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UTAH ARCHAEOLOGY 1997

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IN MEMORIAM

JESSE D. JENNINGS
1909–1997

Jesse David Jennings, noted archaeologist and Fellow of the Utah Professional Archaeological Council and the State Historical Society, died at his home in Siletz, Oregon, on August 13, 1997. Jane Chase Jennings, his wife and partner since their 1935 wedding, was at his side. His nearly forty years as professor of anthropology at the University of Utah profoundly influenced the practice of archaeology both locally and nationally and gained him numerous awards and honors.

The portrait of Jesse Jennings, by Alvin Gittins, hangs in the Utah Museum of Natural History. Photo courtesy of David Jennings.

Born July 7, 1909 in Oklahoma City, Oklahoma, he moved with his family to Estancia, New Mexico at the age of ten. His father worked variously as a sharecropper and traveling salesman and was rarely with the family; Jennings, being the oldest child, began working at the age of twelve tending livestock, hoeing beans and cutting firewood, all while excelling at schoolwork — he skipped three grades and graduated from high school at age fifteen.

His mother, a devout Baptist who vowed that her son would enter the ministry, loaded the family into a covered wagon and made a seven-day trip to Hot Springs, New Mexico, to enroll Jesse in Montezuma College, a small Baptist college that had opened a few years earlier. He worked at various jobs while in college, played sports, led the debate team, and graduated second in his class. Immediately following college he went to Chicago with one of his professors, found a job as a laborer on the University of Chicago Campus, and in the fall was able to begin taking classes as a probationary graduate student. He became interested in anthropology and took classes or seminars from such notable scholars as Fay-Cooper Cole, Robert Redfield, Edward Sapir, Bronislaw Malinowski, Alfred Kroeber, and Alfred R. Radcliffe-Brown. While in graduate school, Jennings worked as a university policeman, and even shot a man, who later died from the resulting pneumonia.

After taking an archaeological field school, enjoying it and doing well, he interrupted his graduate education when, in order to be closer to his ailing father, took a job teaching high school in New Mexico. He taught for two years, working with the field schools in the summers, and returned to graduate school following his father's death in 1933. He completed his classwork in 1936 and worked for the National Park Service in the southwest, and on numerous archaeological projects in the southeast and midwest. His work with A.V. Kidder at Kaminaljuyu, Guatemala, in 1938 formed the basis for his dissertation, which he completed in 1943. After serving as a naval officer in World War II he again worked for the Park Service, resigning in 1948 to accept a faculty position at the University of Utah. Jennings' career at the University of Utah lasted nearly 40 years, ending with his retirement in 1986. During that time he trained many students and conducted research throughout Utah, most notably in the Great Salt Lake Desert, the Glen Canyon of the Colorado, and in the Colorado Plateau. His work at Danger Cave near Wendover, published in 1957, was a remarkable piece of research that contributed greatly to our understanding of area prehistory and set a new standard for archaeological methods and reporting. The report, (*Danger Cave*, University of Utah Anthropological Papers 27) a classic in American archaeology, described in meticulous detail the complex stratigraphy, the artifacts, and the floral and faunal components of the site. Combining the results of the excavation with ethnographic information about regional cultures, Jennings developed a model for Great Basin human adaptation called the Desert Culture that continues to be a useful characterization. The Danger Cave research was also one of the first studies in the world to demonstrate the utility of the then new technique of radiocarbon dating.

When construction of the Glen Canyon dam threatened thousands of archaeological sites, Jennings led an eight-year salvage and research program that resulted in the recording of over 2,000 sites, excavation of dozens more, and over one hundred publications, including the synthetic and wide-ranging summary (*Glen Canyon: A Summary*, Anthropological Papers No. 81, University of Utah, 1966; recently reprinted, with a new introduction by Don Fowler as *Glen Canyon: An Archaeological Summary*, University of Utah Press, 1998). Other significant research projects conducted by Jennings include excavations at Cowboy Cave, Sudden Shelter, Bull Creek, and a multi-year project in Western Samoa.

In addition to teaching and research, Jennings' contributions to the field included a tireless effort to disseminate knowledge widely in the academic community through journals, synthetic works, and textbooks. He served as editor of *American Antiquity* (1950-1954), of the *Plains Archeological Conference Newsletter* (1947-1950), and of the University of Utah Anthropological Papers (1950-1953 and 1963-1985). His *Prehistory of North America* (McGraw-Hill, 1968, 1974, 1989) and two other introductory textbooks (with Robert F. Spencer and Edward Norbeck) introduced generations of students to the field. He edited and contributed to *Ancient Native Americans* (1978), *Ancient North Americans* (1983) and *Ancient South Americans* (1983, all W.H. Freeman) compilations which have been widely used in both graduate and undergraduate courses.

He also served on the Executive Board of the American Anthropological Association (1953-1956), as President of the Society for American Archaeology (1959-1960), and as Vice-President of the American Association for the Advancement of Science (1961). For these many and varied services to the field, Jennings was widely honored. Among his awards are included the Viking Medal in Archaeology (1958), Distinguished Professor, University of Utah (1974), and Doctor of Science, University of Utah (1980). He was elected to the National Academy of Sciences in 1977, was a Fulbright-Hayes Lecturer at the University of Auckland in 1979, and was awarded the Distinguished Service Award by the Society for American Archaeology in 1982.

Jesse Jennings was a tireless advocate for and promoter of archaeology. He and avocational archaeologist George Tripp were responsible for the passage of antiquities protection laws in Utah. He founded the Utah Museum of Natural History, and was a strong supporter of the College of Eastern Utah Prehistoric Museum during its early years. He was an early supporter of the Utah Statewide Archaeological Society and worked with George Tripp to help get it established.

As a researcher Jennings was thorough, diligent, insightful, and creative. He had a very strong conviction that it is an archaeologist's most important responsibility to publish the results of any research in a timely fashion. When a site is excavated, it is destroyed, and Jennings thought it an atrocity if detailed reports were not prepared. He took this responsibility seriously, and expected his students to do the same. He was very disciplined, and demanded discipline from his students. As a teacher he was always fair, although his intensity terrified many students (and colleagues). Most of his students will remember Jennings for his ability to be both gruff and humorous, for his great dedication to and deep love of archaeology, and for his incessant smoking. We often joked that Jennings thought the eraser trays on classroom chalkboards were there for him to use as an ashtray.

Jennings was a big man with a big personality and endless drive. Following his retirement from the University of Utah, Jennings and his wife Jane moved to Siletz, Oregon. During this period of "semi-retirement," he remained active in the field, teaching and advising students at the University of Oregon, writing, and revising his textbook for a new edition. His well-written autobiography *Accidental Archaeologist* (University of Utah Press, 1994) is fascinating reading for anyone interested in archaeology, and it affords considerable insight into this intriguing man whose contributions to archaeology will continue to benefit the field for years to come.

Kevin T. Jones

WINTER CATTAIL COLLECTING EXPERIMENTS

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Cattail (Typha latifolia) rhizomes and shoots were experimentally collected and processed during late winter (January through mid-March) to examine their utility as winter food resource. Shoots are readily collected from warm water springs, but are generally inaccessible where marshes are frozen. They produce return rates of 500-600 Cals/hr., but are bulky and were most likely used as a dietary supplement. Cattail rhizomes were easily collected in fields by using a digging stick to pry off 6-12 inches of frozen soil above the rhizomes. The starch content of the rhizomes is at its highest from late fall until early spring when it begins to support new growth. Processing which employs simple mashing and boiling techniques produces return rates of 3000-4000 Cals/hr. When combined with other experimental data, the return rate range for cattail rhizomes is 200-5000 Cals/hr. Increasing experimental data indicate wide return rate ranges are a common characteristic of many food resources, suggesting the need for caution in applying diet breadth models in archaeological situations.

INTRODUCTION

To examine the possible utility of cattails (*Typha latifolia*) as a winter staple, we conducted a series of collecting experiments throughout January, February and early March of 1997. The tests were initiated as part of a science fair project initiated by one of us (Eschler 1997) intended to examine two simple questions: (A) Can cattails be collected and used as a food resource in the depths of winter? and (B) Is the return rate from collecting and processing these resources high enough to make them viable as a winter staple in lieu of other potential food sources? In answering these questions we were also able to address issues surrounding the role wild plants may have played in the establishment of sedentary village life, and methodological issues surrounding food collecting experiments. These tests are part of a continuing cost-benefit assessment of plant and animal resources commonly collected by Great Basin hunter-gatherers (e.g., Simms 1987; Jones 1981; Madsen and Kirkman 1988; Jones and Madsen 1991). We collected winter cattails for consumption in two ways: new shoots were collected from warm water springs where water temperatures prevent winter freezing and allow some growth during winter months, and rhizomes from cattails in frozen fields were collected with a digging stick.

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CATTAIL SHOOTS

The shoots are easily collected by simply pulling them from the water. The water in the spring fed pond where we made our collection was warm, and collecting the shoots on bright, sunny winter afternoons presented no hypothermic problems. Nearby ponds were frozen solid and neither shoots nor rhizomes were available (Figure 1). The shoots, almost without exception, broke-off from the rhizome when pulled, and came out relatively clean and in little need of washing. The white, starchy, base of the new shoot is the edible portion, and where growth is extensive, the green, chlorophyl enriched, upper leaves must be cut off prior to cooking and eating (Figure 2). These constitute the only processing costs associated with the consumption of cattail shoots. We used a serrated knife in cutting off these green ends to simulate an obsidian knife. Obsidian blades are considerably sharper than steel knives (Robert Elston, personal communication 1997), so this may have introduced some small bias in determining processing time. Since cutting away of the green part of the shoots constitutes the majority of overall handling costs, prehistoric return rates were probably higher. Moreover, when the shoots are younger and first emerging, no cutting at all is necessary, as the entire new stock is edible.

The shoots resemble leeks and can be prepared in the same ways. Often, these new shoots, which "taste much like celery," were merely eaten raw (Fowler 1992:64). We tried them by baking them, boiling them in water and sauteing them in butter. When cooked, they become soft and translucent, much like onions, and lose much of their high water content. To determine their crude nutritional content, we submitted a sample collected January 22, 1997 to Wasatch Laboratories of Ogden, Utah for analysis. They report that basal cattail shoots are 95.13% water, 0.75% ash, 0.70% crude fiber, .05% crude fat, .66% crude protein, and 2.78% carbohydrates. Using a formula in which 1 g of fat produces 9 calories, 1 g of protein produces 4 calories, and 1 g of carbohydrates produces 4 calories, the cattail shoots we tested contain about 142.1 calories per kilogram.[1]

We collected cattail shoots experimentally in an area of warm water springs along Beck Street road in Salt Lake City, Utah on three different days during the winter of 1996-1997. During this period (January 1st to March 15th), daily high and low temperatures ranged from 10° to 59° F, with an average high of 42° and an average low of 25° (Figure 3). In our first experiment we pulled entire cattail plants from the mud, including old growth, rhizomes, roots, and new shoots. Processing consisted of cleaning off mud clinging to the shoots and cutting off the white starchy portion of new growth. In subsequent experiments, we found it easier and faster to simply pull the new shoots from the water and little or no washing was necessary. Again, the white starchy portion of new growth was cut off for consumption. In all, five experiments were conducted (Table 1).

The average return rate of 575 Cals/hr places cattail shoots approximately in the middle of the range of experimentally derived return rates for Great Basin plant resources (e.g., Simms 1987; Jones and Madsen 1991). However, return rates for the collection and consumption of younger shoots, which require no cutting, is probably at least double this rate since our processing time constitutes 57% of overall handling costs. Even so, this rate is much higher than that of other plant resources commonly collected during winter months. While this suggests cattail shoots may have been a favored resource of aboriginal foragers, two major problems with cattail shoots may have tempered this enthusiasm. First, cattail shoots probably had only limited availability during winter months. In areas away from warm water springs, cattails are covered by ice or frozen ground and shoots do not grow. Shoots can be collected from only a few areas where warm springs occur unless plant growth is initiated other marsh areas by a mid-winter thaw. Shoots are, however, one of the few plant resources available in early spring, and, as Fowler (1990: 64) notes, provide "some of [the Northern Paiute's] first fresh food of the season." Second, cattail shoots must be consumed in large quantities to provide any significant energetic gain. A person with a daily requirement of 2000 Cals/day

Figure 1. View of cattail shoot collecting area (a) and adjacent frozen ponds (b) in the Warm Springs area north of Salt Lake City.

Figure 2. View of cattail shoots collected during initial experiments (a) and white edible portion of the shoots prior to cleaning (b).

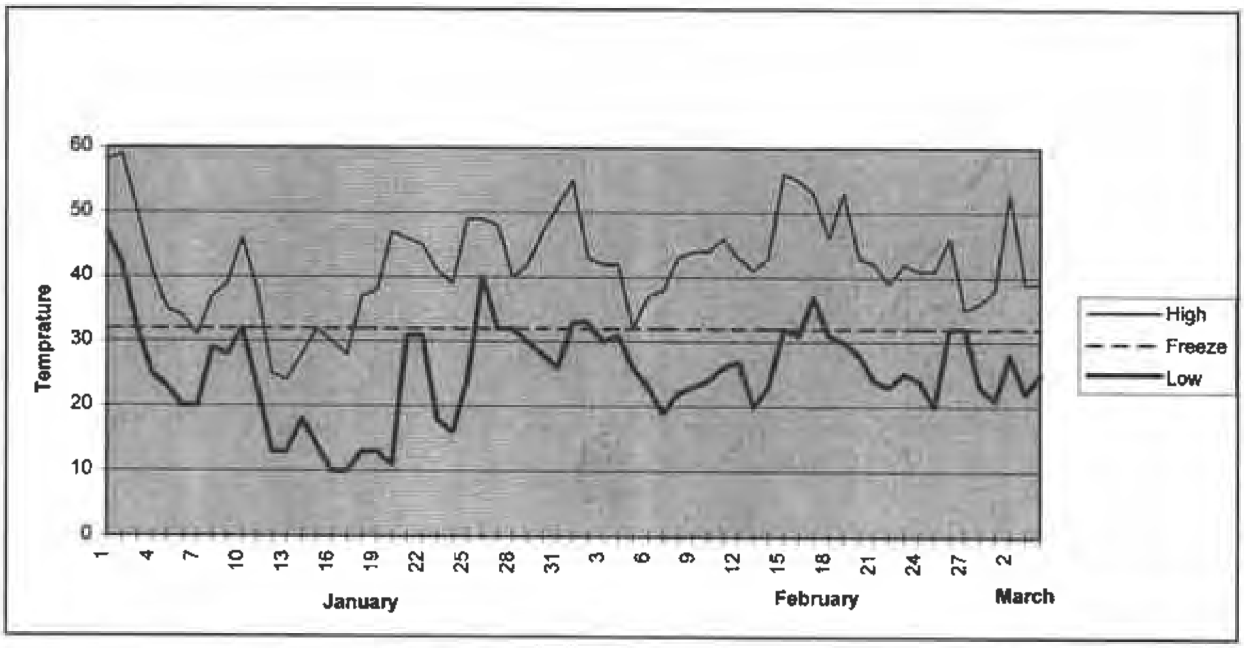

Figure 3. Daily minimum and maximum temperatuers at the Salt Lake airport from January 1 to March 5, 1997 (National Climatic Data Center 1997)

would have to consume more than 14 kg of raw cattail shoots to obtain that much energy. While cattails shoots are ~95% water and this bulk can be considerably reduced by cooking, a diet consisting solely of cattail shoots would still create a substantial intestinal mass. As a result, it is unlikely that cattail shoots were more than a dietary supplement, albeit an important one in early spring.

CATTAIL RHIZOMES

The Northern Paiute commonly collected cattail rhizomes in the spring and fall (Fowler 1992), although Wheat (1967: 8) implies they were collected from fall through spring whenever they were available, and that January and February were the critical months, when "ice formed on the marshes, sealing the fish and the cattail roots from their reach." When the marshes were frozen over, we think rhizomes may have been collected from areas of higher ground where possible, particularly during later winter months when stored resources were running out. According to Morton (1975:20) cattail "...rootstocks are best gathered in autumn and winter" (see also Colville 1897). To test the viability of mid-winter cattail collecting, we collected rhizomes from relatively dry fields away from areas of open water where warm temperatures could initiate early growth of cattail shoots or, conversely where thick layers of ice would preclude their collection. Collections were made in a snow covered field where the ground was frozen (Figure 4).

Table 1. Cattail Shoot Experimental Return Rates.

Date of Collection	Collector	Collecting Time	Processing Time	Product	Hourly Rate	Return Rate
1/20/97	50 yr old M	10 min	7.5 min	886 g	3.038 kg/hr	432 Cal/hr
1/22/97	50 yr old M	5 min	5.0 min	666 g	3.996 kg/hr	568 Cal/hr
2/9/97	51 yr old M	5 min	12.0 min	1171 g	4.133 kg/hr	587 Cal/hr
2/9/97	30 yr old F	5 min	7.33 min	639 g	3.109 kg/hr	442 Cal/hr
2/9/97	38 yr old M	5 min	7.2 min	1211 g	5.956 kg/hr	846 Cal/hr
Average		6 min	7.8 min	915 g	4.046 kg/hr	575 Cal/hr

Cattails begin to store starch in their rhizomes in the summer after primary growth has occurred, and storage accelerates in early fall after seed production is complete. Starch production and storage continues until frost finally kills the upper portion of the plant (Figure 5). In our neck of the woods this usually occurs sometime in November. In early spring (or where warm water springs permit), the starch in the rhizomes is used to support the growth of new shoots. As the shoots grow, the amount of starch in the rhizomes is gradually reduced until the rhizomes are little more than fibrous husks and the plant is getting its energy from chlorophyl production in the new leaves. In the area of the Great Salt Lake, new shoots generally begin to grow in late March after ice is off the ponds and the ground thaws out. As a result, cattail rhizomes are at their most fecund and have their highest utility as a food resource during the winter months from November through March. Where cattails are growing in warm water springs, however, growth can occur throughout the winter and rhizomes in these areas are less useful as a winter food resource. Simms (1987) reports an experiment conducted March 26, 1981 at Blue Lake, a warm water spring near Wendover, Utah, in which he collected "unusable" rhizomes, which had started to send out growing shoots, and which, as a result, "were thin, wrinkled, and contained nothing but coarse fiber when broken open." Unfortunately, no attempt was made to evaluate the food value of the shoots growing from these rhizomes.

Rhizomes can be prepared for consumption in a number of ways. The simplest is to merely peel and chew the rhizomes while raw, extract and swallow the starch, and spit out the wad of fiber (usually called the quid) which remains (Fowler 1992). Another simple procedure is to briefly mash the rhizome with a mano to expose the starch laden fibers within, and then boil the rhizome until the starch is dissolved. Peeling the outer covering from the rhizome is unnecessary. The fibrous remnants of the rhizome are then merely scooped from resulting "soup" with the finger tips and discarded. In our experiment, we mashed a rhizome with a mano for 10 seconds and boiled it for 5 minutes. This is a processing/cooking technique commonly employed by the Northern Paiute and other Great Basin peoples for fibrous tubers, and, while not explicitly associated with cattails, was likely used in preparing them for consumption (Catherine Fowler, personal communication 1997). Starch around the fiber appeared to dissolve within less than one minute of boiling, and the remaining boiling time was only to insure that all starch was removed. Boiling is actually unnecessary, as is "squeezing" the rhizome in water to release the starch (Jones 1981, Jones and Madsen 1991). Both techniques merely accelerate a process that occurs with simple soaking. Schofield (1989)

Figure 4. View of rhizome collecting area and experiment in progress.

Figure 5. Close-up view of winter rhizome interior. Note the heavy accumulation of starch grains along the rhizome fibers.

recommends merely soaking mashed rhizomes in water, waiting for the "flour" to settle to the bottom, pouring off the water and letting the "flour" dry. Other, more labor intensive, preparation methods include scraping off the fiberous outer covering and baking the rhizomes in a fire (e.g., Simms 1987), and using a mano and metate to mash the rhizome and press out a starchy paste which can be dried and used as a flour. Specialized grinding stones found in the Great Salt Lake marshes may have been used for this purpose (see below).

