another 14 percent, while a few flakes of basalt and obsidian were recovered. Core reduction (18 percent), early biface reduction (33 percent) and late biface reduction (17 percent) made up the bulk of the debitage. The scarcity of finishing flakes (8 percent) and lack of notching flakes suggest that projectile point repair/manufacture was either of minor importance or lacking altogether.

Finally, at the Hourglass Overlook site we recovered charcoal and burned and unburned large mammal shaft fragments. Charcoal dating between ca. 1,900–2,360 ^{14}C B.P. confirms its James Creek Phase age. A total of 31 artiodactyl bone fragments was recovered, 10 (32 percent) of which were burned. Importantly, debitage analysis confirms that this location is unlikely to have been a kill spot. Rather, a full range of toolstone reduction and tool manufacture occurred. The quantity and density of debitage at Hourglass Overlook dwarfs the amounts found at the other sites. Waste flakes number 8,651, with an average density of 1,442 pieces per square meter, or 33 times as much as at Mizpah Chute. Given that the site is located only a few hundred

Table 5. Projectile Point Breakage Patterns from Various Sites Located in the SMTC Area and Elsewhere in the North-Central Great Basin.

Site	Complete	Distal[1]	Midsection	Tip	Lateral	Totals
Eagle Rock Phase						
Spruce Ridge	4 (.25)	5 (.31)	6 (.38)	1 (.06)	0 (0)	16
Spruce Pond	8 (.57)	3 (.21)	3 (.21)	0 (0)	0 (0)	14
Liza Jane North B	3 (.25)	5 (.42)	4 (.33)	0 (0)	0 (0)	12
Cobre Trap A	32 (.48)	9 (.14)	16 (.24)	8 (.12)	1 (.02)	66
TOTALS	47 (.44)	22 (.20)	29 (.27)	9 (.08)	1 (.01)	108
Maggie Creek Phase						
Antelope Ridge A	10 (.09)	40 (.37)	35 (.32)	22 (.20)	1 (.01)	108
Palisade Canyon[2]	4 (.07)	4 (.07)	21 (.35)	29 (.48)	2 (.03)	60
Point Blank Hill[2]	50 (.22)	124 (.55)	18 (.08)	6 (.03)	26 (.12)	224
TOTALS	64 (.16)	168 (.43)	74 (.19)	57 (.15)	29 (.07)	392
James Creek Phase						
Antelope Ridge B	14 (.11)	70 (.54)	28 (.22)	15 (.12)	3 (.02)	130
Valley Mountain A	7 (.14)	16 (.32)	12 (.24)	12 (.24)	3 (.06)	50
Hill	3 (.14)	5 (.24)	7 (.33)	4 (.19)	2 (.10)	21
Liza Jane North A	5 (.22)	6 (.26)	10 (.43)	2 (.09)	0 (0)	23
Spruce Knoll A	9 (.18)	27 (.55)	9 (.18)	4 (.08)	0 (0)	49
Hourglass Overlook	4 (.29)	8 (.57)	1 (.07)	1 (.07)	1 (.07)	14
Hourglass Ambush	10 (.40)	9 (.36)	2 (.08)	4 (.16)	0 (0)	25
Cobre Trap B	3 (.06)	12 (.26)	26 (.55)	6 (.13)	0 (0)	47
Santa Fe[2]	11 (.06)	51 (.29)	32 (.18)	61 (.35)	21 (.12)	176
TOTALS	66 (.12)	204 (.38)	127 (.24)	109 (.20)	30 (.06)	535
South Fork Phase						
Mizpah Chute	14 (.10)	53 (.39)	42 (.31)	26 (.19)	1 (.01)	136
Mizpah Valley	1 (.01)	20 (.16)	86 (.68)	19 (.15)	0 (0)	126
Clover Valley	18 (.07)	90 (.35)	89 (.35)	59 (.23)	0 (0)	256
Valley Mountain B	5 (.04)	37 (.31)	55 (.47)	20 (.17)	1 (.01)	118
Spruce Knoll B	10 (.17)	46 (.77)	4 (.06)	0 (0)	0 (0)	60
Sir Spruce III[3]	19 (.27)	33 (.46)	12 (.17)	6 (.08)	1 (.01)	71
Town Creek	21 (.14)	90 (.58)	30 (.19)	13 (.08)	0 (0)	154
Ander Wright[2]	12 (.09)	65 (.46)	15 (.11)	30 (.21)	19 (.13)	141
TOTALS	100 (.09)	434 (.41)	333 (.31)	173 (.16)	22 (.02)	1,062