Rhizomes can also be dried and stored, but require some processing. In our experiments, unprocessed rhizomes began to rot rapidly. The skin around the rhizome helps to retain much of the water it originally contained, leading, in turn, to the break down of the sugars in the starch and the onset of bacterial action. The Northern Paiute dried the rhizomes by splitting them into strips and roasting them on a greasewood fire to retain their "sweet flavor" (Fowler 1992: 65). Often these strips were merely dried without roasting, but there is no report that these strips were peeled prior to drying (Catherine Fowler, personal communication 1997). These stored pieces were later prepared by grinding them into a flour and making them into a mush or roasted cakes. We dried and stored rhizomes by simply breaking them open with a mano and spreading them out to dry, a method recommended by (White 1990). We kept these almost completely dehydrated rhizomes for more than a month (from 2/9/97 to 3/20/97) and then processed them by using the boiling method described above (Figure 6). The dried starches on the exposed fibers went into solution almost as quickly as the fresh specimens. Drying the rhizomes also appears to be a more efficient way to produce cattail "flour" than does extracting a paste while moist. It also postpones a major component of processing costs to a time when it does not conflict with other collecting opportunities (e.g., Barlow and Metcalfe 1996). Although we did not conduct any tests to determine a possible return rate for producing flour from dried rhizomes, it should be relatively close to that reported here, as milling is not normally considered to be part of handling costs (e.g., Simms 1987).

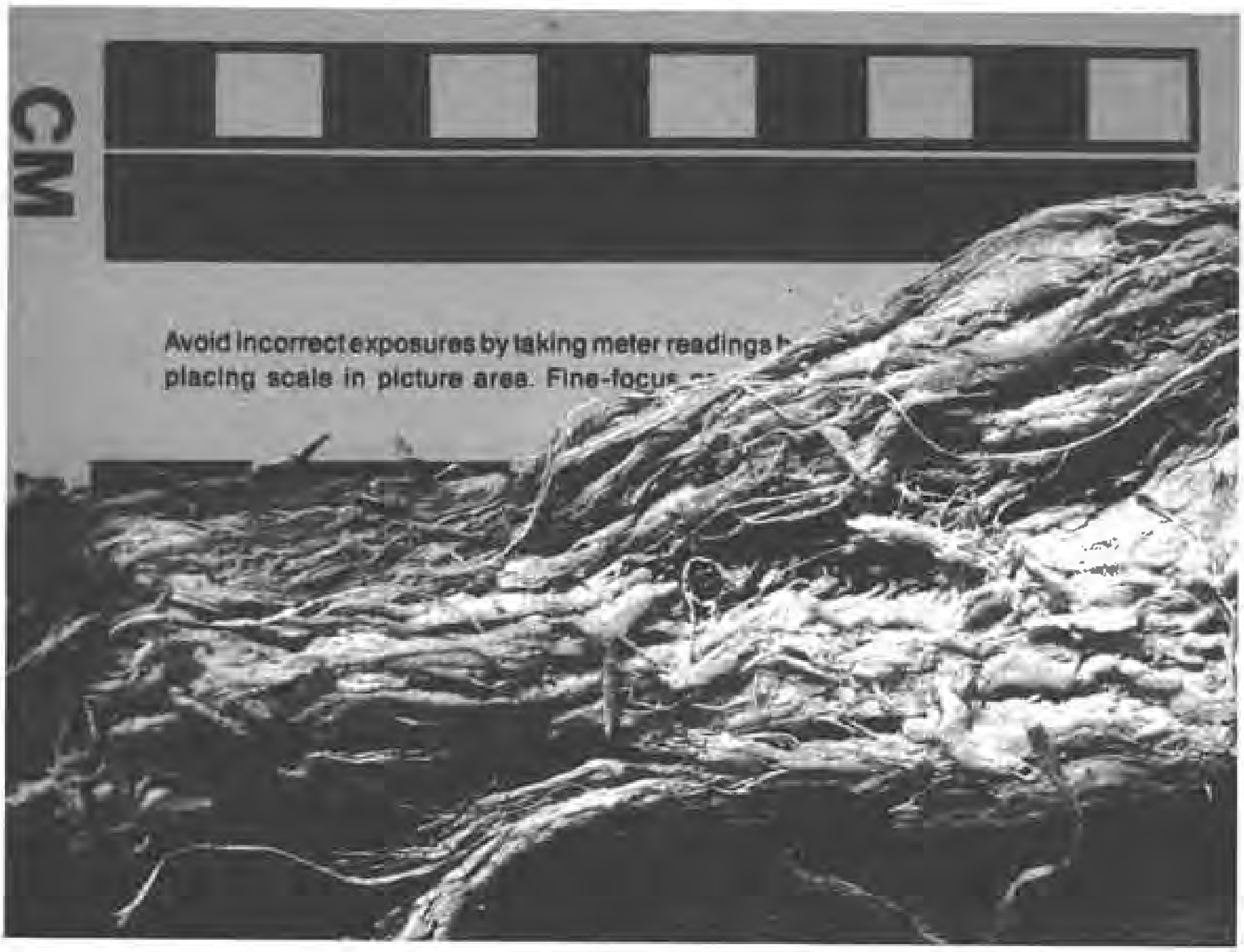

Figure 6. View of mashed cattail rhizome, dried and stored for 45 days. Note the heavy accumulation of starch virtually obscures the rhizome fibers on the flattened end.

The nutritive and energetic values of cattail rhizomes are highly dependent on the time of year they are collected and eaten. In experiments conducted by Jones in 1979 (Jones 1981, Jones and Madsen 1991), fresh rhizomes collected in mid-November contained 224 cal/kg (a figure derived by using the same simplified formula we use here). Since caloric values may vary from year to year and from one location to another, we repeated the experiment using cattail rhizomes collected January 22, 1997 from a field west of Woods Cross, Utah. One rhizome was selected for examination and cut into two equal halves of 22.8 g each. One half was left unprocessed and was submitted directly to Wasatch Laboratories to determine nutritive and caloric values. The other half was mashed with a mano for 10 seconds and boiled in water for 5 minutes. After drying overnight, the weight of the remaining fiber was 1.4 g (i.e., 21.4 g water and starch was converted to an edible "soup"). This cooked fiber was then also submitted to Wasatch Laboratories for identical tests (Figure 7). The nutritive and caloric content of rhizomes processed as "soup" was then easily determined by simply subtracting the caloric values of the two halves of the test rhizome. Results are shown in Table 2. Using the simplified formula described above, the cattail rhizome we tested contains about 656.2 *available* calories per kilogram of fresh rhizome (the 22.8 gram test specimens contained 14.962 net available calories converted to cattail "soup:" 18.217 Cals contained in the unprocessed half, minus 3.255 Cals in the mashed and boiled half.)

Our initial rhizome collecting experiment was conducted only to determine the caloric content of winter cattail rhizomes and to investigate possible processing techniques. No attempt was made to determine caloric return rates during this preliminary investigation On February 22, 1997 we collected rhizomes from a spring-fed marsh area west of Woods Cross City and immediately east of the Farmington Bay marshes. Rhizomes were dug from dry ground about 2-3 m from a partially frozen spring channel containing some areas of open water. The area is boggy in spring and summer, but is relatively dry in winter. The rhizomes were actually easier to get from dry ground than from open water as the relatively dry and/or frozen earth fell easily away from roots. Rhizomes from open water were more difficult to process as the mud on them was heavy and clingy and more difficult to wash away. Perhaps more importantly, the extremely cold water temperatures made it almost impossible to muck out rhizomes for more than a few seconds at a time. When digging in a dry field, dirt is "easy" to remove once the excavation is started and collecting goes rapidly. Shoots were just starting and were still under ground.

Our second rhizome collecting experiment took place in the same location on March 5, 1997. Our initial intention was to investigate minimum winter return rates by collecting from an area we thought would be difficult to work. Collections were made in a snow covered field where the upper ground surface was frozen to a depth of ~ 10 cm. A hardwood digging stick was used to pry up the frozen surface soil and loosen dirt around the rhizomes. Pursuit time included breaking up the frozen ground, loosening the rhizomes, pulling old stocks and rhizomes from the ground, and cutting the rhizomes from the old stocks. Digging was difficult (for an old guy) and this rate could probably not have continued for an entire hour. However, similar situations hold for many other resources measured for only a short time, so results should be comparable. Relatively little cutting was necessary (again a serrated knife was used) as most rhizomes broke-off from the base of the old stock while being removed. Our return rate for our initial collecting episode is somewhat lower because of the initial time required to break through frozen ground. Once a working face was created, it was possible to lever up pieces of frozen earth and get to the rhizome level relatively rapidly. Processing time included washing the rhizomes and mashing them briefly with a mano as described above. However, our boiling experiments suggest mashing is not necessary, as virtually all starch can be removed simply by splitting the rhizomes as they are cooking while watching the pot boil/tending the fire. To be conservative, we include mashing costs here.

The average experimental energetic return rate from collecting and processing winter cattail rhizomes for "soup" is 3299 Cals/hr, with a high of 3966 Cals/hr and a low of 2929 Cals/hr (Table 3). At first glance, this return rate seems astonishingly high given previously reported return rates for cattail rhizomes (Jones 1981; Simms 1987; Jones

Figure 7. View of the two halves of a cattail rhizome tested to determine energetic returns in cattail "soup." Unprocessed half (a); fibrous remnant after mashing and boiling to remove starch (b).

Table 2. Caloric Values for Two Halves of a Single Cattail Rhizome.

	Unboiled Half	Boiled Half
Original Weight	22.8 g	22.8 g
Weight After Boiling	—	1.4 g
Water	75.22%	9.01%
Ash	.89%	2.93%
Crude Fiber	4.09%	30.50%
Crude Fat	.014%	.52%
Crude Protein	2.47%	6.74%
Carbohydrates	17.19%	50.22%
Caloric Value	18.217 Cals.	3.255 Cals.

Table 3. Cattail Rhizome Experimental Return Rates.

Date of Collection	Collector	Collecting Time	Washing Time	Mashing Time	Product	Hourly Rate	Return Rate
3/5/97	51 yr old M	6.67 min	1.72 min	.67 min	674 g	4.464 kg/hr	2929 Cal/hr
3/5/97	51 yr old M	3.5 min	1.33 min	.60 min	547 g	6.044 kg/hr	3966 Cal/hr
3/5/97	38 yr old M	5.63 min	1.65 min	1.17 min	644 g	4.573kg/hr	3001 Cal/hr
Average		5.27 min	1.57 min	.81 min	622 g	5.027 kg/hr	3299 Cal/hr

and Madsen 1991). The difference is related to three principal factors: (1) A difference in season of collection and, hence, a difference in caloric values of 224 Cals/kg verses 656 Cals/kg of raw cattail rhizome; (2) a difference in the location selected to collect the rhizomes; and (3) a difference in complex verses simple processing techniques. We are convinced the simple mashing process we employed is valid, particularly when it is possible to get 656 Cals/kg of available energy into a soup when using that technique. Moreover, the technique we employed is functionally very little different from that used by Jones (1981), since both approaches simply get the rhizome starch into a water solution. We extracted 82% of the available calories from the rhizome we tested using this simple technique, and a more complex processing approach would only require more time and produce relatively little additional return. Since the common winter meal of the Northern Paiute was a "soup" prepared by dropping hot rocks into a watertight basket (Wheat 1967: 16), this simple soup processing technique is likely to be representative. Nevertheless, we applied the .36 hr/kg processing time required for the technique suggested by Jones and Madsen (1991) to the winter rhizomes we collected and found that the resulting average return rate of 1309 Cals/hr still is eight to ten times the 128 Cals/hr and 157 Cals/hr return rates they report.

In September, 1980, Simms conducted a similar rhizome collecting experiment along the eastern shore of the Great Salt Lake. By using a digging stick to excavate the rhizomes in large masses and roll them out like a mat, he was able to collect cleaned cattail rhizomes from a patch in wet ground (but with no standing water) at a rate of 9 kg/hr (Simms 1987; personal communication 1997). Using a more complex processing technique than that described here (a technique which included scraping off the fibrous outer covering), Simms' experiment produced a return rate of only 267 Cals/hr (374 Cals/hr without the scraping). Processing these same 9 kg of rhizomes in the manner suggested by Jones (1981; see also Jones and Madsen 1991) would produce a return rate somewhat above 475 Cals/hr, a rate nearly double that when using the skinning and baking technique.[2] When the simple mashing and boiling technique we used is applied to the raw rhizomes Simms collected, the return rate soars to 1680 Cals/hr (using our average mashing rate of .755 kg/min and the 224 Cals/kg "edible portion" rate derived by Jones for fall cattail rhizomes). At the higher Cal/kg rate available later in the fall at the end of the storage cycle, a similar collecting rate would produce a return rate of 4920 Cals/hr (using our average mashing rate of .755 kg/min and the 656 Cals/kg available in winter rhizomes). In short, the return rate for fall cattail rhizomes can vary significantly from 267 to 475 to 1680 to 4920 Cals/hr depending on when in the storage season they are collected and on the kind of processing technique that is used to prepare them for consumption.

The choice of the most appropriate patch from which to collect cattail rhizomes also has a tremendous impact on overall return rates. The experimental return rates for fall rhizomes produced by Simms (1987) and Jones and Madsen (1991) are not very comparable (contra Jones and Madsen 1991:71) because of differences in collecting locales. Simms, working in a moist field, collected cleaned rhizomes at a rate of 9 kg an hour, while a crew of volunteer foragers led by Jones averaged only 1 kg of unwashed rhizomes for each hour of work when digging them from a hard-packed field. Our collecting rate of 7 kg per hour when digging unwashed rhizomes from a frozen field was midway between these two extremes (Figure 8). Similarly, the time of collection can also have a dramatic impact on return rates as already noted, but they can be particularly different when the rhizomes are collected just before (as reported here) or just after (e.g., Simms 1987) they have produced shoots for the new growing season. These temporal and spatial differences are true for virtually all resources, and the choice of when and where to forage experimentally is critical when comparing the return rates of alternative resources (Simms 1987).

CATTAILS AS A WINTER STAPLE

The central questions we examined are the ones originally posed by (Eschler, 1997): (A) Can cattails be collected and used as food resource in the depths of winter? and (B) Is the return rate from collecting and processing these resources high enough to make them viable as a winter staple in lieu of other potential food sources? We think the results of the experiments reported here clearly suggest that the answer to both question is yes. Dormant cattail rhizomes, containing a maximum amount of recoverable starch, are available throughout the winter months from November through March. These rhizomes can be economically collected and processed, even from frozen fields, at a return rate that exceeds, with a single exception, that of any other plant resource available at any time of the year![3] Moreover, rhizomes can be readily dried and stored for weeks, if not months, and can be prepared for consumption in the same simple fashion as are fresh rhizomes.

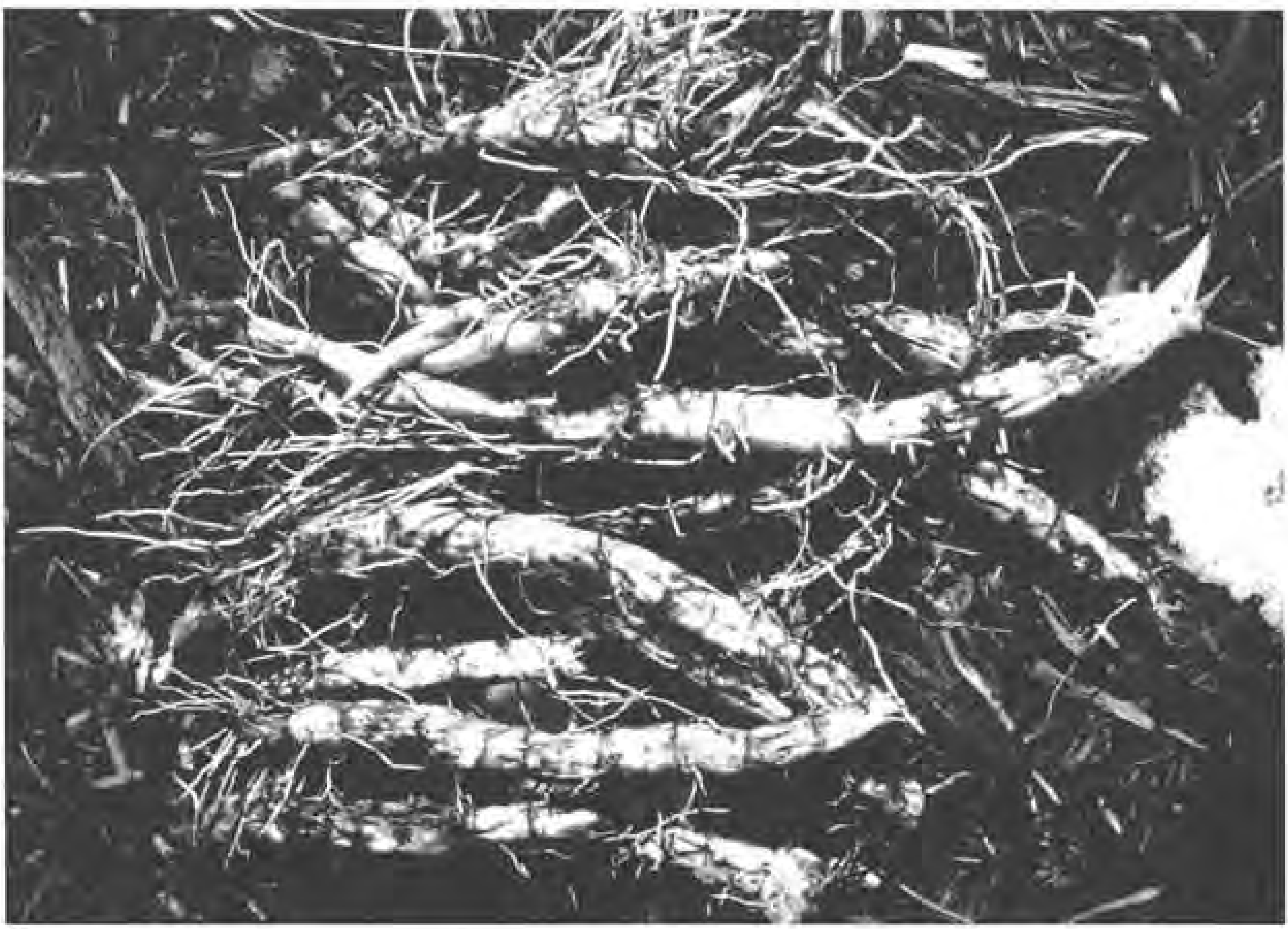

Figure 8. View of unprocessed rhizomes collected in one mid-winter experiment.

Simms (1987: 257) is correct in noting that cattail "...roots are similar to *Scirpus* roots in that they are generally not available year round." Rather, they are available only about half the year. Rhizomes appear to be viable as a moderately ranked plant resource from September through November when starch storage is only partially complete, and as a high ranked plant resource from November through March when they are at their maximum return rate. During the remaining five months of the year, however, other parts of the cattail plant provide alternative resources. Cattail shoots, while having only an average return rate in comparison to other plant types, are available during the early spring months of March, April, and May, when few other plant types are available. They were eagerly sought in March and April: "Spring was a good time [because] it meant that new shoots of the cattail would soon appear above the water. Impatient for fresh green food, naked women waded into the marshes, reaching arm-deep into the chilly water to search in the mud (Wheat 1967: 9)." Young spikes were eaten fresh by the Northern Paiute during late May and June (Fowler 1992), although they appear to have served only as a dietary supplement and no experimental return rates have been defined.

Cattail pollen, with the highest return rate of all experimentally tested plant resources (Simms 1987), is available during the early to mid-summer months of June and July. Pollen was commonly baked into cakes and consumed directly or stored for later use (Fowler 1992:65). Only during the late summer months of August and early September, must cattails take a back seat to other Great Basin plant resources. However, cattail seeds are available during this time period, and can be collected and processed at a return rate that averages 260 Cals/hr (David Rhode, 1997 personal communication). While this return rate is low relative to a number of other plant types available during this time period, it is still comparable to a wide range of plant types used aboriginally and can serve as a viable resource during years when plant types with higher return rates are relatively rare. More likely, the seed heads were collected and stored, then processed during winter months (e.g., Wheat 1967:15). In short, cattails are available as a food resource in some form year-round, and can be economically collected and stored for winter use and/or can be collected directly during the winter months.

The dramatic increase in return rates when simply processing cattail rhizomes as soup raised a number of questions about prehistoric culinary utensils. The intensive use of the marshes around the Great Salt Lake is, in large measure, associated with pottery using groups (Fawcett and Simms 1993), and it is interesting to speculate that once a suitable boiling vessel was available, people moved into the marshes to exploit root crops there. However, twined and coiled baskets were used by a variety of Great Basin groups as cooking vessels, and pottery does not appear to be directly linked to the consumption of "soups." Among the Norther Paiute, for example, these vessels were "commonly coiled baskets, made to hold roughly two to three gallons of liquid....Heated stones were placed in them along with the mush or soup to be cooked, and the liquid soon boiled vigorously....the more a boiler was used the more water tight it became, as particles of mush soon filled the interstices of the weave (Fowler 1992:135)." Yet there is a clear distinction between the basketry made by Numic-speaking peoples and that made by earlier Basin peoples, and it is unclear whether or not boiling baskets were a common feature of these earlier textile industries (e.g. Adovasio and Pedler 1994). It is perhaps possible that the dramatic increase in the use of both the Lahontan Basin and Bonneville Basin marshes, which occurred at roughly the same time (Raven and Elston, 1988; Kelly 1990) may be associated with the advent of a suitable boiling vessel; the boiling basket in the western Basin and the ceramic jar in the eastern Basin. Though it seems likely that boiling vessels were in use before this time, it is perhaps a question worth investigating.

A unique mano form, common to the marshes of the Great Salt Lake but found rarely outside marsh settings, may also be associated with rhizome processing. These manos are usually small cobbles which are ground around their margins rather than on either of the opposing flat sides, although some battering is usually evident on virtually all surfaces (Fawcett and Simms [1993] refer to these tools as "V-edge cobbles"). The edge grinding is bifacial and the outer margin of the mano is lens-shaped in cross-section (Figure 9, see also Fry and Dalley 1979: 78, Figure 57, g-h). This shape is produced by a rocking motion, as the margin of the mano is pressed on a resistant surface and pushed across the item being processed. Subjectively, this type of mano seems to be almost a perfect tool for processing cattail rhizomes, and we used one of these beaked forms to process the rhizomes we collected for our experiments.[4] The technique we employed was to quickly pound and mash the rhizome in six or seven strokes, then push edge of the mano along the rhizome to flatten it out and expose all the fibers for boiling and/or drying. Manos much like these beaked forms occur in the marshes of Australia where they were used to process fibrous roots (H.J. Hall, 1997 personal communication). These may have included cattail rhizomes since they were a common aboriginal food resource (Irvine 1957; Morton 1975). It seems very possible that the manos of the Great Salt Lake served a similar purpose. The use of the Australian manos was identified by examining diagnostic starch grains clinging to the rough surface of the stone. Similar tests on the Great Salt Lake manos may confirm the use suggested here.

Figure 9. View of "beaked" or "v-edged" mono common at archaeological sites in the marshes of the Great Salt Lake.

SUMMARY

Our experiments, together with others conducted previously, suggest that return rates for cattail rhizomes are highly variable, with differences due to the season and location of collection, and to the type of processing employed. When collected in the off-season, from difficult situations, and processed with more complex techniques, rhizomes produce return rates of only 200 Cals/hr or lower. When collected at their productive peak, from easy collection locations and processed with simple techniques, their return rate may be as high as 5000 Cals/hr. Rates anywhere between these two extremes depend on which particular combination of variables obtains at any one time and place. The average return rate for our experiments in collecting rhizomes from a frozen field in mid-winter was over 3000 Cals/hr. Such a high rate, much higher than pine nuts for example, suggests cattails rhizomes can be, and probably were, a valuable winter staple, either consumed directly or stored for later use. Younger cattails shoots are also available during the winter months in favored locations and produce return rates of 500-600 Cals/hr. During early spring months they were widely available and, due to limited competition from other resources, may have been a principal plant resource.

One of the more instructive aspect of these cattail experiments is that it reveals the extreme range of variation that may be associated with the collection of any one resource. Cattail rhizomes are yet another example of a number of resources which have return rates with order of magnitude differences between the low and high ends of their return rate scale. While the cattail range of 200-5000 Cals/hr is modest compared to resources like crickets, which range from 600 to more than 33,000 Cals/hr (Jones and Madsen 1991), it still reflects how dramatically changes in processing methods, collecting techniques and procurement locations can alter return rates, and suggests that similar extreme ranges may exist for other plant resources. Bulrush (*Scirpus* spp.) seeds, for example, seem like another likely candidate. A limited number of experiments using a seed beater produced moderate return rates of 300-1700 Cals/hr (Simms 1987). However, a principal technique of the Northern Paiute was to gather bulrush seeds "...in considerable quantity during fall and early winter when the seed dropped from the plant into the water. It accumulated in windrows along the shore and could be scooped up into winnowing baskets and burden baskets and taken to camp (Fowler 1992:67)." Since pursuit time constitutes more than half of overall handling time for bulrush seeds, it is likely this windrow collecting technique produces dramatically higher over all return rates than does the seed beater technique.

These cattail experiments also illustrate the very preliminary nature of experimental results obtained to date. Resource collecting experiments are only in their infancy, and it is very inappropriate to draw any but the most general conclusions from them. Many resources have been tested in only one experiment, while return rates for others are based entirely on speculation. Even when multiple tests have been run, they often consist of only two or three tests conducted using the same techniques in similar situations. Yet despite these experimental limitations (and any number of cautionary notes about those limitations, e.g., Simms 1987; Jones and Madsen 1991), return rate data for Great Basin resources continues to be misused, as in "the return rate for plant X is Y;" or "animal Z is high ranked." But plant X does not have a return rate, it has a return rate range, and, like cattail rhizomes, it may be an extended range. Whether or not animal Z is high ranked depends on how its range over laps those of other resources and on the particular circumstances that determine which rates obtain within those ranges. As a result, the archaeological application of these return rates may be difficult unless these particular circumstances are known. In sum, return rate experiments, like those detailed here, continue to produce surprising results, and there is a clear need to conduct some initial tests on the many food resources, particularly faunal resources, that have yet to be examined. As our experiments show, however, an array of additional experiments on resources which have been tested in only a limited number of situations is equally necessary.

ACKNOWLEDGMENTS

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NOTES

[1]While a number of more accurate formulas are available in determining the nutritive and energetic content of various food types, the 9-4-4 formula is simple, relatively accurate, and has been widely used in other return rate experiments [e.g.,Simms 1987; Jones 1981]. For comparative purposes we use the simple formula here.

[2]Time spent washing the rhizomes was included by Simms in his pursuit time, while Jones included it in his processing time. As a result, it is counted twice in these calculations. The processing technique employed by Simms approximates that used by the Northern Paiute in drying rhizomes for storage (Fowler 1992:65), although there is no report that they first removed the outer covering. Our drying experiments suggest the rhizome need only be split open.

[3]The exception, interestingly enough, is cattail pollen, which Simms (1987) collected experimentally in two tests at rates of 2811 and 8667 Cals/hr. Experimental return rates for all other plants are typically below about 1500 Cals/hr (Jones and Madsen 1991)

[4]Fry and Dalley (1979: 59-60) suggest these stones were used to produce ground slate tools, but they do not have striations on the ground surface that would occur when grinding the edge of such hard stone, and they appear to have been used with softer materials

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THE ESCALANTE GAME DRIVE SITE

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The Escalante Game Drive site (5DT192) is along the Gunnison River valley in west-central Colorado. Investigations at the site by the Chipeta Chapter of the Colorado Archaeological Society have documented at least 27 cultural features thought to represent components of a game drive system, as well as a broad scatter of stone and Euroamerican artifacts. Chipeta Chapter members conducted limited excavations at the site to salvage two prehistoric hearths threatened by erosion, resulting in the identification of two Late Prehistoric period components. The association between the hearths and the game drive features is unclear. Game drive features include stacked rock and brush fences, as well as circular enclosures thought to represent blinds. Through consideration of the site's topographic setting and the distribution of game drive features, a model of prehistoric game driving at the site is constructed. Game drive systems have been reported in low frequencies in Utah and Colorado, primarily in areas characterized by relatively high game populations, considerable local relief, and low vegetation.

INTRODUCTION

Between 1988 and 1992, members of the Chipeta (Montrose) Chapter of the Colorado Archaeological Society conducted investigations at the Escalante Game Drive site (5DT192) in west-central Colorado with the assistance of Alpine Archaeological Consultants, Inc. The site, administered by the Bureau of Land Management, covers approximately 240,500 m^2 (59.4 acres) and consists of numerous circular stone structures, thought to be hunting blinds; stone and brush fences, designed to direct game animals toward concealed hunters; several hearths; and a sparse scatter of historic and prehistoric artifacts. The objectives of the project included documenting a relatively rare site type, assessing the nature of surface artifacts, salvaging archaeological data from two hearths threatened by erosion, and furthering the training of Chipeta Chapter members in archaeological techniques.

LOCATION AND SETTING

The Escalante Game Drive site is 18 km (11 miles) west of Delta, Colorado, on the canyon rim and benches north of the Gunnison River. US Highway 50, which extends between Delta and Grand Junction, is approximately 3 km (2 miles) to the northeast.

The site is situated approximately 200 m northeast of the Gunnison River. The Gunnison River is a major tributary to the Colorado River, into which it flows at Grand Junction, Colorado. In the site vicinity, the Gunnison River separates the Grand Mesa from the Uncompahgre Plateau, uplifted areas that rise to elevations over 3,000 m (10,000 feet). The river is locally entrenched in a narrow valley that is approximately 244 m (800 feet) deep. The northern

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valley wall, where the site is situated, is especially steep, and is called the Dominguez Rim.

The western portion of the site is atop the Dominguez Rim. Cretaceous-age Dakota and Burro Canyon sandstone are exposed there, usually covered with a thin veneer of soil. From the canyon rim, the land slopes gently to the northeast, away from the river. The lowlands to the northeast are underlain by Cretaceous-age Mancos Shale. Below the Dominguez Rim, the Dakota sandstone and Mancos Shale have been eroded, exposing Jurassic-age Morrison formation sandstone and shale (Tweto 1979).

The site's elevation is 1,630 m (5,350 feet). Common vegetation includes saltbush, narrow-leaf yucca, snakeweed, prickly pear cactus, and grasses. Juniper are sparsely scattered along the canyon rim. The site is in an ecotone setting, where the Shrublands of the Saltdesert vegetation zone abuts the Woodlands of the Intermountains zone. The Shrublands of the Saltdesert cover the Mancos Shale lowlands that skirt the base of Grand Mesa, northeast of the site. Saltbushes and greasewood are common plant species. The Woodlands of the Intermountains zone is dominated by pinyon and juniper. This zone extends along the base of the Uncompahgre Plateau, which is across the Gunnison River to the southwest (Soil Conservation Service 1972). Fauna in the vicinity include pronghorn, mule deer, elk, mountain sheep, coyote, black bear, cougar, cottontail, jackrabbit, rodents, birds, and reptiles.

INVESTIGATIONS

Surface Artifacts

Stone artifacts were found widely scattered over the surface of the site and included debitage, utilized flakes, a Sudden Side-notched projectile point, a core, and two bifaces. Lithic surface artifacts were concentrated in the southeastern portion of the site, east of the Dominguez Rim, where evidence of at least three eroding hearths was found.

Historic artifacts were also found in the southeastern portion of the site, but are not believed to be associated with the stone artifacts (Reed et al. 1997). These include six hole-in-cap food cans; amber, light green, olive green, and purple glass bottle fragments; and seven cartridge cases. One amber glass bottle base was marked "FHGW," indicating manufacture by the Frederick Hampson Glass Works of Lancastershire, England, between 1880 and 1900 (Toulouse 1971:202). Three of the cartridge cases are .40-70 cases. According to analyst Douglas Scott (citing Sellers 1982:339), this round was introduced by Sharps in 1876, designed for use in the Model 1874 Sharps rifles. One .45 Colt cartridge case was found that was probably used in pistols, as evidenced by striations evincing rotation in a revolver cylinder. According to Douglas Scott, the case was probably fired in a gun such as the Colt revolver Model 1873. A single case was identified as a .44-40 case. This cartridge, lacking a headstamp, was introduced for use in the Winchester Model 1873 rifle (Madis 1985). Although this type of round was adopted for use by other firearms, Scott observed markings on the case consistent with those produced by Winchester rifles. A .45-60-caliber case was found; it was headstamped W.R.A.Co./45-60. According to Scott, this type was made by the Winchester Repeating Arms Company between 1880 and 1939 and retained evidence of use in a Model 1873 Winchester rifle. The cartridge cases indicate use of a Colt revolver, a Sharps rifle, and two different calibers of Winchester rifles at the Escalante Game Drive site. The firearms may or may not have been used contemporaneously.

The historic artifacts are concentrated along a small wash. The concentration is interpreted as a camp site, occupied sometime between 1880 and 1900. The campsite may be that of Art Brown, a commercial hunter hired to provide meat for construction crews building a narrow gauge railroad along the Gunnison River. A 1972 newspaper article in the Grand Junction *Daily Sentinel* Colorado West supplement describes an apparent "bison trap and kill site" on a bench overlooking the Gunnison River, with a series of rock blinds from which prehistoric hunters sprang to kill driven animals, visited by Art Brown (Casebier 1972). The article states:

> Ralph Vernon, veteran outdoorsman and hunter, now in his 70s, was a mere lad when Charlie Brown, another hunter in his declining years, showed Ralph the blinds. The story goes that Charlie's brother, Art Brown, first discovered the game trail in 1882 when he was hired out to the railroad to furnish game for railroad crews building track through Western Colorado. It was in the migratory season, and this particular game trail yielded 37 deer on a single hunting trip when the going price was five cents a pound.
>
> Years of hardship on the frontier had clouded the memory of Charlie Brown, however, he related one item of interest about his deceased brother finding a buffalo jump where he believed thousands of mountain buffalo had been run over by the Indians. The best Charlie could remember, Art had said the trap was on the Gunnison River [Casebier 1972].

That the Escalante Game Drive site is the site described in the newspaper article is suggested by the age of the historic artifacts, the historic description of the hunting blinds along the Gunnison River, and the dearth of similar game drive sites in the region. Of course, it is possible that Art Brown hunted, but did not camp, at the site.

Excavations

Two hearths 5.5 m apart in the southeastern portion of the site, threatened by erosion, were excavated. A block of 11 excavation units, each consisting of 1 m by 1 m squares, was dug, resulting in the removal of 4.1 m^3. One hearth (Feature 1) was partly lined and filled with sandstone. Additional fire-cracked rock was found in the excavated area northwest of the hearth, indicating repeated use of the feature, but little concern for cleaning of the hearth activity area. Charcoal from the hearth yielded a radiocarbon age of 1180 $\pm$ 50 BP (Beta-55978), which, when calibrated, indicates an occupation sometime between A.D. 687 and 980. The other hearth contained less rock and was not dated.

Excavations resulted in the recovery of a Desert Side-notched projectile point, a mano fragment, and 11 flakes. The paucity of artifacts, in conjunction with the informal manner of waste disposal as indicated by fire-cracked rock distributions, suggests that the hearth area was utilized on a short-term, but repeated basis, and that lithic reduction was not an important activity. The small quantity of artifacts tentatively suggests that resource processing, rather than habitation, occurred in this portion of the site. At least two occupations are indicated in the excavation area. The radiocarbon assay from Feature 1 indicates an occupation between A.D. 687 and 980, a period contemporaneous with horticultural groups, such as represented by the Fremont tradition or, as Reed (1997) has argued for portions of west-central Colorado and east-central Utah, the Gateway tradition. No evidence of horticulture or artifacts diagnostic of the Fremont or Gateway groups were found at the site, however. Although it is possible that the site was utilized by people that practiced horticulture during the period between A.D. 687 and 980, it is also possible that the Escalante Game Drive site was used by a people fully engaged in a hunting and gathering lifeway. The discovery of a Desert Side-notched point indicates a later site occupation, dating sometime after A.D. 1000 (Reed 1994).

Game Drive Features

Twenty-seven stone hunting blinds and several associated stone and brush fences were identified at the Escalante

Game Drive site (Figure 1). The blinds were constructed with unmodified sandstone slabs that were either stacked or set on end to form low walls (Figure 2). Some incorporate talus boulders. The walls vary in height; none presently exceed 1.0 m. The blinds are oval or round in plan view and range in size from 0.9 m^2 to 10.1 m^2. Mean blind size is 4.1 m^2 (s.d. = 1.963). Additionally, one stone circle consisting of four conjoined structures was present. It, too, probably served as a blind. The blinds are clustered along the Dominguez Rim and on a lower bench.

At least 10 stone alignments are present within the site area that appear to represent fence lines. Some fence segments are only a single stone high, but in other areas, sandstone boulders are stacked. Frequently, natural boulders are incorporated in the fence lines. Remains of branches are evident in some of the fence lines, indicating that brush was incorporated (Figure 3). Branches are most evident in the major fence line that climbs the talus slope on the south edge of the site. Patination of the exposed surfaces of the rock gives an indication of the relative age of the alignments to each other and, in at least one instance on the northwest edge of the site, it appears that stone was taken from one fence and used in a more recent alignment.

Fence lines were primarily built along the top of cliff edges and on ridge crests at locations where the topography would have allowed animals to escape. The broken topography of the game drive would have allowed some natural ridges and rock outcrops to have been used without modification as blinds or barriers. The extent and degree that these natural features were used is difficult to assess, but may have been considerable.

Model of Game Drive System Use

The Escalante Game Drive site comprises a game drive system, composed of a combination of rock and brush fences and rock blinds strategically situated on the landscape. It has all of the key attributes of a game drive system, as identified by Benedict (1985:85), including 1) a collection area, where animals are first encountered; 2) an animal concentration area, formed by natural and architectural features; 3) a kill area, where the concentrated animals are dispatched; and 4) an overlook, where an observer can direct hunters and drivers about the progress of the hunt.

The system has been constructed at the base of a topographic feature shaped like an inverted triangle that restricts animal movements. The top of the triangle, oriented roughly east-west, is approximately 3 km north of the Escalante Game Drive site. It consists of a steep talus slope and cliffs on the northern side of Wells Gulch, a tributary to the Gunnison River. At the western end of the northern barrier, the cliffs and talus slopes along Wells Gulch intersect with the Gunnison River, making passage along the river bottom to the north difficult. The western edge of the triangle consists of the Gunnison River, and the eastern edge consists of the Dominguez Rim cliffs. The enclosed area, representing the systems collection area, comprises approximately 1,000 acres of valley bottom, with easy access to permanent water. Access to the bottom land is provided by Wells Gulch, which becomes progressively less entrenched to the east. The site is at the base of the inverted triangle, where the Gunnison River flows against the canyon wall to concentrate animals driven southward. The area south of the site is rugged talus and cliffs, with slopes often exceeding 60 percent grade. Travel along the river bottom or talus slope south of the site would be difficult.