[1]"Distal" ends are defined here as projectile point bases, in contrast to point "tips."
[2]Additional kill locations located in the north-central Great Basin outside of the study area
[3]Combines both South Fork (Humboldt and Gatecliff) and James Creek (Elko Series) phase projectile points because the midsections and tips from this site could not be separated into individual phases

meters from a primary outcropping of Valley Mountain chert, it is no surprise that this material accounts for 99 percent of the debitage. Emphasis was on biface reduction although core/flake blank production and final finishing are represented. While the 320 finishing flakes make up only 9 percent of the debitage at Hourglass Overlook they are still more numerous here compared to the other sites. The presence of finishing flakes and three notching flakes indicates projectile point repair or manufacture . This site was not a kill spot, but probably played a role in the communal hunt as a camp where gearing-up using local chert took place immediately prior to the hunt and consumption of game afterwards during the James Creek Phase.

In sum, projectile point breakage patterns are commensurate with the topographic context analysis, and these data suggest that the majority of the point concentrations recorded in the SMTC area are kill spots. These data strongly suggest that the kill spots represent the remains of degraded corrals that were constructed as early as 3,500 ^{14}C B.P. and perhaps as early as 5,000 ^{14}C B.P. Repair of broken projectile points occurred at some of these kill

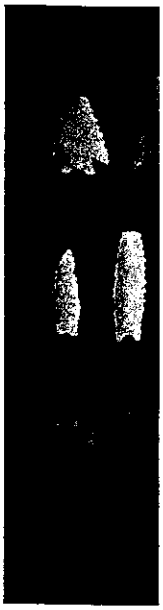

Figure 9. Projectile points
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Bottom row: Elko Series p

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Raw Material Use an
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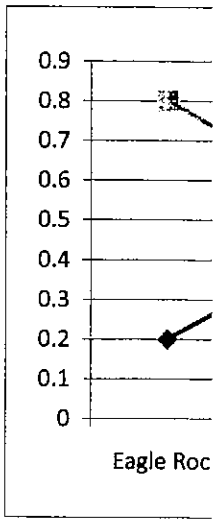

Figure 10. Composite perc
SMTC point concentratior

a and Elsewhere

ral	Totals
1)	16
1)	14
1)	12
2)	66
1)	108
1)	108
3)	60
.2)	224
17)	392
2)	130
5)	50
1)	21
)	23
)	49
7)	14
)	25
)	47
2)	176
6)	535
1)	136
)	126
)	256
.)	118
)	60
.)	71
)	154
3)	141
2)	1,062

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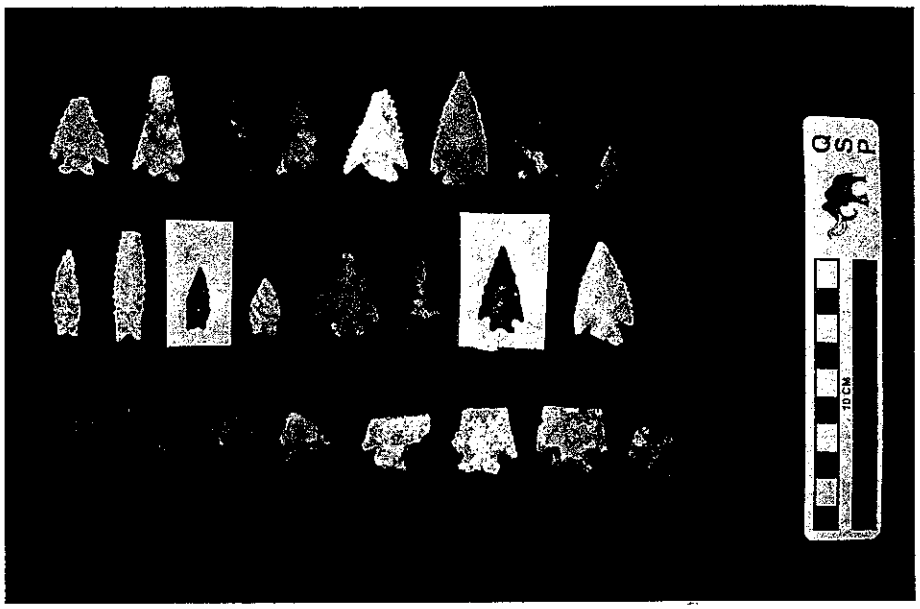

Figure 9. Projectile points recovered from the Sir Spruce III (top and middle rows) and Antelope Ridge B (bottom row) sites. Top row: Elko Series points from Sir Spruce III. Middle row: Humboldt and Gatecliff points from Sir Spruce III. Bottom row: Elko Series points from Antelope Ridge B.

spots, but this activity appears to have been minimal. Portions of cooked pronghorn carcasses were discarded at several of the kill spots.