It is believed that game animals entered the river bottom, perhaps from Wells Gulch, and were driven south toward the Escalante Game Drive site (Figure 4). The valley floor is primarily vegetated by desert shrubs, so human drivers could be easily seen from a distance, and animals could not hide until the drivers passed. The Dominguez Rim and the Gunnison River precluded an easy escape to the sides. The site is atop a bench above the river, and extends up a steep talus slope to include a relatively short segment where there is a break in the cliffs that form the Dominguez Rim. With respect to the area both north and south of the site, the site area affords a *comparatively* easy means of egress from the valley bottom. As animals encountered the northwestern portion of the site, those traveling along the

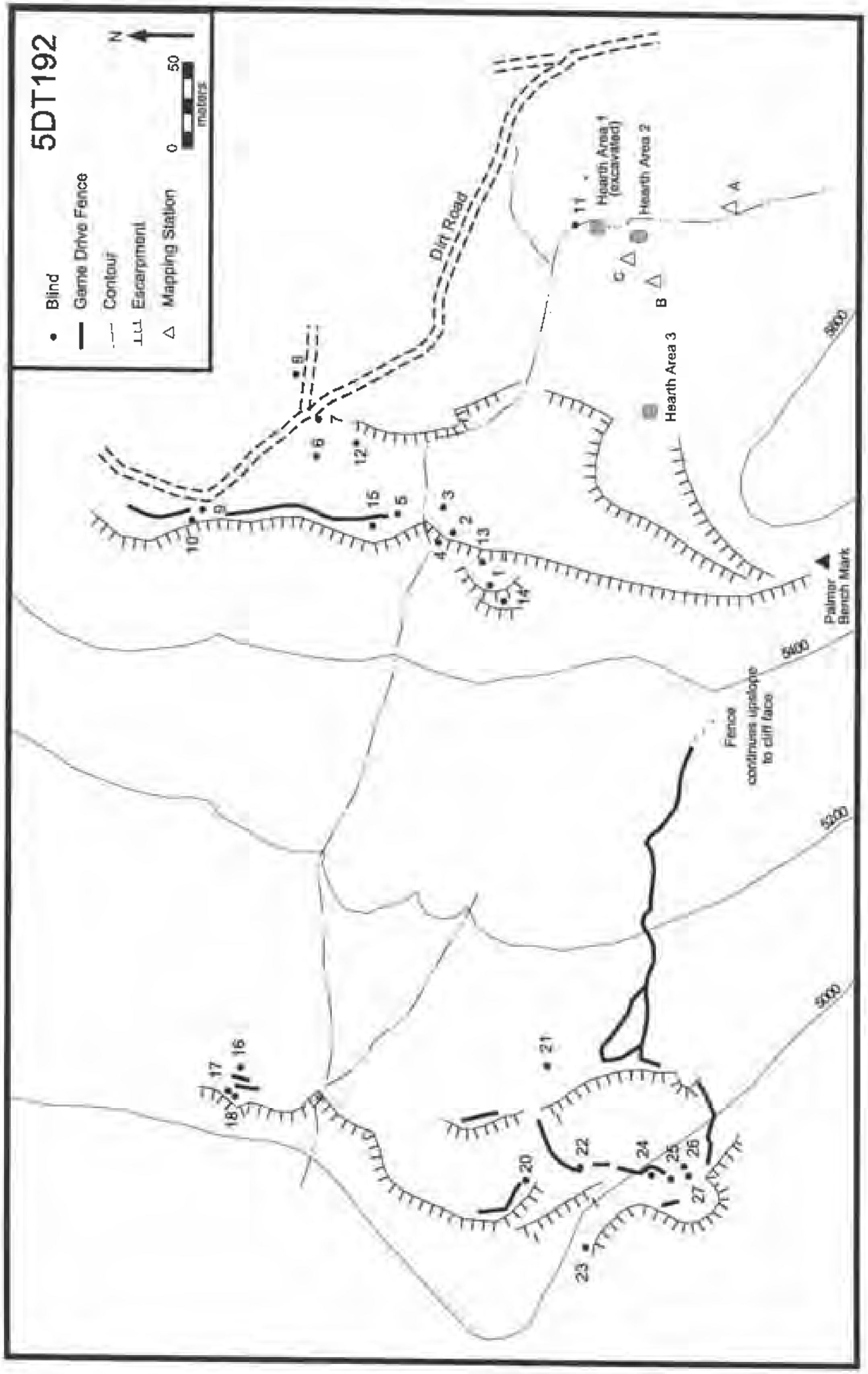

Figure 1. The distribution of cultural features at the Escalante Game Drive site.

Figure 2. Blind 4, a relatively intact feature.

Figure 3. A segment of the primary fence on the talus slope in the southern portion of the site. Note the association of the branches with the rock alignment.

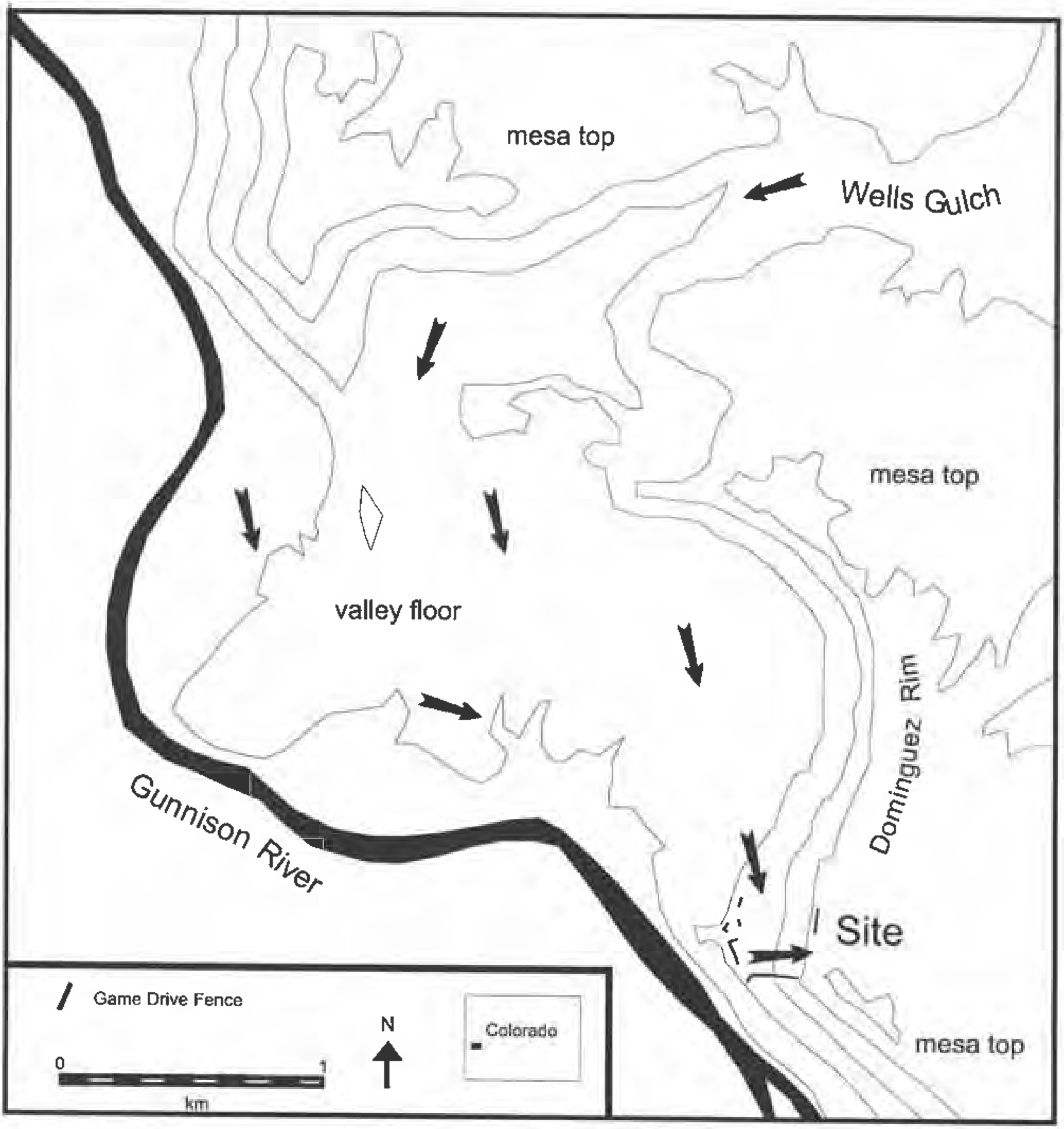

Figure 4. A model of the game drive system. Contour intervals are 200 feet (61 m).

lower cliffs encountered fence lines and associated Blinds 16 and 18. Animals successfully passing these hazards continued to be bound by cliffs and fences to the west, so proceeded to the southwestern corner of the site where a series of blinds and fences were located. There, a major fence line oriented up the talus slope was encountered, forcing animals either upslope to the mesa top, or downslope toward more blinds and fences. Animals moving up the slope along the major fence line ultimately encountered an impassable cliff, so were forced several tens of meters northward to where the cliff disappears. Those continuing along the rim may have encountered a cluster of blinds in the vicinity of Blinds 1-5, and those going eastward from the rim may have encountered Blind 11, constructed along a drainage. Some animals may have elected to climb the talus slope before encountering the main fence up the slope, and may have chosen the cover offered by a small draw up the slope along which scattered juniper trees presently grow. The talus slope is, otherwise, devoid of trees. These animals would have directly encountered the cluster of blinds in the vicinity of Blinds 1-5 at the top of the slope.

This model of game-driving does not account for the fence lines and blinds in the northeastern corner of the site, situated along the rim of the escarpment. It does, however, account for natural game movements; Southwell's research (1995) indicates that mule deer and bighorn sheep tend to flee upslope when threatened by predators. It is possible that animals successfully escaping the hazards to the south could be predicted to travel north atop the canyon rim to the site's northeastern corner, where they would have encountered more hunters.

A less satisfactory model involves driving animals from the gently rolling and wide-open Mancos Shale lowlands to the east of the site toward the Dominguez Rim. This "reverse" model is undermined by problems associated with driving animals out of wide-open areas in a predictable manner without the aid of multiple topographic barriers. Such could be effected with the aid of fire or large numbers of human drivers, as has been described among historic Plains groups (Southwell 1995), but would have been considerably more "expensive" in terms of labor, energy, and resources. Both models imply primary use of the game drive system by communal hunting parties. It is likely, however, that individual hunters also exploited the natural concentration of game in the site area.

The animal species exploited at the site cannot be determined. The only bone collected at the site is attributed to the historic component. It is possible that pronghorn, mule deer, elk, or bighorn sheep were prehistorically hunted at the site. All presently inhabit the project vicinity, though probably not in the same numbers as in the past. It seems less likely that bison were hunted at the site, partly because bison may never have been common in the region (see Meaney and Van Vuren 1993). Pronghorn may have been less apt to jump the rock and brush fences at the Escalante Game Drive site than the other species mentioned, so perhaps they were the exploited species.

The age of the game drive features cannot be determined. Southwell (1995:55) indicates that game drive system features such as cairns, stone walls, pits, blinds, and stone circles may have been used throughout prehistory. That the stone fence lines retain brush constituents indicates use during the Late Prehistoric period. It is entirely plausible, however, that the features are quite old, and have been repeatedly repaired and reused through time. Diagnostic artifacts and the radiocarbon data support the hypothesis that the site has been repeatedly occupied. A Sudden Side-notched point found on the site surface suggests a Middle Archaic period occupation, between approximately 4400 and 2500 B.C. (Holmer 1986). The radiocarbon date obtained from excavated Feature 1 indicates an occupation sometime between A.D. 687 and 980, and the Desert Side-notched point found during excavations points to a post-A.D. 1000 occupation. Whether these artifacts and features were associated with use of the game drive features cannot be positively determined.

Unlike most game drive systems, the Escalante Game Drive site may have been the locus of on-site animal processing. This is suggested by the discovery of hearths in the southeastern portion of the site, such as Features 1 and 2 described above, and by the presence of utilized flakes and bifaces. The low quantity of surface artifacts found at the site also support the hypothesis that game processing occurred on-site, if only because use of the site for habitation would have probably resulted in the discovery of greater quantities of artifacts, especially debitage.

As a game drive system, the site represents a type of site poorly represented in the regional archaeological record. A site file search conducted by the Utah Division of State History resulted in the identification of a single game drive in eastern Utah. The site, known as the Mountain Sheep Drive Site (42UN1796), is a game drive system comprised of linear and circular rock alignments in apparent association with a low-density artifact scatter. It is situated at 2,204 m (7,230 feet) elevation in the Uinta Mountains in a transition zone between a pine forest and an extensive sagebrush park. Blaine Phillips (personal communication 1998) reports of another possible game drive site in Daggett County, Utah, near the Wyoming border. In her synthesis of Colorado game drive sites, Southwell (1995) identified 147 game drive or kill sites; of these, only 54 evidence an association of feature types sufficiently complex to merit classification as a game drive system. Of the previously recorded game drive systems in Colorado, most are in high elevation settings, often above timberline (e.g., Benedict 1985). Southwell's (1995) data indicate that 83 percent of game drive systems occur at elevations over 2,286 m (7,500 feet). Lower elevation game drive systems have been identified on the Plains and in western Colorado (e.g., 5DT771, 5RB160, and 5SM755), and, of course, at the Mountain Sheep Drive Site in northeastern Utah. The utility of game drive systems is especially great in areas characterized by are relatively abundant game animals and little vegetation cover to conceal hunters — attributes common to many lowland settings on the northern Colorado Plateau and in the adjacent mountains.

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A COMPARISON OF HUMAN SKELETAL REMAINS FROM VIRGIN ANASAZI, KAYENTA ANASAZI, AND PAROWAN FREMONT ARCHAEOLOGICAL SITES

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Human skeletal remains from archaeological sites representing three prehistoric cultural traditions, the Virgin Anasazi, the Kayenta Anasazi, and the Parowan Fremont, were examined. The objective of the study was to determine the extent of differences in the skeletal remains of the 125 individuals studied. Statistical comparisons of stature, robusticity, and cranial measurements show no statistically significant differences in skeletal metric traits. Preliminary results of the comparison of nonmetric traits show that Virgin Anasazi cranial nonmetric traits are more similar to a Mogollon series studied by Birkby (1973) than to the Parowan Fremont series. Paleopathological conditions were also compared. While most individuals in the three series were healthy, the prevalence of periostitis, osteitis, and dental hypoplasia was found to be highest among the Virgin Anasazi individuals. Two other pathological conditions frequently associated with iron deficiency anemia — porotic hyperostosis and cribra orbitalia — were most common among the Kayenta individuals and the least prevalent among the Parowan Fremont.

INTRODUCTION

Human skeletal remains can provide important clues to the health, diet, and biological relatedness of prehistoric people. Health stress can be evaluated through the identification of paleopathological conditions and biological relatedness can be assessed through comparisons of certain morphological traits known as nonmetric traits. This study of skeletal remains from Virgin Anasazi, Kayenta Anasazi, and Parowan Fremont sites in southwestern Utah and southern Nevada was conducted to answer two key questions: are Parowan Fremont individuals biologically different from the Anasazi individuals, and are patterns of health similar or different?

Biological relatedness was assessed by comparing metric and nonmetric skeletal traits. Using Jennings' (1978:155-156) model of Parowan Fremont origins and Aikens' (1966) observation that some kind of cultural barrier may have existed, I hypothesized that the Parowan Fremont should be different from the Virgin and Kayenta Anasazi. Metric traits (Bass 1987, Brothwell 1981, Olivier 1969) are variants concerned with the size and dimensions of the skeleton such a stature and robusticity. These traits are believed to be more sensitive to environmental influences including nutrition, cultural practices, and disease than are nonmetric traits. Nonmetric traits are minor morphological variations that are recorded as being present or absent in both the cranial and postcranial skeleton (Berry and Berry 1967, Finnegan n.d., Hauser and DeStefano 1989). Some of the more familiar of these traits are the Inca Bone, shovel shaped incisors, and Carabelli's cusp. Although the heritability of these traits is not fully understood, many physical anthropologist consider them to be superior to metric traits in determining biological relatedness (Hauser and DeStefano 1989, Saunders 1989).

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Patterns of health were compared for the three skeletal series following a model developed during a 1982 Wenner Gren Symposium on human health before and after the Neolithic (Cohen and Armelagos 1984). Most participants in this world-wide conference noticed that skeletal indicators showed an increase in health stress following the adoption of agriculture. Subsequent research in the southwest has supported these findings (Akins 1986; Fink and Merbs 1991; Holland and O'Brien 1997; Roberts 1991, 1992; Stodder 1987). Health stress, which is the product of environmental constraints, cultural systems, and host resistance, can leave a series of indicators in bone and teeth.

Some examples of these health stress indicators are enamel hypoplasia, porotic hyperostosis, and caries. Enamel hypoplasia (Figure 1), a tooth enamel defect occurring during childhood, can mark health stress associated with a wide variety of diseases and nutritional deficiencies. Anemia-related pathological conditions including porotic hyperostosis and cribra orbitalia are commonly found in individuals from agricultural and sedentary cultures. Dental pathological conditions including caries and rates of attrition can be the result of diet, eating, and food preparation habits. An increase in the rate of caries through time is often associated with a shift to high carbohydrate foods such as maize. Changes in the frequencies of other pathological conditions including dental attrition, osteoarthritis, and dental abscesses have been found to change following a shift in subsistence focus.

It is generally believed that the subsistence focus of the Parowan Fremont, Virgin Anasazi, and Kayenta Anasazi was agricultural and the settlement strategy sedentary (Jennings 1978; Marwitt 1970; Aikens 1966; Dalley and McFadden 1988; Myhrer 1986; Lyneis et al. 1989). Other studies have pointed out the dearth of data, particularly for Virgin Anasazi sites and the Coombs Site, and alternative settlement strategies have been suggested (Westfall 1987; Altschul and Fairley 1989). While debate continues, for the purposes of this study, the former opinion is taken. The hypothesis is, if settlement and subsistence pattern were similar for the three cultural groups, then skeletal patterns of health stress should also be similar.

Figure 1. Linear enamel hypoplasia lines on the incisors of a Virgin Anasazi juvenile (AHUR 515).

METHODS

The collection of skeletal remains examined for this study consisted of 125 individuals; 51 came from Parowan Fremont sites, 42 from Virgin Anasazi sites, and 32 from the Coombs Site. The artifacts and architectural traits from the Coombs Site contain both Virgin Anasazi (Altschul and Fairley 1989) and Fremont characteristics (Lister and Lister 1961) yet it is generally considered to have been affiliated with the Kayenta Anasazi (Jennings 1978:125). All of the skeletal remains included in the study were either buried with artifacts that are culturally diagnostic or they were recovered from sites or components that are affiliated with these cultures. However, the reader is cautioned that these skeletal series represent a collection of individuals from a variety of archaeological sites that may or may not be representative of the burial population. Data on 95 of the skeletons were compiled by the author through direct observation and 30 were examined by other physical anthropologists (Roberts 1991).

The Parowan Fremont series is the largest collection and includes 51 individuals excavated from three sites in southwestern Utah (Figure 2). Evans Mound (Richard Thompson, personal communication 1990; Berry 1972), Paragonah (Coles 1956; Judd 1919) and Median Village (Dodd 1982; Pecotte 1982). The majority of the remains came from the Evans Mound Site which dates to A.D. 1050 to 1200. The other sites date from A.D. 900 to 1200 (Dodd 1982). The Virgin Anasazi series consists of skeletal remains representing 42 individuals. Twenty-two of the remains came from sites in southern Nevada (Figure 2) including Steve Perkins, Burial Hill, and Lost City, and the other 20 individuals were excavated from 14 small habitation sites in southern Utah. The dates of occupation for the Virgin Anasazi sites range from A.D. 800 to 1250. All 32 Kayenta series individuals came from the Coombs Site in Boulder, Utah which dates from A.D. 1050 to 1160 (Jennings 1978:125) and perhaps as late as A.D. 1275.

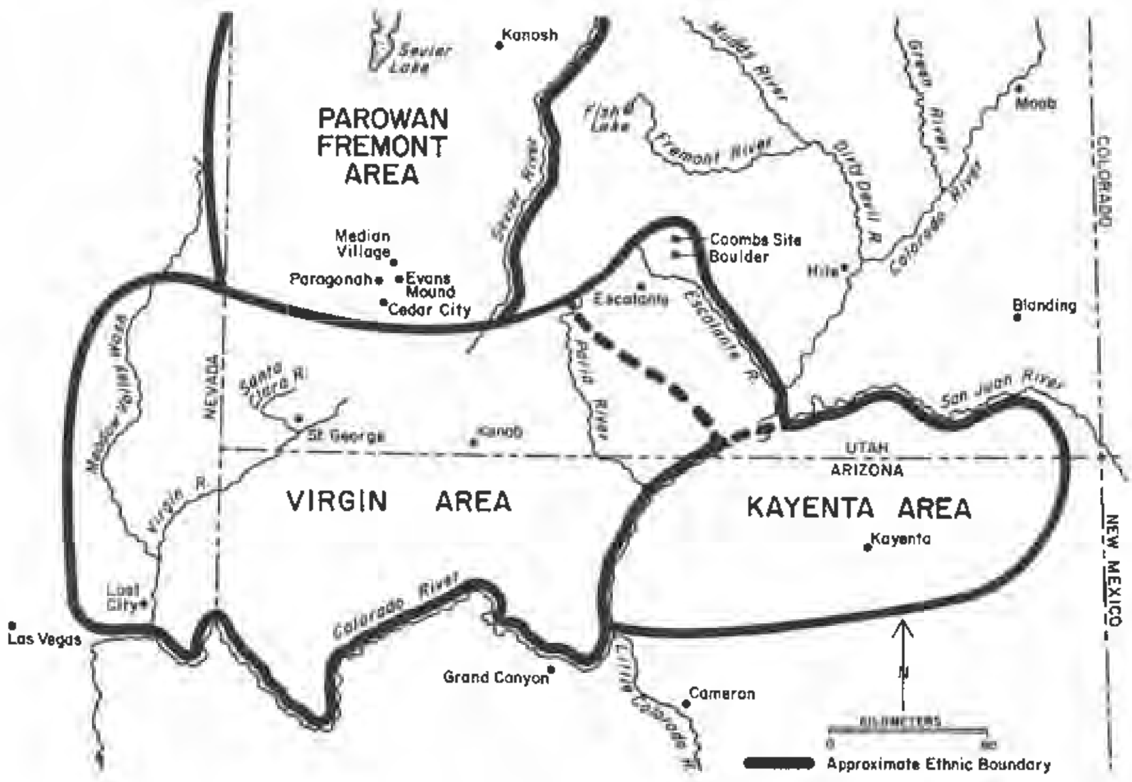

Figure 2. Locations of the Virgin Anasazi, Kayenta Anasazi, and Parowan Fremont culture areas.

The demographic composition of the three series are similar except for the Virgin Anasazi series (Figure 3). For reasons that could not be determined, the Virgin series contains fewer infants, more juveniles between the ages of 6 to 20 years, and more older adults. Figure 3 shows that infant mortality was comparably high in the Coombs and Parowan Fremont series. When these rates are compared to other southwestern skeletal series they are slightly high (Akins 1986 ; El-Najjar 1986; Stodder 1987: Table 41). The sex composition of all three series was similar with half of the sexed individuals male and half female. Although roughly half of the individuals were male and half female at the Coombs site, it is interesting that no males were found in primary burial contexts. A simple calculation of the mean age at death for each of the series yielded the following means: Coombs 14.7 years, Parowan Fremont 18.7 years, and Virgin Anasazi 29.4.

For the analysis of metric traits, standard measurements from anthropometric landmarks were made on all individuals where possible. These measurement were compared to test the hypothesis that Virgin and Kayenta Anasazi skeletal measurements should be different than Parowan Fremont measurements. Two-tailed t-tests were used to determine the significance of the differences. The sample size was not large enough to use other statistical methods such as multivariate statistics. Multivariate statistics would have reduced the number of measurements further by sub-sampling the data, and there are no indications that it would have increased any statistical correlations.

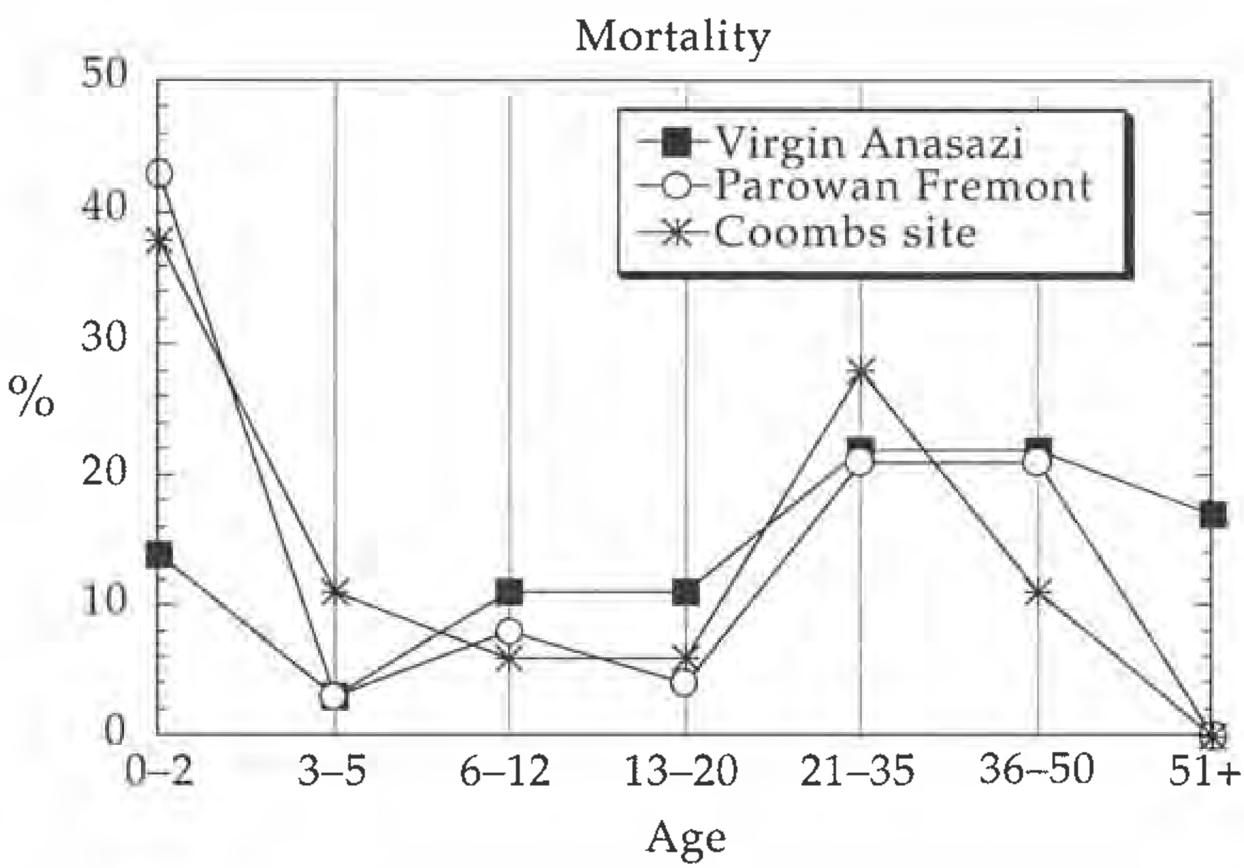

Figure 3. Mortality curves of the three skeletal series studied.

BIOLOGICAL RELATEDNESS

The hypothesis that Parowan Fremont and Virgin Anasazi skeletal measurements and indices should be different was rejected by statistical tests. Interseries comparisons of Parowan Fremont and Virgin Anasazi cranial measurements and indices by means of two-tailed t-tests failed to find significant differences in the cranial or post cranial measurements at the 0.05 level of significance (Roberts 1991). It is also possible that no significant differences were found due to the large standard deviations and the small size of the series. The Coombs series could not be included because of the small number of measurements represented.

While interseries metric trait differences do not exist, in the Parowan Fremont series measurements related to sexual dimorphism were found to be significantly different. These differences were found between males and females in the ischio-pubic index and the clavicular index. This may indicate that sexual dimorphism was greater in this series (Figure 4). This finding of greater sexual dimorphism in the Parowan Fremont series was also evident in the stature estimations. Figure 4 demonstrates that stature was remarkably similar except for the Parowan males who were larger than Virgin Anasazi males.

Differences, although not statistically significant, recognized in the cranial indices probably reflect the types and degrees of cranial modification. The majority of the crania observed (N=46) for the three series were artificially modified (88-100 percent), although the predominant style of modification varied. Coombs crania were modified occipitally (leaves the back of the head almost straight) causing the greatest breadth relative to the length of the skulls. Parowan Fremont crania were predominantly modified in the lambdoid style (flattening applied to the upper part of the occiput at an angle of 50 to 60 degrees), and this style does not shorten the length as much as the occipital style. The Virgin Anasazi series contained the largest percentage of unmodified crania resulting in a longer length of the crania. Modification styles were also more variable for the Virgin Anasazi crania.

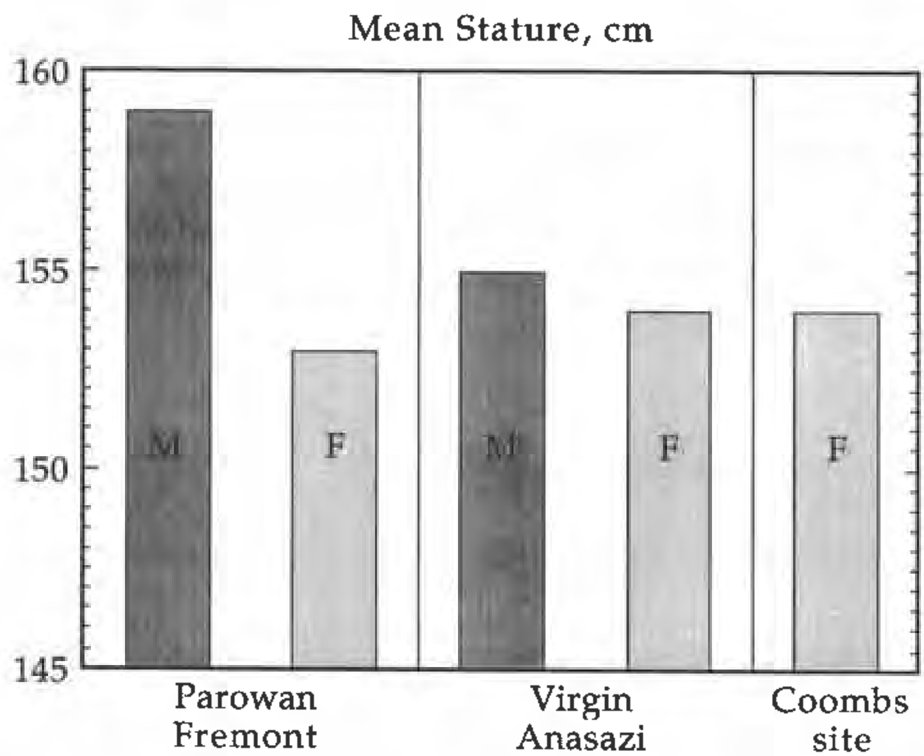

Figure 4. Mean stature for the three skeletal series, males and females (cm).

Nonmetric traits were scored as present or absent in order to identify differences in trait frequencies (Table 1). Statistical tests could not be used due to the small sample size that was the result of incomplete skeletal materials and poor preservation. Table 1 shows that cranial metric trait frequencies are similar for the series. A comparison of cranial traits scored for the Virgin Anasazi, Parowan Fremont, and a Mogollon series scored by Birkby (1973) showed that the Virgin Anasazi cranial trait frequencies may be more similar to Mogollon scores than to the Parowan Fremont scores (Roberts 1991: Table 37). When Virgin Anasazi and Parowan Fremont cranial trait frequencies were compared to 23 traits scored by Birkby (1973), 15 Virgin Anasazi traits were within 10 percent of the Mogollon score as opposed to 10 Parowan Fremont traits. An expanded skeletal series and additional studies are needed before meaningful conclusions can be drawn from this type of research.

PATHOLOGICAL CONDITIONS

Cribra orbitalia and porotic hyperostosis are suspected to result from anemia. Cribra orbitalia (Figure 5) or lesions present on the superior surface of the eye orbits represents the earliest signs and porotic hyperostosis the more advanced (Klepinger 1992). Porotic hyperostosis, recognized by the appearance of surface porosity is a lesion occurring on the cranial vault and results from a widening of the spongy diploe and a corresponding thinning of the outer dense cortical bone. Until recently it was suggested that in the New World high rates of this condition may have been related to a maize dependant diet (El-Najjar et al. 1976). Maize and other vegetable foods are low in iron and, unlike animal iron from meat, it is difficult to absorb. It was suspected that chronic iron deficiency anemia resulted from a combination of factors including high maize/low meat diet, the low content of iron in maize, and the practice of alkali soaking. This process increased the calcium and phosphate content of maize but further reduced the availability of iron as the process promotes the binding of iron into insoluble complexes.

Parasite involvement, infectious disease, and gastrointestinal disturbances can further inhibit the absorption of nutrients. It has been suggested that the high rate of anemia is indicative of a heavy pathogen load, particularly intestinal parasites (Stodder 1989:178; Stuart-Macadam 1992). Parasites found in the southwest among the Fremont, Sinagua, and Anasazi farming populations include the following: threadworm, whipworm, intestinal roundworm, thorny-headed worm, hairworm, tapeworm, and pinworm (Reinhard and Clary 1986:184). Stodder (1989), and Palkovich (1984), have demonstrated that high rates of parasitism are found where population densities are high, and particularly in canyon settings (Stodder 1989:182). Recently, Holland and O'Brien (1997) have developed a symbiotic model in which both diet and pathogens contribute to porotic hyperostosis. This model also stresses the diagnostic value of anemia conditions as a marker of early agriculture.

The lowest incidence of anemia related pathological conditions was found among the Parowan Fremont, and the highest at the Coombs Site (Figure 6). The incidence of cribra orbitalia and porotic hyperostosis in the Virgin Anasazi fell between the two (Figure 6). In the southwest, high rates of 50 percent or more, have been identified in Chaco Canyon (Akins 1986), Mesa Verde (Stodder 1987), and Canyon de Chelly (El-Najjar 1986). Although the Coombs series is too small to draw conclusions the prevalence at this site resembles frequencies at Anasazi sites in Canyon settings. The Virgin Anasazi rates may be considered on the low end, and the Parowan Fremont rates are atypically low for a southwestern series and resemble rates identified for populations in California and northern Nevada (Brooks et al. 1988; Dickel et al. 1984; Stark 1983).

Periostitis and osteitis are both non specific infectious skeletal lesions. Periostitis is confined to the outer periostial surface of the bone and osteitis occurs when the reaction involves both the marrow and cortex. Figure 6 demonstrates

Table 1. Cranial nonmetric variation for Parowan Fremont, Virgin Anasazi, and Kayenta Anasazi skeletal remains.

Trait	Parowan Fremont		Virgin Anasazi		Coombs Site	
	N	%	N	%	N	%
Highest nuchal line	3/18	16.6	3/13	23	0/1	0
Ossicle at lambda	5/17	29.4	4/14	28.5	0/1	0
Lambdoid ossicle	12/20	60	8/13	61.5	1/2	50
Parietal foramen-unilateral	7/17	41.1	8/12	66.6	0/2	0
Parietal foramen-bilateral	4/16	25	1/12	8.3	0/2	0
Bregamatic bone	0/18	0	0/14	0	0/3	0
Metopism	0/21	0	1/18	5.6	0/2	0
Coronal ossicle	1/32	3.0	1/23	4.4	0/4	0
Epipteric bone	5/31	16.1	3/27	11.1	0/4	0
Fronto-temporal articulation	2/27	7.4	0/24	0	0/4	0
Parietal notch bone	6/35	17.1	1/24	4.2	0	0
Ossicle at asterion	17/39	43.6	4/23	17.4	0/2	0
Auditory torus	0/37	0	1/28	3.6	0/4	0
Foramen of Huschke	2/37	5.4	4/24	16.7	0/4	0
Mastoid foramen	21/33	69.7	9/19	47.4	0	0
Mastoid foramen absent	12/31	38.7	3/19	15.8	0/2	0
Posterior condylar canal patent	21/25	84	9/18	50	2/2	100
Condylar facet double	0/33	0	0/9	0	0/3	0
Precondylar tubercle	8/30	26.7	3/18	16.7	2/2	100
Anterior condylar canal double	2/33	6.0	2/17	11.8	0/2	0
Foramen ovale incomplete	2/33	6.0	4/17	23.5	0/2	0
Foramen spinosum open	9/33	27.3	4/15	26.7	2/2	100
Accessory lessor palatine foramen	26/34	76.8	10/16	62.5	1/2	100
Palatine torus	23/35	65.7	8/23	34.8	0/4	0
Maxillary torus	10/32	31.3	2/27	7.4	0/4	0
Zygomatico-facial foramen	37/37	100	14/18	77.8	3/4	75
Anterior ethmoid foramen exsutural	13/18	72.2	2/14	14.3	0	0
Posterior ethmoid foramen absent	10/19	52.6	1/19	5.6	0	0
Accessory infraorbital foramen	6/32	18.6	8/18	44.4	0/1	0

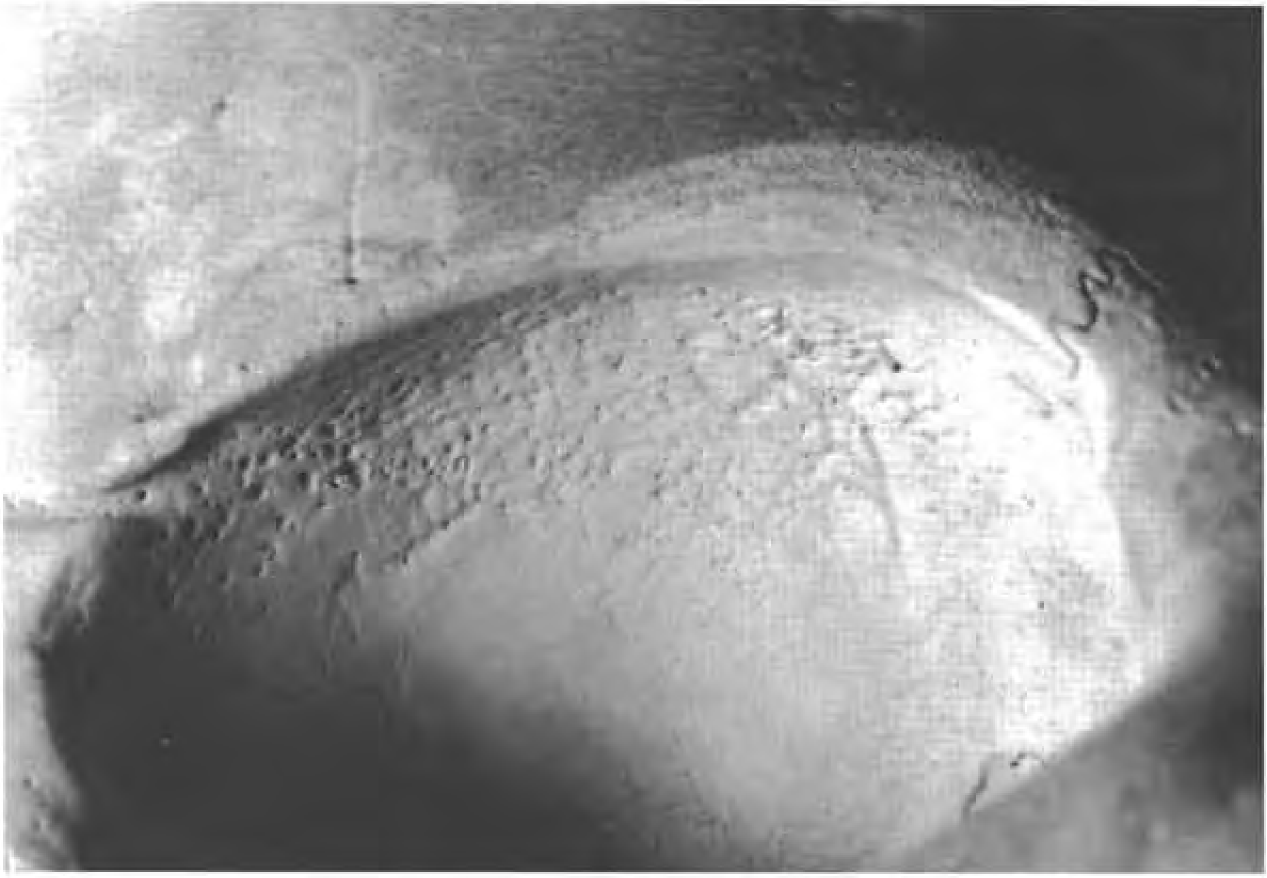

Figure 5. Partially healed cribra orbitalia lesions in the superior surface of the eye orbit of a Virgin Anasazi juvenile (AHUR 515).

that the Virgin Anasazi series had the highest frequency of periostitis and osteitis. The most extensive case of periostitis was found in a 45 to 60 year old female excavated from the Bunker Hill Site, in the Moapa/Muddy River Valley. Both tibiae, fibulae, and the distal third of the right ulna were thickened circumferentially with periosteal reactive bone. Involvement was most severe on the distal half of the bones and except in the ulnae the epiphyses were not affected. The anterior, medial, and lateral surfaces of the tibiae were porous and spongy in appearance and the posterior surface was smooth. This pathological condition has been associated with treponemal infections such as yaws or venereal syphilis (Steinbock 1976; Steele and Bramblett 1988).

As in many prehistoric skeletal series the rate of traumatic injuries is low (Figure 6), and the only type of trauma identified were healed or partially healed fractures. As can be seen in Figure 6, rates for the three series are almost exactly the same. All but one of the fractures occurred in adults and they were more common in females (67%) than males (33%). The bones most often fractured were ulnae, femora, and crania.

Osteoarthritis, is recognized as pitting, porosities, or lipping along the edges of joint surfaces and was the most common pathological condition identified in adults. Forty percent of the Parowan Fremont adults and 50 percent of the Virgin Anasazi adults exhibited this condition in varying degrees. The Coombs series had the lowest incidence of this condition probably because older individuals were underrepresented. Schmorl's nodes, recognized as a depression on the vertebral body due to herniation, were observed in three Parowan Fremont males. Kennedy (1989) associated Schmorl's disk herniation with flexion and lateral bending characteristic of generalized physical stress among prehistoric hunter-forager and modern urban populations.