Raw Material Use and Human Movements to the SMTC Area for Communal Hunting

Now that we have established that communal pronghorn hunting likely occurred in the SMTC area beginning in the South Fork Phase, we can address questions related to the timing of gearing up prior to these communal kills through the analysis of the raw material used to manufacture projectile points. Chert was used more frequently than any other raw material stone to manufacture the

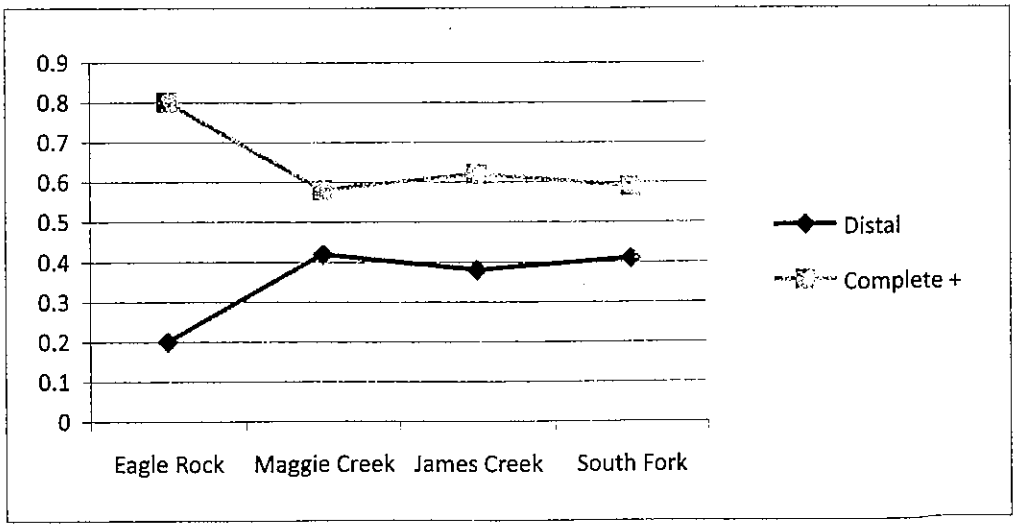

Figure 10. Composite percentages of projectile point distal ends (bases) versus complete points and point tips from the SMTC point concentration sites.

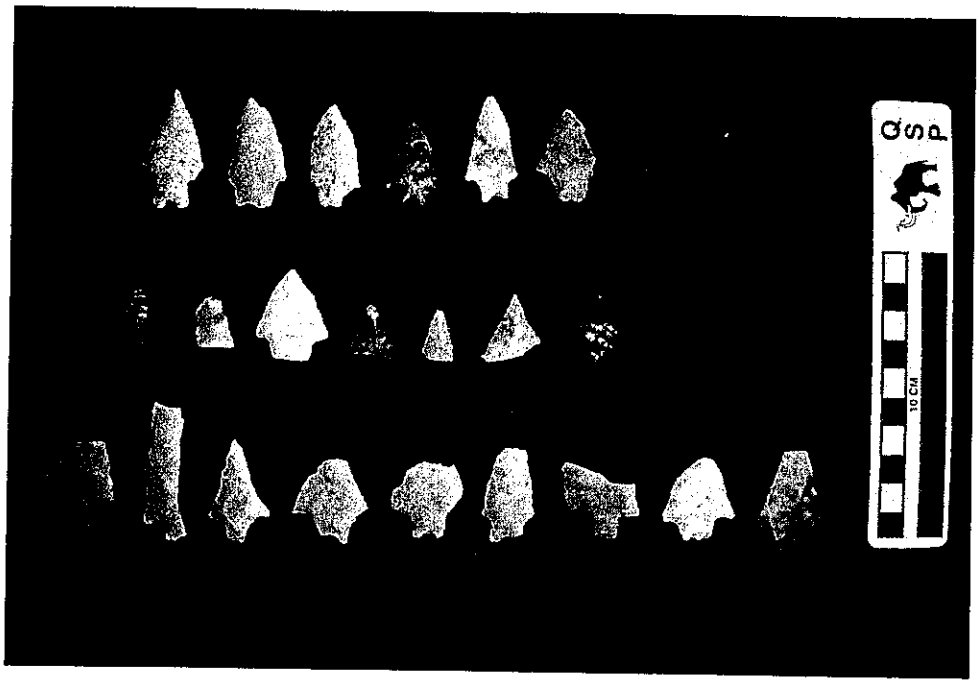

Figure 11. Projectile points recovered from the Mizpah Chute kill spot. Top row: complete Gatecliff points. Middle row: point tips. Bottom row: various Gatecliff points manufactured from local argillite.

projectile points found at the SMTC kill spots during the South Fork, James Creek, and Maggie Creek phases (Table 7). The Valley Mountain chert source is the only raw material with bedrock outcroppings available within the SMTC area itself. Fortunately, this chert is visually distinctive from other known chert sources. In general, Valley Mountain chert is either white or reddish in color. Oranges, yellows, and occasionally brown and green also occur. The white material tends to range from poor to fair quality. It is opaque with a dull luster that can be entirely white, mottled, or contain black inclusions. The reds and other colors are semi-translucent and typically contain white or occasionally white and black inclusions that give the material a speckled or mottled appearance. Even the pieces that are a solid color typically will have an occasional white inclusion.

The second-most commonly utilized raw material stone was obsidian. Obsidian was the preferred material, however, just prior to Euro-american contact during the Eagle Rock Phase. The vast majority of glass points were manufactured of Browns Bench Obsidian (BBO), a visually distinctive glass that is typically black in color and completely opaque in appearance (although mahogany or red

Table 6. Faunal Remains and Radiocarbon Dates Obtained from Four of the SMTC Area Point Concentrations and Two Hearths Located at the Existing Cobre Trap.

Site:	Artiodactyl Remains (*N*):	Radiocarbon Dates (^{14}C BP):
Antelope Ridge A	2	2,150 ± 40 (Beta-235958)
Antelope Ridge B	0	2,910 ± 40 (Beta-235959)
		3,410 ± 40 (Beta-235960)
Mizpah Chute	62	
Hourglass Overlook	31	1,890 ± 40 (Beta-235957)
		2,360 ± 40 (Beta-235955)
		2,360 ± 40 (Beta-235956)
Cobre Trap	35	120 ± 40 (Beta-236870)
		690 ± 40 (Beta-236868)

Figure 12. Regional view ... toolstone source areas. Wh... cies for use of different too...

with black inclusions i... the BBO source area is ... corner of Nevada, abou... the SMTC area (Figur...

Several source area... basalt, argillite, and silts... a 60 km radius surrou... ure 12). The basalt so... mately 30–60 km south... argillite source (fine-gr... sometimes banded) is l... the study area. Siltsto... north. A small percenta... manufactured of a tann... we have yet to locate a r... artifact quality cobbles ... SMTC area.