Dental hypoplasia, or a deficiency in the enamel thickness resulting from interruption in enamel formation during childhood, is caused by infectious disease, congenital defects, nutritional disturbances, neurological disturbances,

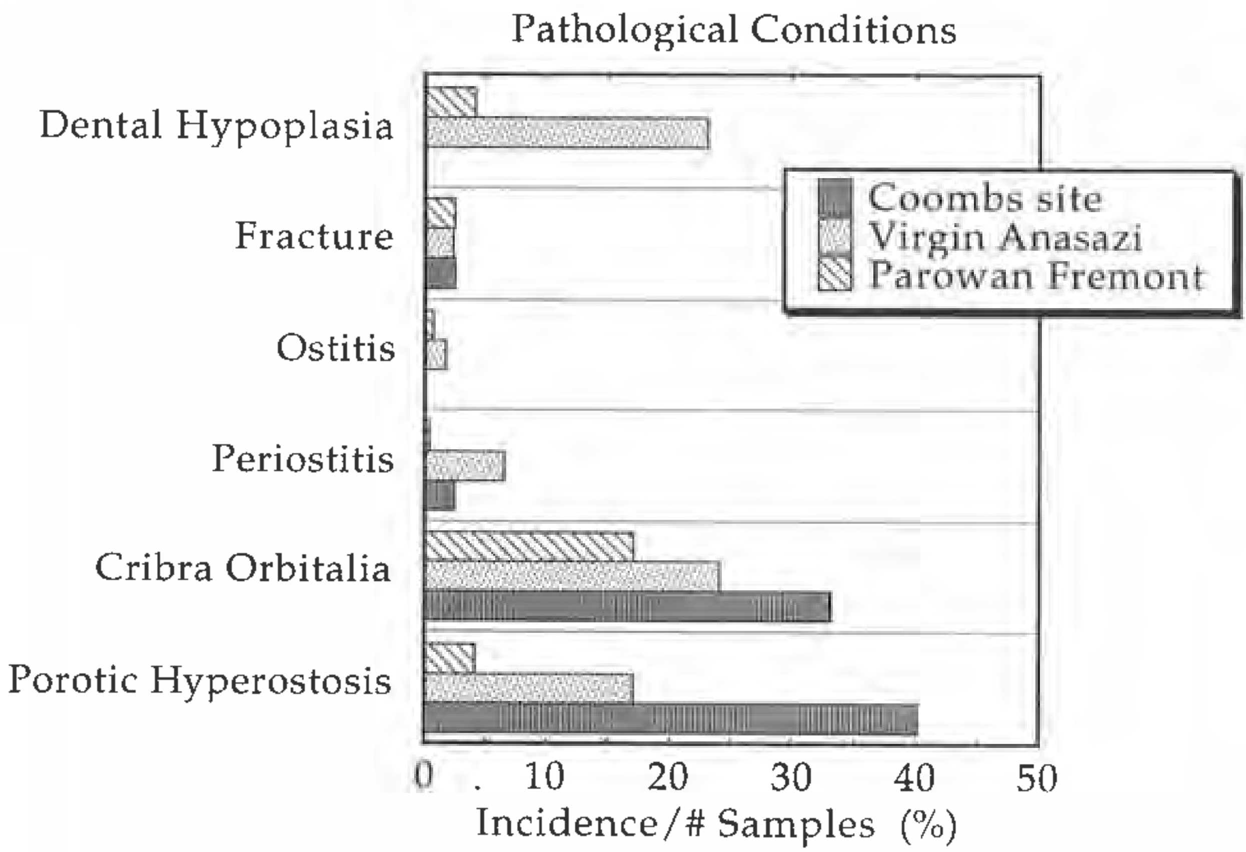

Figure 6. A comparison of the pathological conditions for the three skeletal series studied.

trauma, and intoxicants. This condition is commonly noted in southwestern skeletal series. High rates in a population are believed to be a marker of nutritional problems or infectious disease during childhood (Skinner and Goodman 1992). Figure 6 demonstrates that rates for this condition were significantly higher in the Virgin Anasazi series than in the Fremont and Kayenta series.

Other dental pathologies including the prevalence of caries, abscesses, and tooth loss were not different for the three series (Table 2). Note that the rate of caries, in terms of teeth observed, for all three series falls between 7 to 8 percent. Seven percent is between the mean Lukacs (1989) identified for cultures with a mixed economy (4.8%) and that of an agricultural economy (10.4%). The total number of individuals with caries ranged from 50 to 56 percent for the three populations. Patterns of dental attrition were slightly different in the Fremont series, as there were more individuals with severe attrition than in the other two series (Roberts 1991).

Patterns of dental attrition among the Virgin Anasazi and the Kayenta series were similar. Most individuals (Table 2) exhibited moderate attrition (cusps worn and dentin visible). Severe attrition (pulp visible), considered less common among people with an agricultural subsistence focus, was found in 23 percent of the Virgin Anasazi individuals and 12 percent of the Kayenta dentitions. The Parowan Fremont dental wear patterns were different; there were more individuals with severe and slight attrition than moderate attrition (Table 2). Overall the Parowan Fremont series was comparatively younger at death than the Virgin Anasazi series, and age at death can not be called upon to explain the observed differences in the attrition patterns.

Table 2. Dental pathological conditions, individual count (top) and tooth count (bottom).

Series	Cavities		Abscesses		Hypoplasia		Antemortem Loss	
	I/N*	%	I/N*	%	I/N*	%	I/N*	%
Parowan Fremont	13/23	56	9/23	39	1/23	4	13/23	56.5
Virgin Anasazi	12/22	55	9/22	41	5/22	23	10/22	45.4
Coombs Site	4/8	50	2/8	25	0	0	4/8	50

Series	Cavities		Abscesses		Antemortem Loss		Average Exposed Root M1 (mm)
	I/N*	%	I/N*	%	I/N*	%	I/N*
Parowan Fremont	32/459	7	19/459	4	104/459	23	3.3
Virgin Anasazi	27/381	7.4	17/381	4.2	88/381	25	3.9
Coombs Site	9/105	8.5	3/105	2.8	25/105	24	2.6

* Incidence / # individuals observed

SUMMARY

The objective of this study was to answer two key questions: are the Parowan Fremont skeletal remains biologically different from the Anasazi remains, and are patterns of health similar or different? Biological differences are measured by comparing metric and nonmetric skeletal traits. Metric trait comparisons indicate that the three series are not significantly different. Two-tailed t-tests failed to find significant differences in the cranial measurements at the 0.05 level of significance (Roberts 1991). Post cranial indices show that Parowan Fremont individuals were slightly more robust than individuals in the Virgin Anasazi series, however, these differences were not statistically significant. It is possible that no significant differences were found due to the large standard deviations and the small size of the series.

While interseries measurements are not statistically different, robusticity indices and stature calculations show that sexual dimorphism was greater in the Parowan Fremont series than the Virgin Anasazi series. Two differences, significant at the 0.05 level, were found in the ischio-pubic index and the clavicular index between Parowan Fremont males and females. Significant differences were also found between Parowan Fremont females and Virgin Anasazi females in the humero-femoral index. It has been suggested that "sexual dimorphism should be greatest in those populations under the least amount of stress, because males will be subject to less growth disruption" (Stodder 1989:184). Other factors such as genetic variation make interpretations of these data difficult without additional research.

Cranial and post cranial nonmetric trait frequencies for the Virgin Anasazi and Parowan Fremont series were compared to assess biological relatedness (Roberts 1991: Tables 36-38). Archaeologists have suggested that some form of cultural barrier may have existed between the Fremont and Anasazi, and if such was the case, then it is possible that nonmetric trait frequencies may differ significantly. The three skeletal series studied were not large enough to use biological distance statistics but a simple frequency comparison was conducted to identify trends. Despite the potential problems of inter-observer error it is notable that traits scored by Birkby (1973), for a Mogollon skeletal series from Arizona, show closer agreement to the Virgin Anasazi series than to the Parowan Fremont series.

Comparison of pathological conditions revealed that health stress patterns are different for the three skeletal series. If pathological conditions are used as indicators of relative health, then the individuals in the Virgin Anasazi series experienced the highest overall prevalence of health stressors and the Parowan Fremont the lowest. The Virgin Anasazi series has the highest rates of non-specific infectious lesions and enamel hypoplasia, and the Coombs and Virgin Anasazi series both have a greater prevalence of anemia related pathological conditions than the Parowan Fremont. I interpret these differences to be related to greater sedentarism among the Anasazi groups, combined with higher population density, and a heavier pathogen load. I suspect that the greater incidence of anemia at the Coombs Site and Virgin Anasazi sites is tied to sanitary conditions, crowding, and perhaps to increased disease transmission rates related to an emphasis on long distance trade (Lyneis 1995, Jennings 1978). Future studies may also show that dietary factors also play a role.

An accurate comparison of health patterns, before and after agriculture, awaits the recovery and analysis of preagricultural skeletal series from the study area. Until such data are available it is difficult to attribute the prevalence of pathological conditions to differences in settlement and subsistence strategies, as other factors including genetics and environment can influence the rates. One of the first of these studies has recently been completed by Edgar (1994) for a Basketmaker skeletal series from the Virgin Anasazi region. In this agriculturally transitional series, Edgar found that pathological conditions related to anemia and infectious disease were non-existent. Several hundred years later the inhabitants of the Virgin Anasazi area experienced an increase in health stressors that leave markers on bone. It should be recognized, however, that skeletal evidence of disease often reflects a physiological response to chronic rather than acute infections, and therefore the skeletal lesions within a skeletal series must be interpreted with caution (Powell 1988).

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STEWARD ALCOVE: A CASE OF SUPERPOSITION DATING OF BARRIER CANYON STYLE ROCK ART

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Pinus edulis *needles adhering to a Barrier Canyon Style anthropomorph in southeastern Utah produced a radiocarbon date with a two-sigma calibrated range of A.D. 1400-1655. Because the sample was superposed over the pictograph, the pictograph must have been created before this date, perhaps as much as several hundred or even a thousand years earlier. The investigation of other cases of superposition could help shed light on the date range of the Barrier Canyon and other styles of rock art.*

INTRODUCTION

Since Polly Schaafsma (1971) defined Barrier Canyon Style rock art, the date range of the style has intrigued many researchers. Tipps (1995) summarizes this research and discusses the potential date range of Barrier Canyon Style rock art. She suggests it was created during a 2200-year time span from about 1900 B.C. to A.D. 300 (Tipps 1995:168). The ending date is of particular interest since Schaafsma (1971) posits a transitional style between the earlier Barrier Canyon Style and the later styles of Fremont and Anasazi rock art. Given the issue of transition of styles and cultures, it is important to attempt to date when Barrier Canyon Style fell out of use and new styles were developed.

In 1997, we were informed of a site that might shed light on the issue of the ending date for Barrier Canyon Style. The pictographs at this site had evidence of superposition that might help solve this problem. Superpositioning and superimpositioning are indirect or relative techniques for bracketing the date when a style falls out of use. The two terms are often used interchangeably, but they have different meanings. In the context of rock art studies, superimposition refers to the placement of one rock image over another, earlier image. As an example of superimposition, Schaafsma (1971:130) cites the case of a Fremont Style anthropomorph superimposed over Barrier Canyon Style figures at Temple Mountain. Tipps (1995:83) notes a case of superimposition of an Anasazi sprayed hand print over a Barrier Canyon Style anthropomorph at site 42SA20615. These and other examples of superimposition suggest that some time had passed between the creation of the Barrier Canyon Style and the creation of the later superimposed Fremont and Anasazi styles.

Superposition usually refers to the geomorphological principle that overlaying strata (and the artifacts and features within them) are younger than underlying strata (Harris 1979). Superposition is not generally thought of in relation to rock art, but it is applicable when deposits or strata cover rock art images. An example of the use of the principle

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of superpositioning in rock art research is the radiocarbon date obtained from a feature within a stratum that covered a Barrier Canyon Style anthropomorph at the Rochester Creek site in central Utah (Loendorf 1985). This radiocarbon date has a tree-ring calibrated one-sigma age range of 170 B.C.-A.D. 200, suggesting that the Barrier Canyon figure was created prior to the date.

In this paper, we describe another example of superposition dating of Barrier Canyon Style rock art at Steward Rockshelter. The site is named after its discoverer, David Steward, who recognized the importance of the site. In July, 1997, we visited the site and recorded it as 42SA23203. After discussing treatment plans and obtaining the necessary ARPA permit from Bruce Louthan of the Bureau of Land Management, we returned to the site and collected a small radiocarbon sample that was in the matrix adhering to one of the pictographs in the panel. We report the results of dating this sample and present the implications of this date in relation to dating Barrier Canyon Style rock art.

SITE DESCRIPTION

Steward Rockshelter (42SA23203) is located in southeastern Utah, in a tributary canyon east of the Colorado River. The site consists of a rock art panel and associated lithic scatter in a south-facing alcove (Figure 1) overlooking an alluvial terrace just above a stream. The site measures 10 m north-south from the dripline to the rear wall of the alcove and 35 m east-west across the alcove mouth. This site is unusual because the western portion of the rock art panel had originally extended below the modern ground surface.

Six separate looter's pits (up to 40 cm deep) were dug into the floor of the alcove; one immediately in front of the rock art panel. One screened backdirt pile was also noted next to one of the pits. Artifacts recorded across the site surface included 2 tested Summerville Chalcedony cobbles and perhaps 20 bifacial thinning and pressure retouch flakes of Summerville Chalcedony in the backdirt pile. A few burned sandstone fragments were also noted in this pile. One modern rock-ringed firepit was also recorded in the rear of the alcove. No diagnostic artifacts or pottery were identified at the site.

Typical of other Barrier Canyon Style pictographs, the rock art panel is located in an exfoliating arc in the rear of the shelter. The panel, about 0.9 m high and 5.2 m long, includes both anthropomorphic and zoomorphic elements. Unlike other Barrier Canyon Style pictographs, a portion of the panel had been partially buried by sediments. Although most of these sediments (and presumably cultural artifacts) had been dug away from the panel by looters, a small amount of sediment and pack rat midden still adhered to the rear wall, covering one of the anthropomorphs and thus allowing us to obtain organic material for a radiocarbon date.

PANEL DESCRIPTION

While not all motifs at Steward Alcove can be classified as Barrier Canyon Style, the majority of the motifs within the panel fit Schaafsma's (1971:69) original definition of Barrier Canyon Style rock art. Since the pigment of all the elements or motifs appears to be the same, it is likely that the panel represents one painting episode.

Three anthropomorphs are located on the left side of the panel. The full torsos of the three left-most anthropomorphs at Steward Alcove are not visible due to salts and sediments that had previously covered this portion of the panel (Figure 2). However, if we project the angle from the exposed shoulders of these figures to the probable torso

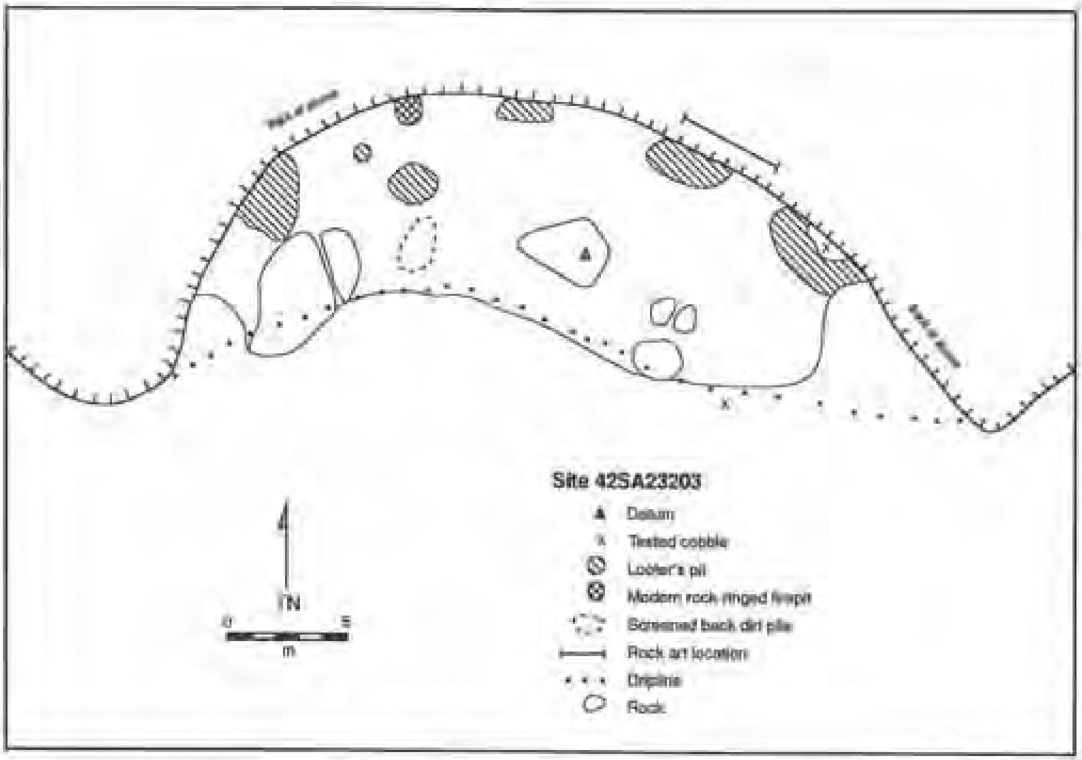

Figure 1. Plan map of Steward Alcove showing the looter's pits, backdirt pile, and general location of the Barrier Canyon Style rock art panel along the rear wall.

terminus, the figures fall within the classic elongated proportions of Barrier Canyon Style anthropomorphs. Two of the anthropomorphs have short lines projecting from their heads in typical Barrier Canyon Style fashion and the left-most anthropomorph, along with some possible anthropomorphs to the right, appear to have pecked-out "hearts," another characteristic Barrier Canyon trait.

Also present are nine or more small quadrupeds painted in a curved line reaching upward from below the present ground surface. These are badly weathered, but the individual quadrupeds and their arrangement in a curved line are classic Barrier Canyon Style (Schaafsma 1971:131). However, below these small animals is a faint anthropomorph in a stick-figure style uncharacteristic of Barrier Canyon Style.

Above the arc of quadrupeds and extending to the right are two parallel lines of red and white pigment. The uppermost line has 13 perpendicular red tick marks and where the tick marks end, a horizontal red and white parallel line begins. This right-most horizontal line is located an average of 53 cm above the present ground surface. Above this line are vertical linear motifs that appear abstract, but may, in fact, represent anthropomorphs. These motifs are simply too weathered and faded to determine their original shapes. Beneath the red and white parallel lines are a series of vertical parallel lines that might either be characteristic "rakes" (Schaafsma 1971:159; Manning's 1990:62-63 "rain clouds"), or possibly, lines of anthropomorphs with torsos depicted by parallel lines.

Until the recent looting, the lower portion of the western end of the panel was partially buried by natural sediments. It appears that sediments covered at least the lower 20 cm of the panel in this area. Unfortunately, the fill covering this portion of the panel had been dug away by looters. Given the presence of a screened backdirt pile and a few surface artifacts, the sediments burying the rock art probably contained cultural deposits. Luckily, some of the matrix, including a few pack rat feces and pine needles, still adhered to the wall and overlay some of the pictographs (Figure 3).