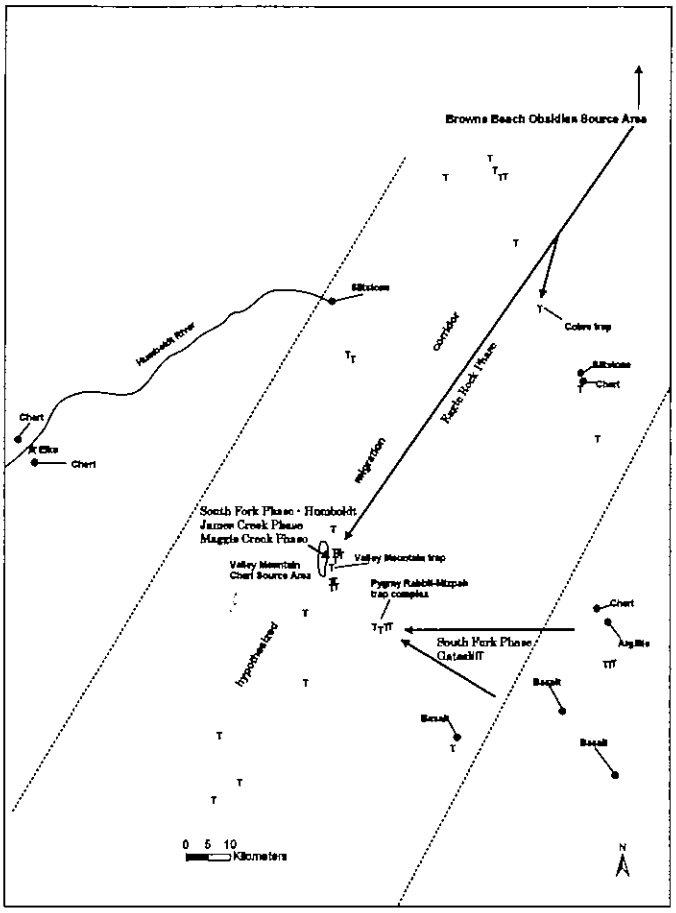

Figure 12. Regional view of the existing corrals (T) within the SMTC area and surrounding areas in relation to known toolstone source areas. While Valley Mountain chert was used in all phases, the black arrows show the different tendencies for use of different toolstone sources through time.

with black inclusions is also present). The heart of the BBO source area is located in the northeastern corner of Nevada, about 150–200 km northeast of the SMTC area (Figure 12).

Several source areas of artifact quality chert, basalt, argillite, and siltstone are also located within a 60 km radius surrounding the SMTC area (Figure 12). The basalt sources are located approximately 30–60 km southeast of the SMTC area. The argillite source (fine-grained, grayish-blue in color; sometimes banded) is located about 50 km east of the study area. Siltstone is available 50–60 km north. A small percentage of projectile points were manufactured of a tannish colored rhyolite. While we have yet to locate a rhyolite source outcropping, artifact quality cobbles are scattered throughout the SMTC area.

The Valley Mountain chert source and the other sources of basalt, argillite, and rhyolite can be considered local raw materials because they are all located less than a day's walk to the SMTC area. The obsidian artifacts, in contrast, are nonlocal. Analysis of the raw material used to manufacture the SMTC area projectile points produces significant results (Table 9). During all phases, the vast majority of chert projectile points were manufactured locally from the Valley Mountain source (Table 7). This means that, regardless of age, hunters geared up to some degree after their arrival at the SMTC area, utilizing the Valley Mountain chert that they knew beforehand would be available. Nevertheless, the use of nonlocal sources varied considerably amongst the various kill spots and between cultural phases.

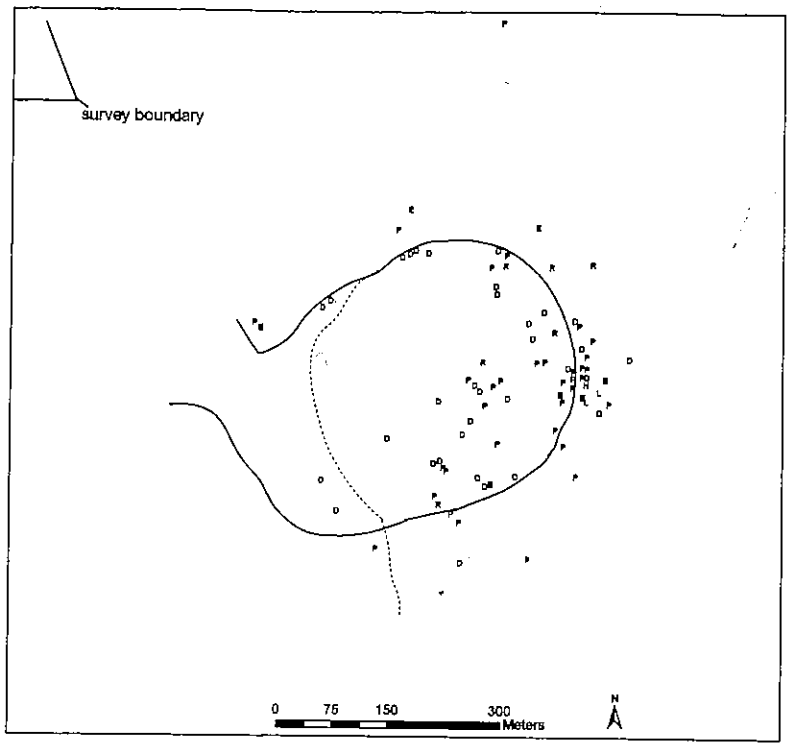

Figure 13. The Cobre Trap and associated point scatter. The dashed line represents a second (and probably earlier) corral wall that likely formed the western end of the structure. The eastern side of this second corral may be buried under sand and silt. Virtually no projectile points were located beyond about 30m of the existing corral walls, regardless of time period or point type. L = LSN points; H = Humboldt points; E = Elko points; R = Rose Spring/Eastgate points; D = DSN points; P = undifferentiated point fragments.

Interestingly, Gatecliff and Humboldt points show distinctive patterns of raw material use during the South Fork Phase. For Gatecliff points, and in particular those found at the Mizpah Chute and Mizpah Valley kill spots, the points that were manufactured of raw materials other than Valley Mountain chert almost exclusively derived from the basalts and argillites located southeast of the SMTC area (Figure 12). This suggests that many of the hunters involved in the communal killing of pronghorn during the early Middle Archaic moved into the SMTC area from the southeast, taking advantage of the basalt and argillite sources available along their journey. In contrast, the Humboldt points that were shot at pronghorn closer to the topographic constriction were almost exclusively manufactured of Valley Mountain chert (Figure 12). The distance between the Mizpah Complex sites and those within the constriction is only 20 km, yet the use of raw material varied considerably within this short distance. The location of the Valley Mountain chert source within the topographic constriction apparently was the deciding factor in the hunters waiting to gear up for the communal kills until after they arrived at the kill site. This difference in raw material use between Gatecliff and Humboldt points is intriguing given the fact that these point styles are contemporaneous and are often found together at campsites.

During the subsequent James Creek and Maggie Creek phases, or the time that Elko points replaced Gatecliff and Humboldt points and Eastgate and Rose Spring points largely replaced Elko points, respectively, hunters primarily utilized the local Valley Mountain chert source (Figure 12). This suggests again that the majority of gearing up activities during these two phases essentially occurred at the kill sites.

The Protohistoric Period (Eagle Rock Phase), however, saw DSN points replace Eastgate and Rose Spring points about 600 ^{14}C B.P., and with it a very different pattern emerged (Figure 11). More than 50 percent of all Eagle Rock Phase points were manufactured of nonlocal obsidians, with the

Table 7. Raw

Site
Eagle Rock Phase
Spruce Ridge
Spruce Pond
Liza Jane North B
Cobre Trap A
TOTALS
Maggie Creek Phase
Antelope Ridge A
TOTALS
James Creek Phase
Antelope Ridge B
Valley Mountain A
Hill
Liza Jane North A
Spruce Knoll A
Sir Spruce III
Hourglass Overlook
Hourglass Ambush
Cobre Trap B
TOTALS
South Fork Phase
Mizpah Chute
Mizpah Valley
Clover Valley
Valley Mountain B
Spruce Knoll B
Sir Spruce III
Town Creek
TOTALS

[1]Other raw materials inclu

majority of these cor
Source Area. This pat
Trap site located nort
and Figure 13). This
aging societies invest
prior to entering the S
vious foragers who c
ground. This in turn
the wholesale use o
explain the hunting b
more ancient foraging
Great Basin.

Discussion

Topographic context
patterns indicate that
jectile point concentr

Table 7. Raw Material of the Projectile Points Located at Kill Spots from the Spruce Corridor Sites.

Site	Obsidian	Basalt	Chert	Argilite	Other[1]	Totals
Eagle Rock Phase						
Spruce Ridge	8 (.50)	0 (.00)	8 (.50)	0 (.00)	0 (0)	16
Spruce Pond	4 (.29)	0 (.00)	10 (.71)	0 (0)	0 (0)	14
Liza Jane North B	7 (.58)	0 (.00)	4 (.33)	1 (.08)	0 (0)	12
Cobre Trap A	37 (.56)	2 (.03)	27 (.41)	0 (0)	0 (0)	66
TOTALS	56 (.52)	2 (.02)	49 (.45)	1 (.01)	0 (0)	108
Maggie Creek Phase						
Antelope Ridge A	13 (.12)	0 (0)	95 (.88)	0 (0)	0 (0)	108
TOTALS	13 (.12)	0 (0)	95 (.88)	0 (0)	0 (0)	108
James Creek Phase						
Antelope Ridge B	14 (.11)	12 (.09)	104 (.80)	0 (0)	0 (0)	130
Valley Mountain A	5 (.10)	3 (.06)	40 (.80)	0 (0)	2 (.04)	50
Hill	5 (.24)	0 (0)	16 (.76)	0 (0)	0 (0)	21
Liza Jane North A	9 (.39)	0 (0)	12 (.52)	2 (.09)	0 (0)	23
Spruce Knoll A	12 (.24)	5 (.10)	29 (.59)	2 (.04)	1 (.02)	49
Sir Spruce III	7 (.29)	0 (0)	16 (.67)	1 (.04)	0 (0)	24
Hourglass Overlook	0 (0)	0 (0)	14 (1.0)	0 (0)	0 (0)	14
Hourglass Ambush	0 (0)	2 (.08)	22 (.88)	0 (0)	1 (.04)	25
Cobre Trap B	25 (.53)	1 (.02)	21 (.45)	0 (0)	0 (0)	47
TOTALS	77 (.20)	23 (.06)	274 (.72)	5 (.01)	4 (.01)	383
South Fork Phase						
Mizpah Chute	12 (.09)	5 (.04)	68 (.50)	30 (.22)	21 (.16)	136
Mizpah Valley	26 (.21)	4 (.03)	71 (.56)	13 (.10)	12 (.10)	126
Clover Valley	44 (.17)	10 (.04)	202 (.79)	0 (0)	0 (0)	256
Valley Mountain B	21 (.18)	3 (.03)	91 (.77)	2 (.02)	1 (.01)	118
Spruce Knoll B	13 (.22)	14 (.23)	23 (.38)	0 (0)	10 (.17)	60
Sir Spruce III	10 (.34)	0 (0)	19 (.66)	0 (0)	0 (0)	29
Town Creek	58 (.38)	0 (0)	96 (.62)	0 (0)	0 (0)	154
TOTALS	184 (.21)	36 (.04)	570 (.65)	45 (.05)	44 (.05)	879