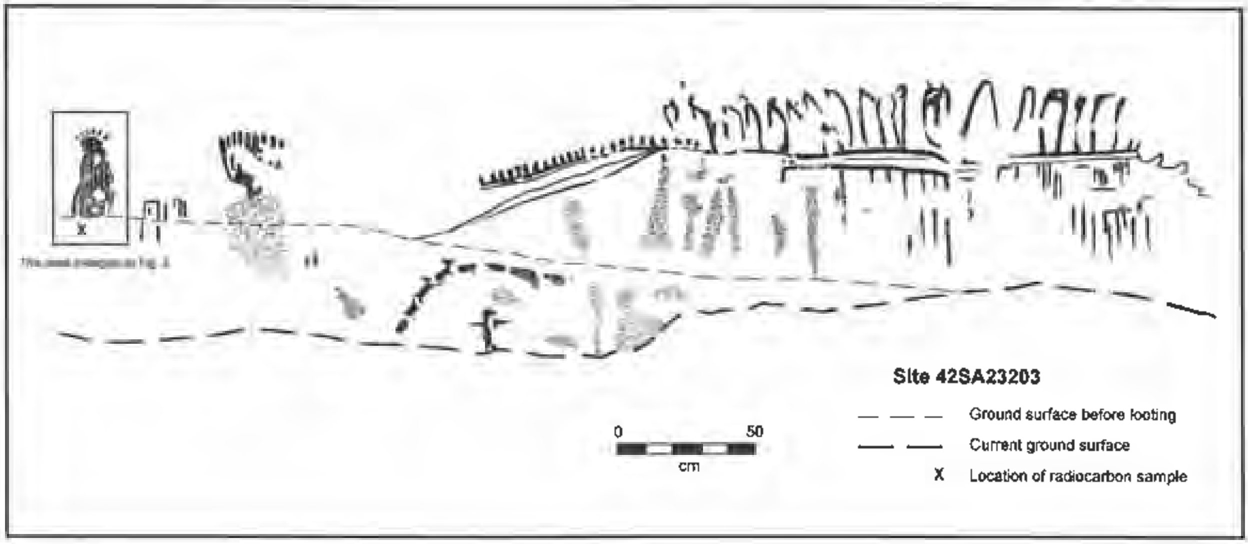

Figure 2. Drawing of the rock art panel at Steward Alcove. Also shown is the location of the radiocarbon sample and the original ground surface (prior to looting).

RADIOCARBON SAMPLE

Two *Pinus edulis* needles that were part of the cemented midden material overlying the westernmost anthropomorph were collected as a radiocarbon sample. The sample was submitted to Beta Analytic Inc. for an Accelerator Mass Spectrometry date. Since the sediment and pine needles were superposed on top of a Barrier Canyon Style anthropomorph, a radiocarbon date of the needles should represent a date some time after the pictograph was painted and used. The possibility does exist, however, that pine-needles older than or contemporary with the rock art were later incorporated into the adhering sediments. The sample's conventional radiocarbon age (corrected for C12/C13 fractionation) was 420 $\pm$ 80 BP (Beta-107403). The one-sigma tree-ring calibrated date was A.D. 1425-1520 and A.D. 1570-1630. The two-sigma calibrated date was A.D. 1400-1655.

DISCUSSION

The ideal sample for superposition dating at this panel would have been dateable material that covered or overlapped the very bottom of the pictographs, since that would represent the time when the deposits started to accumulate after the rock art was originally created. Unfortunately, with the looting of the deposits, such a date could not be obtained from this site. Rather, the A.D. 1400-1655 date represents the end of the episode of deposition and accumulation of sand and sediment at the site that covered the pictograph. This clearly indicates the western side of the panel was created some time before A.D. 1400-1655, most likely hundreds of years earlier, depending on the rate of deposition in the alcove.

Figure 3. Close-up photograph of the westernmost anthropomorph showing the sediments adhering to the pictograph. The pine needles visible in this photograph were submitted for radiocarbon dating.

This radiocarbon date has several implications. First, the date does not contradict the date range Tipps (1995) posited for Barrier Canyon Style rock art. Second, the date challenges Manning's (1990) hypothesis that Barrier Canyon Style was created by Pueblo IV Hopi after A.D. 1300. If this were the case, 20 cm of deposition should not have covered the panel prior to A.D. 1400-1655. Third, the date also raises some questions about natural depositional events in overhangs and rockshelters in southeastern Utah. This date demonstrates the present ground surface in Steward Alcove (prior to recent looting) had been stable for several hundred years. If the pictographs were painted between 1900 B.C. and A.D. 300, then environmental conditions between their creation and A.D. 1400 were such that at least 20 cm of sediments were deposited, but these depositional processes within the alcove ceased sometime between A.D. 1400 and 1655. The deposition patterns at Steward Alcove reflected in this radiocarbon date may have been affected by two severe drought periods (A.D. 1385-1404 and A.D. 1622-1639) identified in the Canyonlands region by Schwartz (1994:64, 65).

While rock art researchers have long noted the importance of superimpositioning, we hope that by reporting this date, rock art enthusiasts will be alerted to the importance of superpositioning in rock art studies. Whether the superposed stratum is a thin veneer of sediment as in the case of Steward Alcove, a mud flow, mud daub, or a dense deposit of pack rat midden, as long as there is organic matter in the superposed sediment or material, it is likely that a radiocarbon date can be obtained. Such superposed dates are especially important since they document when a particular panel or image fell out of use. If we can accumulate a database of such superposed dates for Barrier Canyon Style rock art, then we can finally begin to place the rock art in its cultural context, and learn about the social system that existed on the Colorado Plateau several thousand years ago.

ACKNOWLEDGMENTS

We thank the Canyonlands Natural History Association for paying for the AMS date. We acknowledge David Steward, who reported the site to Gary Cox, who in turn informed us of the site. We also gratefully acknowledge Bruce Louthan and thank him for assisting in the file search, for discussing treatment plans with us, and for permitting us to collect a sample and date it. We also appreciate Greg Miller's help preparing the computer images for this report.

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ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY, LIST OF REPORTS WITH 1996 PROJECT NUMBERS ASSIGNED

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INTRODUCTION

All organizations who conduct archaeological projects in the state are obliged to: (1) obtain a project number from the Antiquities Section, Division of State History and (2) submit a report on the work done.

The following is a list of project numbers assigned by the Antiquities Section for projects with 1996 project numbers.

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ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY
1996 PROJECT NUMBERS ASSIGNED

County	Activity	Organization	Field Supervisor	Project Name	Project Number
BE	Survey	Intersearch	B. Frank	Circle Four ROW Survey	U-96-IG-0040p
BE	Survey	Intersearch	B. Frank	Beaver River Flood Channel	U-96-IG-0178b
BE	Survey	Intersearch	B. Frank	Ross Centurion Mines Powerline	U-96-IG-0343b
BE	Survey	Intersearch	B. Frank	Capps BLM Survey	U-96-IG-0704b
BE	Survey	JBR	R. Crosland	South Milford Skyline Trunk for UP&L	U-96-JB-0451b,p
BE	Survey	Senco-Phenix	J. Senulis	Beaver Block	U-96-SC-0007s
BE	Survey	USFS-Fishlake	C. Mackelprang	Buck Pasture ATV Trail	U-96-FS-0032f
BE	Survey	USFS-Fishlake	C. Mackelprang	Crooked River Ranch Trail Ride	U-96-FS-0031f
BE	Survey	USFS-Fishlake	M. Cartwright	Elk Meadows Water Line	U-96-FS-0625f
BE	Survey	USFS-Fishlake	R. Leonard	Upper Kents Lake Modification	U-96-FS-0728f
BE/PI	Survey	Abajo	W. Hurst	UDOT SR-153	U-96-AS-0504f,s
BO	Survey	ARCON	G. Norman	SR-30 Repaving Gravel Pits (UDOT)	U-96-AK-0347p,s
BO	Survey	BLM-Salt Lake	D. Melton	Black Butte Guzzlers	U-96-BL-0028b
BO	Survey	BLM-Salt Lake	D. Melton	Sparks Spring Fence	U-96-BL-0133b
BO	Survey	BLM-Salt Lake	D. Melton	West Locomotive Springs Boundary Fence	U-96-BL-0148b,s
BO	Survey	BLM-Salt Lake	D. Melton	DWR Guzzlers	U-96-BL-0149b
BO	Survey	BLM-Salt Lake	C. Eccles	Rosebud Community Pit	U-96-BL-0324b
BO	Survey	BLM-Salt Lake	D. Melton	Black Pine Disposal Track	U-96-BL-0398b
BO	Survey	BLM-Salt Lake	D. Melton	Cedar Hill Waterline Extensions	U-96-BL-0410b
BO	Survey	BLM-Salt Lake	D. Melton	Rozel Point Pipeline	U-96-BL-0590b
BO	Survey	BLM-Salt Lake	D. Melton	Newfoundland Trespass Access Road	U-96-BL-0619b,p
BO	Survey	Hill AFB	D. Weder	MSA Road	U-96-HL-0204m
BO	Survey	Hill AFB	D. Weder	Phoenix Firing Range Fire Break	U-96-HL-0509m
BO	Survey	Hill AFB	D. Weder	Bug Hill Observation Site	U-96-HL-0632m
BO	Survey	USFS-Sawtooth	D. Santini	Johnson Creek Road Improvement	U-96-FS-0294f
BO	Survey	Utah State University	R. Lewelling	Lemuel's Garden	U-96-UI-0327p
BO/WB	Monitor	Utah State University	S. Simms	BLM Monitoring	U-96-UI-0577w
CA	Survey	UDOT	C. Lizotte	UDOT 1400 North in Logan	U-96-UT-0587p,s
CA/RI	Survey	USFS-Wasatch/Cache	C. Thompson	Old Canyon Basin Timber Sale	U-96-FS-0601f
CA/RI	Survey	USFS-Wasatch/Cache	C. Thompson	Logan Canyon Scenic Byway	U-96-FS-0299f
CB	Survey	AERC	G. Hadden	Winterquarters Canyon Drill Holes & Access Routes	U-96-AF-0524f

ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY
1996 PROJECT NUMBERS ASSIGNED

County	Activity	Organization	Field Supervisor	Project Name	Project Number
CB	Survey	Baseline	A. Nielson	Two Compressor Stations for River Gas	U-96-BS-0711p
CB	Survey	Baseline	A. Nielson	River Gas Evaporation Ponds and Alternatives	U-96-BS-0113p,s
CB	Survey	Baseline	A. Nielson	River Gas Overburden Storage Site	U-96-BS-0156s
CB	Survey	Baseline	A. Nielson	River Gas Porphry Bench Wells, Roads, and Utility Lines	U-96-BS-0213p,s
CB	Survey	Baseline	A. Nielson	Two Evaporation Ponds for River Gas	U-96-BS-0558s
CB	Survey	Baseline	J. Allison	River Gas - Two Well Locations near Consumers Road	U-96-BS-0425p,s
CB	Survey	Baseline	J. Allison	River Gas 1996 Drilling Season	U-96-BS-0345p,s
CB	Survey	Baseline	J. Allison	River Gas Well D-3 and Access	U-96-BS-0002s
CB	Survey	Baseline	J. Allison	River Gas Well Pad and Evaporation Ponds	U-96-BS-0044s
CB	Survey	BLM-Price	B. Miller	Christen Ranch R&PP	U-96-BL-0041b
CB	Survey	BLM-Price	B. Miller	Dry Canyon Road Repair	U-96-BL-0276b,p
CB	Survey	BLM-Price	C. Atwood	Miller Creek-Hays Wash Water Pipelines	U-96-BL-0588b
CB	Survey	BLM-Price	C. Atwood	East Carbon Fire Complex Rehab	U-96-BL-0589b,p
CB	Survey	JBR	L. Billat	Helper Bridge	U-96-JB-0455s
CB	Survey	JBR	L. Billat	Price River Bridge in Carbonville	U-96-JB-0456s
CB	Survey	Montgomery	J. Montgomery	Anadarko Warehouse Canyon and Cardinal Wash Drill Sites	U-96-MQ-0536b,p,s
CB	Survey	Montgomery	J. Montgomery	Cyprus Plateau Willow Creek N. Drill Sites and Alt. Access	U-96-MQ-0238b
CB	Survey	Montgomery	J. Montgomery	Madsen-Hammond Drill Location	U-96-MQ-0578p
CB	Test/Etc.	Sagebrush	S. Ellis	Willow Creek Mine (42Cb1000) Test and Data Recovery	U-96-SJ-0232p(e)
CB	Survey	Sagebrush	H. Weymouth	Cyprus Waterline	U-96-SJ-0406s
CB	Survey	Senco-Phenix	J. Senulis	Dugout Creek Road Upgrade	U-96-SC-0102b
CB	Survey	Senco-Phenix	J. Senulis	Dugout Creek Road Borrow/Staging Area, 10 Acre Block	U-96-SC-0103b
CB	Survey	Senco-Phenix	J. Senulis	Two Powerline Alternatives for the Willow Creek Mine	U-96-SC-0452b,p
CB	Survey	SWCA	K. Quick	Questar Lateral 102	U-96-ST-0550p
CB/EM	Survey	Baseline	J. Allison	Emery Telephone Fiberoptic Line	U-96-BS-0186b,s
CB/EM	Survey	Baseline	J. Allison	River Gas CRM Inventory of 12 Wells and Roads	U-96-BS-0547b,p
CB/UT	Survey	Sagebrush	S. Murray	Scofield Reservoir RMP Phase II	U-96-SJ-0401s,w
DA	Survey	BLM-Vernal	E. Moncrief	Devils Hole Trail	U-96-BL-0038b
DA	Survey	BLM-Vernal	E. Moncrief	Lucky RC Placer Mine	U-96-BL-0192b
DA	Survey	BLM-Vernal	E. Moncrief	Dutch John Mountain Rangeland Project	U-96-BL-0496b
DA	Survey	BLM-Vernal	E. Moncrief	Little Hole Fencing Project	U-96-BL-0723b

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1996 PROJECT NUMBERS ASSIGNED

County	Activity	Organization	Field Supervisor	Project Name	Project Number
DA	Survey	USFS-Ashley	L. Ingram	Greendale Canal	U-96-FS-0008f
DA	Survey	USFS-Ashley	A. Edwards	Antelope Flat Fence	U-96-FS-0212b,f,s
DA	Survey	USFS-Ashley	L. Ingram	Greendale Overlook Fuelwood	U-96-FS-0219f
DA	Survey	USFS-Ashley	K. Malmstrom	South Valley Pipeline and Trough	U-96-FS-0271f
DA	Survey	USFS-Ashley	K. Malmstrom	Cedar Springs Pinyon-Juniper Manipulation	U-96-FS-0297f
DA	Survey	USFS-Ashley	B. Loosle	Greendale PIT Survey	U-96-FS-036
DA	Cleared	USFS-Ashley	K. Malmstrom	Carter Road ATV Trail	U-96-FS-0421f
DA	Survey	USFS-Ashley	K. Malmstrom	Spruce Creek Burn	U-96-FS-0436f
DA	Cleared	USFS-Ashley	K. Malmstrom	Sheep Creek Burn	U-96-FS-0437f
DA	Survey	USFS-Ashley	L. Ingram	Hicks Timber Sale	U-96-FS-0531f
DA	Survey	USFS-Ashley	L. Ingram	Deep Creek Timber Sale	U-96-FS-0532f
DA	Survey	USFS-Ashley	J. Berke	Spruce Creek RX Burn	U-96-FS-0540f
DA	Survey	USFS-Ashley	J. Berke	Upper Buck Springs Waterline	U-96-FS-0541f
DA	Survey	USFS-Ashley	A. Haney	Lucerne Special Use Area	U-96-FS-0599f
DA	Survey	USFS-Ashley	K. Malmstrom	Quarry Site Project	U-96-FS-0651f
DA/SM	Survey	USFS-Ashley	K. Malmstrom	Round Park and Lost Creek Timber Salvage	U-96-FS-0334f
DA/UN	Survey	USFS-Ashley	K. Malmstrom	Roadshed and Deep Creek Timber Salvage	U-96-FS-0315f
DA/UN	Survey	USFS-Ashley	B. Loosle	High Uintas Weyman Park Survey	U-96-FS-0462f
DC	Survey	AERC	R. Hauck	Balcron Wells 41-8-9-16 and 11-9-9-16 - Wells Draw	U-96-AF-0066b
DC	Survey	AERC	R. Hauck	Brundage Canyon Wells/Roads for 15-16/16-18/5-20/15-23	U-96-AF-0143i
DC	Survey	AERC	R. Hauck	Six Wells and Access - Brundage and Sowers Canyons	U-96-AF-0179i
DC	Survey	AERC	R. Hauck	Tabiona Pipeline	U-96-AF-0196p
DC	Survey	AERC	G. Hadden	Four Wells with Roads and Pipelines - Castle Peak Draw	U-96-AF-0235b
DC	Survey	AERC	R. Hauck	Pipeline Complex - Pariette Bench and Wells Draw	U-96-AF-0445b
DC	Survey	AERC	G. Hadden	Six Wells - Wells Draw	U-96-AF-0556b
DC	Survey	AERC	R. Hauck	Eight Wells - Wells Draw and Castle Peak Draw	U-96-AF-0623b
DC	Survey	AERC	R. Hauck	Ten Inland Wells - Castle Peak Draw	U-96-AF-0700b
DC	Survey	AIA	J. Truesdale	Petroglyph Well 04-03	U-96-AY-0063i
DC	Survey	AIA	J. Truesdale	Seven Tribal Wells & Pipeline/Road between 29-10 & 29-15	U-96-AY-0188i
DC	Survey	AIA	J. Truesdale	Block Survey of Section 4 in T5S, R3W	U-96-AY-0201i
DC	Survey	AIA	J. Truesdale	Petroglyph Sections 5 and 28 in T5S, R3W	U-96-AY-0207i

ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY
1996 PROJECT NUMBERS ASSIGNED

County	Activity	Organization	Field Supervisor	Project Name	Project Number
DC	Survey	AIA	J. Truesdale	Barrett Ute Tribal Well 5-26	U-96-AY-0231i
DC	Survey	AIA	J. Truesdale	Coastal Pipeline	U-96-AY-0257i
DC	Survey	AIA	J. Truesdale	Petroglyph Sections 8 and 29 in T5S, R3W	U-96-AY-0258i
DC	Survey	AIA	J. Truesdale	Four Barrett Wells	U-96-AY-0314i
DC	Survey	AIA	J. Truesdale	Coastal Oil and Gas Pipeline	U-96-AY-0335i
DC	Survey	AIA	J. Truesdale	Petroglyph Ute Tribal Wells 17-12 and 03-12	U-96-AY-0336i
DC	Survey	AIA	J. Truesdale	Petroglyph Section 20 in T5S, R3W	U-96-AY-0337i
DC	Survey	AIA	J. Truesdale	Petroglyph Section 21 in T5S, R3W	U-96-AY-0381i
DC	Survey	AIA	J. Truesdale	Petroglyph Section 19 in T5S, R3W	U-96-AY-0383i
DC	Survey	AIA	J. Truesdale	Petroglyph Section 30 in T5S, R3W	U-96-AY-0384i
DC	Survey	AIA	J. Truesdale	Coastal Pipelines	U-96-AY-0418i
DC	Survey	AIA	J. Truesdale	Six Petroglyph Wells, Roads and Flowlines	U-96-AY-0419i
DC	Survey	AIA	J. Truesdale	Coastal Oil and Gas Pipeline	U-96-AY-0424i
DC	Survey	AIA	J. Truesdale	Coastal Pipeline Extension	U-96-AY-0491i
DC	Survey	AIA	J. Truesdale	Petroglyph Section 16 in T5S, R3W	U-96-AY-0499i
DC	Survey	AIA	J. Truesdale	Petroglyph Section 18 in T5S, R3W	U-96-AY-0500i
DC	Survey	AIA	J. Truesdale	Petroglyph Section 9 in T5S, R3W	U-96-AY-0501i
DC	Survey	AIA	J. Truesdale	Petroglyph Section 7 in T5S, R3W	U-96-AY-0502i
DC	Survey	AIA	J. Truesdale	Three Petroglyph Wells	U-96-AY-0503i
DC	Survey	AIA	J. Truesdale	Petroglyph Section 3 in T5S, R3W	U-96-AY-0516i
DC	Survey	AIA	J. Truesdale	Coastal Pipeline in Sections 21, 22 and 23 in T1S, R1W	U-96-AY-0517i
DC	Survey	AIA	J. Truesdale	Barrett Ute Tribal Well 9-19	U-96-AY-0559i
DC	Survey	AIA	J. Truesdale	Barrett Ute Tribal Well 15-19	U-96-AY-0560i
DC	Survey	AIA	J. Truesdale	Barrett Ute Tribal Well 16-21	U-96-AY-0561i
DC	Survey	AIA	J. Truesdale	Barrett Ute Tribal Well 5-21	U-96-AY-0562i
DC	Survey	AIA	J. Truesdale	Barrett Ute Tribal Well 3-19	U-96-AY-0563i
DC	Survey	AIA	J. Truesdale	Barrett Ute Tribal Well 3-25	U-96-AY-0564i
DC	Survey	AIA	J. Truesdale	Barrett Ute Tribal Well 1-21	U-96-AY-0565i
DC	Survey	AIA	J. Truesdale	Barrett Ute Tribal Well 7-21	U-96-AY-0566i
DC	Survey	AIA	J. Truesdale	Barrett Ute Tribal Well 5-22	U-96-AY-0567i
DC	Survey	AIA	J. Truesdale	Barrett Ute Tribal Well 2-25	U-96-AY-0568i