[1]Other raw materials include siltstone and rhyolite

majority of these coming from the Browns Bench Source Area. This pattern is repeated at the Cobre Trap site located north of the SMTC area (Table 7 and Figure 13). This suggests that the recent foraging societies invested more effort at gearing up prior to entering the SMTC area than did the previous foragers who communally hunted the same ground. This in turn seriously calls into question the wholesale use of ethnographic accounts to explain the hunting behaviors and motivations of more ancient foraging societies in the north-central Great Basin.

Discussion and Conclusion

Topographic context and projectile point breakage patterns indicate that the vast majority of the projectile point concentrations recorded in the SMTC area are kill spots—places where large game animals were surrounded or corralled and shot. We think that the most parsimonious explanation is that these kill spots represent places of ancient, now-decayed corrals (cf. Petersen and Stearns 1992) because of the patterned distribution of these sites in relation to the existing corrals. If this interpretation is valid, then, as Hockett (2005) suggested, communal pronghorn hunting commenced by 3,500 to 5,000 ^{14}C B.P. during the earliest stages of the Middle Archaic of the north-central Great Basin.

If sites such as Trappers Point in Wyoming suggest that communal hunting of pronghorn commenced there during the Early Archaic, is there any similar evidence from the north-central Great Basin? We know of only three sites that may suggest Early Archaic communal large game hunting in the north-central Great Basin based on archae-

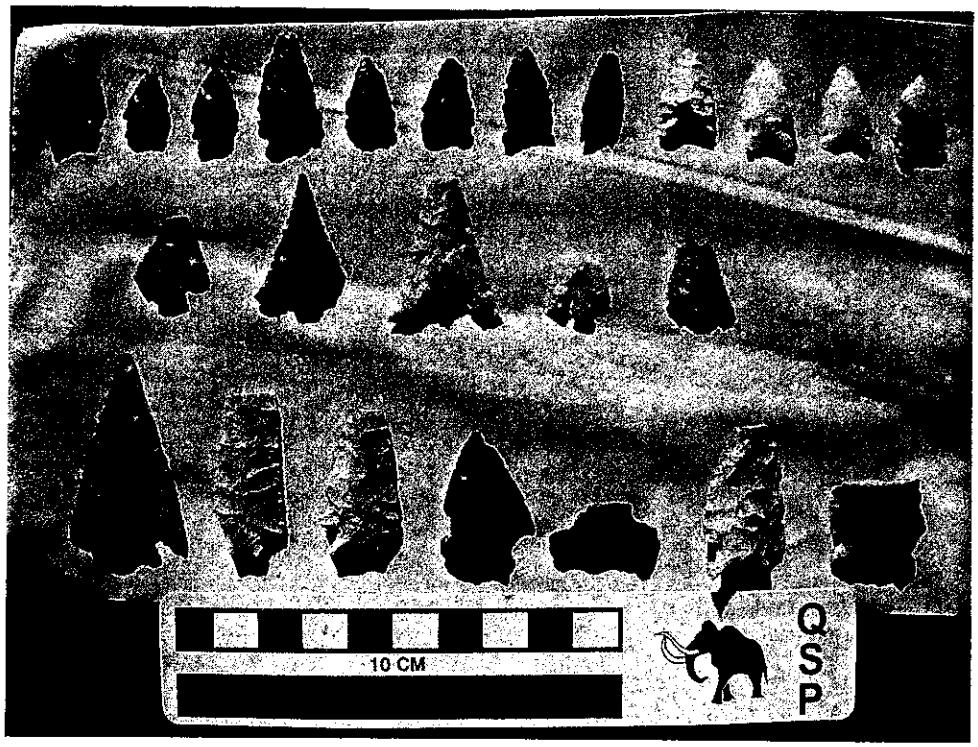

Figure 14. Projectile points recovered from the Cobre Trap. Top row: Desert Series. Middle row: Eastgate. Bottom row: Elko Series and Large Side-Notched.

ological and topographic contexts. One is the Cobre Trap site located north of the SMTC area (see Tables 4, 5, 7; Figure 12). Cobre is an existing corral that contains a dense concentration of projectile points located within the corral and just outside the corral walls. We surveyed a 300-m perimeter surrounding the corral (Figure 13) in 2007, and confirmed that the projectile points, regardless of age, are directly associated with the existing corral, suggesting that this spot may have served as a prime location for corralling pronghorn for a lengthy period of time. The projectile points recovered from the site consist of DSN ($N = 66$), Eastgate ($N = 9$), Elko ($N = 39$), Humboldt ($N = 2$), and Large Side-Notched (LSN) ($N = 8$) (Figure 14). There is no doubt that hundreds of points remain buried and unrecorded at this locale, and hundreds more have been carried off by artifact collectors. Many more LSN points (Pie Creek Phase) were probably associated with the existing Cobre Trap. It is possible that pronghorn have been trapped at this location since the Early Archaic, between ca. 5,000 and 7,500 ^{14}C B.P.

The remaining two candidates are located in the SMTC area itself. Seven LSN points were found just outside the corral wall at the Hill Trap, and five LSN points were found on top of a ridge overlooking the Storey Trap. Neither of these sites met our arbitrary definition of a point concentration, yet similar to all sites in the SMTC area, additional projectile points may be recovered if these sites were subjected to full-scale excavation. In any case, it is worth repeating that our definition of 20 points as representative of a potential communal kill spot is arbitrary, especially considering the fact that a number of existing corrals in the north-central Great Basin contain only a single DSN point within the confines of their corrals. It is therefore possible that some of the Middle and Early Archaic sites in the SMTC area that contain far fewer than 20 points were places of ancient communal pronghorn trapping.

Communal pronghorn trapping during the Early Archaic in the north-central Great Basin would not be surprising. Recent faunal analysis at Bonneville Estates Rockshelter, located just east of the SMTC

area, indicates that l
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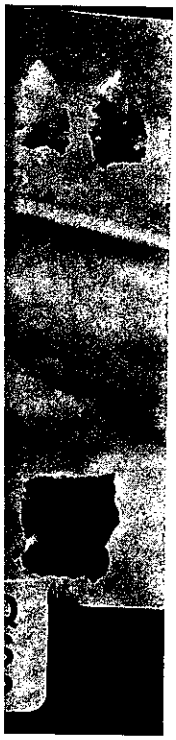

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ysis at Bonneville
east of the SMTC

area, indicates that large game hunting intensified during the Early Archaic compared to Paleoarchaic (pre–7,500 ^{14}C B.P.) times (Hockett 2007b). The combination of increasingly arid climatic conditions during the Middle Holocene (ca. 8,300–5,000 ^{14}C B.P.) coupled with a reduction in species biodiversity (particularly the availability of fish, shellfish, and birds) probably helped fuel an increasing focus on large game at specific places during this period (Hockett 2005, 2007b). The communal capturing of pronghorn during the Early Archaic is a possibility, although the probable reduction in the intensity of human occupation in this portion of the Great Basin at this time might have meant that communal large-game hunts were more difficult to plan and carry out, and therefore were relatively rare events. In any case, communal rabbit hunting certainly began by the Early Archaic in the nearby west Bonneville Basin (Schmitt and Madsen 2005), and communal pronghorn hunting appears to have been in full swing by the early stages of the Middle Archaic. And communal large-game trapping remained an important social activity for the foragers of the north-central Great Basin until contact with Euro-american immigrants in the mid-nineteenth century.

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