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County	Activity	Organization	Field Supervisor	Project Name	Project Number
DC	Survey	AIA	J. Truesdale	Barrett Ute Tribal Well 8-25	U-96-AY-0569i
DC	Survey	AIA	J. Truesdale	Petroglyph Section 17 in T5S, R3W	U-96-AY-0635i
DC	Survey	AIA	J. Truesdale	Petroglyph Section 10 in T5S, R3W	U-96-AY-0665i
DC	Survey	AIA	J. Truesdale	Petroglyph SE ¼ of Section 6 in T5S, R3W	U-96-AY-0666i
DC	Survey	AIA	J. Truesdale	Barrett Pipeline	U-96-AY-0689i
DC	Survey	BIA	N. Crozier	UOIR Consolidated 18	U-96-BI-0706i
DC	Survey	BIA	N. Crozier	UOIR STP-L304(1) Arcadia Road	U-96-BI-0709i
DC	Survey	BLM-Price	B. Miller	Ninemile Canyon 1996	U-96-BL-0730p
DC	Survey	Dames & Moore	E. Bassett	Fort Duchesne Sewage Facility	U-96-DH-0479i
DC	Survey	Metcalf	D. Barclay	Coastal UteTribal Well 2-31C6	U-96-MM-0246p
DC	Survey	Metcalf	D. Barclay	Coastal UteTribal Well 1-6D6	U-96-MM-0405i
DC	Survey	Metcalf	M. Metcalf	Enserch Federal 13-15H and 14-15H	U-96-MM-0385b
DC	Survey	Metcalf	M. Metcalf	Enserch Federal 31R-9H	U-96-MM-0386b
DC	Survey	Montgomery	K. Montgomery	Sixteen Wells in Wells Draw for Equitable	U-96-MQ-0703b
DC	Survey	Sagebrush	M. Polk	South Pleasant Valley Wells 9-19, 4-29 and 4-30 and Roads	U-96-SJ-0010b
DC	Survey	Sagebrush	H. Weymouth	Inland Resources Monument Butte Pipeline A	U-96-SJ-0011b,s
DC	Survey	Sagebrush	H. Weymouth	Inland Resources Monument Butte Pipeline B	U-96-SJ-0012b,s
DC	Survey	Sagebrush	H. Weymouth	Inland Resources Monument Butte Pipeline C	U-96-SJ-0013b,s
DC	Survey	Sagebrush	M. Polk	Inland Tar Sands Federal Wells 8-31, 9-31 and 15-31	U-96-SJ-0021b
DC	Survey	Sagebrush	H. Weymouth	Inland Tar Sands Wells 4-31, 5-31, 11-31 and 12-31	U-96-SJ-0022b
DC	Survey	Sagebrush	H. Weymouth	Pipeline for Hanging Rock Federal Well 1-16	U-96-SJ-0023b
DC	Survey	Sagebrush	H. Weymouth	Monument Butte Fed. 13-27 and Travis Fed. 1-33 and Roads	U-96-SJ-0024b
DC	Survey	Sagebrush	M. Polk	Inland OK Corral 4-28 Well	U-96-SJ-0047b
DC	Survey	Sagebrush	H. Weymouth	Inland Pipeline Group 2: Segments 1A-1D, 4 and 5 and Road	U-96-SJ-0074b
DC	Survey	Sagebrush	H. Weymouth	Inland Pipeline Group 2: Segment 2	U-96-SJ-0075b
DC	Survey	Sagebrush	H. Weymouth	Inland Pipeline Group 2: Segment 3	U-96-SJ-0076b
DC	Survey	Sagebrush	H. Weymouth	Gilsonite State Well 16-32 and Access Road	U-96-SJ-0077s
DC	Survey	Sagebrush	H. Weymouth	Boundary Federal Wells 15-21 and 16-21	U-96-SJ-0078b
DC	Survey	Sagebrush	H. Weymouth	Tar Sands Federal Wells 4-33 and 5-33 and Access Roads	U-96-SJ-0079b
DC	Survey	Sagebrush	H. Weymouth	Sundance State Wells 1-32 and 3-32 and Access Roads	U-96-SJ-0080s
DC	Survey	Sagebrush	H. Weymouth	Tar Sands Federal Wells 2-28, 3-28 and 4-28	U-96-SJ-0081b

ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY
1996 PROJECT NUMBERS ASSIGNED

County	Activity	Organization	Field Supervisor	Project Name	Project Number
DC	Survey	Sagebrush	H. Weymouth	Tar Sands Federal Well 1-31 and Access Road	U-96-SJ-0082b
DC	Survey	Sagebrush	H. Weymouth	Boundary Federal Wells 15-24 and 16-24	U-96-SJ-0116b
DC	Survey	Sagebrush	H. Weymouth	Tar Sands Federal Wells 4-30 and 5-30	U-96-SJ-0117b
DC	Survey	Sagebrush	H. Weymouth	Boundary Federal Well 13-19	U-96-SJ-0118b
DC	Survey	Sagebrush	H. Weymouth	Ashley Federal Wells 9-23, 10-24R, 11-24 and 12-24R	U-96-SJ-0119b
DC	Survey	Sagebrush	S. Ellis	Monument Butte Federal Wells 9-24, 10-24, 11-24 and 14-24	U-96-SJ-0134b
DC	Survey	Sagebrush	S. Ellis	Tar Sands Wells 12-30 and 13-30 and Addendum	U-96-SJ-0135b
DC	Survey	Sagebrush	S. Ellis	Inland Pipeline Additions and Addendum	U-96-SJ-0157b
DC	Survey	Sagebrush	M. Polk	Monument Butte NE Federal Wells 13-24, 4-25 and 5-25	U-96-SJ-0227b
DC	Survey	Sagebrush	W. Simmons Johnson	Inland Pipeline Group 3: Segment 1A	U-96-SJ-0250b
DC	Survey	Sagebrush	W. Simmons Johnson	Inland Pipeline Group 3: Segment 9	U-96-SJ-0251b
DC	Survey	Sagebrush	W. Simmons Johnson	Inland Pipeline Group 3: Segments 2 thru 8	U-96-SJ-0252b
DC	Survey	Sagebrush	W. Simmons Johnson	Monument Butte Federal Wells 2-34 and 4-34	U-96-SJ-0253b
DC	Survey	Sagebrush	W. Simmons Johnson	Monument Butte Federal Well 3A-35 and Access Road	U-96-SJ-0254b
DC	Survey	Sagebrush	W. Simmons Johnson	Boundary Federal Wells 5-19, 6-19 and 12-19 and Road	U-96-SJ-0255b
DC	Survey	Sagebrush	S. Murray Ellis	Monument Butte NE Federal Wells, Roads and Pipelines	U-96-SJ-0342b
DC	Survey	Sagebrush	H. Weymouth	Class II Survey at Starvation Reservoir	U-96-SJ-0362s
DC	Survey	Sagebrush	H. Weymouth	Tar Sands Federal Wells 3-30, 6-30, 11-30, 14-30 and 16-30	U-96-SJ-0474b
DC	Survey	Sagebrush	H. Weymouth	Inland Resources Waterline	U-96-SJ-0475b
DC	Survey	Sagebrush	H. Weymouth	Tar Sands Federal Wells 5-28 and 6-28	U-96-SJ-0476b
DC	Survey	Sagebrush	H. Weymouth	Tar Sands Federal Wells 1-29 and 8-29 and Roads	U-96-SJ-0477b
DC	Survey	Sagebrush	H. Weymouth	Tar Sands Federal Well 8-26	U-96-SJ-0478b
DC	Survey	Sagebrush	M. Polk	Wells Draw Federal Well 3-30	U-96-SJ-0542b
DC	Survey	Sagebrush	M. Polk	South Pleasant Valley Federal Well 3-22	U-96-SJ-0543b
DC	Survey	Sagebrush	S. Ellis	South Pleasant Valley Federal Well 2-20	U-96-SJ-0615b
DC	Survey	Sagebrush	S. Ellis	Idle Tribal Lands	U-96-SJ-0620i
DC	Survey	Sagebrush	S. Ellis	Pipeline Between Wells 9-25 and 16-25	U-96-SJ-0641b
DC	Survey	Sagebrush	H. Weymouth	Rainbow Federal Wells 8 through 12 and Roads	U-96-SJ-0660b
DC	Survey	Sagebrush	H. Weymouth	Monument Butte NE Well 7-26 and Monum. Butte Well 16-23	U-96-SJ-0674b
DC	Survey	USFS-Ashley	C. Cowan	Sowers Canyon Fence and Pipeline	U-96-FS-0225f
DC	Survey	USFS-Ashley	C. Todd	Timber Canyon Stone Sale	U-96-FS-0240f

ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY
1996 PROJECT NUMBERS ASSIGNED

County	Activity	Organization	Field Supervisor	Project Name	Project Number
DC	Survey	USFS-Ashley	K. Malmstrom	Grouse Creek Salvage Timber Sale	U-96-FS-0287f
DC	Survey	USFS-Ashley	K. Malmstrom	Dry Gulch Burn	U-96-FS-0359f
DC	Survey	USFS-Ashley	K. Malmstrom	Whiterocks River Bridges	U-96-FS-0363f
DC/UN	Survey	AERC	R. Hauck	Eleven Wells-Wells and Castle Pk. Draws/Pleasant V./Pariette	U-96-AF-0217b
DC/UN	Survey	AERC	R. Hauck	Pipeline Complexes in the Pariette Draw Locality	U-96-AF-0218b
DC/UN	Survey	AERC	G. Hadden	Five Wells-Wells Draw/Pariette Bench/8mile Flat/Big Wash	U-96-AF-0301b
DC/UN	Survey	AERC	R. Hauck	Two Monument State Wells - Castle Peak Draw	U-96-AF-0365s
DC/UN	Survey	Senco-Phenix	J. Senulis	Reliable Pariette Bench Prospect Seismic Line	U-96-SC-0495b,p
DV	Survey	University of Utah	D. Metcalfe	Antelope Island Field School	U-96-UA-0405s
EM	Survey	AERC	R. Hauck	Two Escarpment and Talus Zone Drill Sites in Rilda Canyon	U-96-AF-0396f
EM	Survey	ARCON	G. Norman	Two Drill Pads in Upper Huntington Canyon	U-96-AK-0582f
EM	Survey	Abajo	K. Montgomery	Huntington Creek Bridge Borrow Areas (UDOT)	U-96-AS-0109p
EM	Survey	Abajo	K. Montgomery	Texaco Grimes Wash and Buzzard Bench Drill Sites, Etc.	U-96-AS-0139b
EM	Survey	Abajo	K. Montgomery	Huntington Materials Fill Area (UDOT)	U-96-AS-0199s
EM	Survey	BLM-Price	B. Miller	Hyde Draw Burro Capture	U-96-BL-0272b
EM	Survey	BLM-Price	B. Miller	Taylor Flat Fence	U-96-BL-0273b,s
EM	Survey	BLM-Price	B. Miller	Horse Bench Fence	U-96-BL-0274b
EM	Survey	BLM-Price	B. Miller	Hebe Gypsum Mine	U-96-BL-0275b
EM	Survey	BLM-Price	B. Miller	University of Utah Drill Holes	U-96-BL-0295b
EM	Survey	BLM-Price	B. Miller	Cedar Mountain GPS Site	U-96-BL-0366b
EM	Survey	BLM-Price	B. Miller	Emery Dump Powerline	U-96-BL-0367b
EM	Survey	BLM-Price	B. Miller	1996 Motorcycle Race	U-96-BL-0505b,s
EM	Survey	BLM-Price	B. Miller	Little Wild Horse Trailhead	U-96-BL-0546s
EM	Survey	BLM-Richfield	C. Harmon	Dugout Well	U-96-BL-0101b
EM	Survey	GRI	C. Conner	Exxon Core Site	U-96-GB-0269b
EM	Survey	JBR	S. Billat	Cellular Tower Pad	U-96-JB-0358b
EM	Survey	JBR	R. Crosland	Cellular Tower Pad SW of Green River	U-96-JB-0408b
EM	Survey	Mariah	T. Reust	Class III Survey for US Gypsum Quarry	U-96-ME-0144b
EM	Survey	Metcalf	M. Metcalf	Ferron Chandler Federal Well 12-13-18-7	U-96-MM-0489b
EM	Survey	Montgomery	K. Montgomery	Four Texaco Drill Sites up Fish Creek in Huntington Canyon	U-96-MQ-0356b
EM	Survey	Montgomery	K. Montgomery	Four Locations in Grimes Wash for Anadarko	U-96-MQ-0249b,p,s

ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY
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County	Activity	Organization	Field Supervisor	Project Name	Project Number
EM	Survey	Montgomery	K. Montgomery	Texaco Grimes Wash Pipeline and Lateral A	U-96-MQ-0293s
EM	Survey	Montgomery	K. Montgomery	Lawrence Road Waste Disposal Area	U-96-MQ-0639p
EM	Survey	Montgomery	K. Montgomery	Texaco Grimes Wash and Cottonwood Creek Pipelines	U-96-MQ-0697b,p,s
EM	Survey	Montgomery	K. Montgomery	Texaco State "U" 2-48 Well	U-96-MQ-0698s
EM	Survey	Sagebrush	M. Polk	Texaco Buzzard Bench Pipeline	U-96-SJ-0009b,p
EM	Survey	Senco-Phenix	J. Senulis	Western Clay Gypsum Mine Block	U-96-SC-0466b
EM	Survey	SWCA	K. Quick	Questar Poison Springs Compressor Station	U-96-ST-0591b
EM	Survey	UDOT	S. Miller	UDOT SR-31 MP 19.1 Culvert Extension	U-96-UT-0554s
EM	Survey	USFS-Manti/La Sal	B. Blackshear	Mills Flat Road Improvements	U-96-FS-0056f
EM	Survey	USFS-Manti/La Sal	B. Blackshear	Huntington Cattleguard Fence	U-96-FS-0057f
EM	Survey	USFS-Manti/La Sal	B. Blackshear	Joe's Valley Reservoir Campground/Waterline/Marina	U-96-FS-0221f
EM	Survey	USFS-Manti/La Sal	S. McDonald	Juicy Fruit Gravel Source Area	U-96-FS-0244f
EM/SV	Analysis/Rept.	Alpine	R. Greubel	UDOT Eleven Sites: I-70/Castle Valley to Rattlesnake Bench	U-96-AI-0463b,s
EM/SV	Survey	Montgomery	J. Montgomery	Eight Locations in Packet A for Texaco Exploration	U-96-MQ-0248b,p,s
GA	Survey	BLM-Kanab	D. McFadden	Boulder Town Land Disposal Tract 37	U-96-BL-0061b
GA	Survey	BLM-Kanab	D. McFadden	McGath Point Road Trespass	U-96-BL-0062b
GA	Survey	BLM-Kanab	D. McFadden	Escalante Desert Catchments	U-96-BL-0070b
GA	Survey	BLM-Kanab	D. McFadden	Hildale Vicinity Reservoirs	U-96-BL-0163b
GA	Survey	BLM-Kanab	D. McFadden	Panguitch Community Clay Pit	U-96-BL-0164b
GA	Survey	BLM-Kanab	D. McFadden	Frank Pierce Rights of Way	U-96-BL-0371b
GA	Survey	BLM-Kanab	D. McFadden	Calf Creek Access Turnout	U-96-BL-0372b
GA	Survey	BLM-Kanab	D. McFadden	Hawkins Creek Fence	U-96-BL-0373b
GA	Survey	BLM-Kanab	D. McFadden	Haws Trespass	U-96-BL-0375b
GA	Survey	BLM-Kanab	D. McFadden	Wide Hollow Fence	U-96-BL-0376b
GA	Survey	BLM-Kanab	D. McFadden	Panguitch City Exchange	U-96-BL-0394b
GA	Survey	BLM-Kanab	D. McFadden	Rock Canyon Division Fence	U-96-BL-0427b
GA	Survey	BLM-Kanab	D. McFadden	BFD Inventory	U-96-BL-0681b
GA	Survey	BLM-Richfield	C. Harmon	Indian Spring Pipeline	U-96-BL-0098b
GA	Survey	BLM-Richfield	C. Harmon	Arches Reservoir	U-96-BL-0099b
GA	Survey	BLM-Richfield	C. Harmon	Cedar Point Well	U-96-BL-0100b
GA	Survey	BLM-Richfield	C. Harmon	Kaibab Gold Mill Site	U-96-BL-0712b

ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY
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County	Activity	Organization	Field Supervisor	Project Name	Project Number
GA	Survey	BLM-Richfield	C. Harmon	Ticaboo Pipeline and Trough	U-96-BL-0713b
GA	Survey	BYU-Museum	J. Janetski	Capitol Reef Year One - 1995	U-96-BC-0214n
GA	Monitor/Survey	NPS-Glen Canyon	N. Muller	1996 OCL Monitor and Recon	U-96-NA-0166n
GA	Survey	NPS-Glen Canyon	C. Goetze	1996 Escalante Rock Art Recording	U-96-NA-0261n
GA	Survey	SWCA	F. Miller	UDOT Maintenance Shed in Panguitch	U-96-ST-0005s
GA	Survey	SWCA	K. Quick	Ruby's Inn to Red Canyon Fiberoptic	U-96-ST-0338b,p,s
GA	Survey	USFS-Dixie	M. Jacklin	Prescribed Burns D-3	U-96-FS-0054f
GA	Survey	USFS-Dixie	M. Jacklin	Posy Lake Overlook Restoration	U-96-FS-0055f
GA	Survey	USFS-Dixie	M. Jacklin	Pine Lake Spawning Channel	U-96-FS-0305f
GA	Survey	USFS-Dixie	M. Jacklin	Single Rock Mistletoe	U-96-FS-0306f
GA	Survey	USFS-Dixie	M. Jacklin	East Slope Allotment Fence	U-96-FS-0308f
GA	Survey	USFS-Dixie	M. Jacklin	Horse Hollow Burn	U-96-FS-0309f
GA	Survey	USFS-Dixie	M. Jacklin	Barker Recreation Site Development	U-96-FS-0310f
GA	Survey	USFS-Dixie	M. Jacklin	Poison Creek Burn	U-96-FS-0311f
GA	Survey	USFS-Dixie	M. Jacklin	Garkane Land Exchange	U-96-FS-0583f
GA	Survey	USFS-Dixie	M. Jacklin	Jones Corral Burn	U-96-FS-0584f
GA/IN	Survey	USFS-Dixie	M. Jacklin	Blue Springs/Reeds Valley Salvage	U-96-FS-0325f
GA/KA	Survey	NPS-Glen Canyon	T. Burchett	Glen Canyon NRA Uplake Signs	U-96-NA-0140n
GA/PI	Survey	SWCA	K. Quick	Panguitch to Circleville Fiberoptic	U-96-ST-0339b,p,s
GR	Monitor	Abajo	K. Montgomery	UP&L Monitor of Power Removal at 42Gr2029	U-96-AS-0270b
GR	Survey	Abajo	M. Bond	Space Chimp White Wash Filming Location	U-96-AS-0634b
GR	Survey	Abajo	W. Davis	Grand County Capitol Reef Burr Trail Project	U-96-AS-0726n,s
GR	Survey	BLM-Grand	B. Louthan	Little Grand Wash Reservoirs	U-96-BL-0046b
GR	Survey	BLM-Grand	B. Louthan	Rim Tours Bike Trip Campsites	U-96-BL-0065b
GR	Survey	BLM-Grand	B. Louthan	FNAWS Floy & Crescent Fences & Reservoirs & Addendum	U-96-BL-0137b,s
GR	Survey	BLM-Grand	B. Louthan	Agate Wildlife Water Catchment	U-96-BL-0154b
GR	Survey	BLM-Grand	B. Louthan	Monument Wildlife Water Catchment	U-96-BL-0155b
GR	Survey	BLM-Grand	B. Louthan	East Thompson Boundary Fence	U-96-BL-0222b
GR	Survey	BLM-Grand	B. Louthan	Archview Trail Ride Camps	U-96-BL-0607b
GR	Survey	BLM-Grand	B. Louthan	Colin Fryer Agricultural Lease	U-96-BL-0609b
GR	Survey	BLM-Grand	B. Louthan	Dubinky Well Windmill Move	U-96-BL-0610b

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GR	Survey	BLM-Grand	B. Louthan	Big Cut Wildlife Fence	U-96-BL-0611b
GR	Survey	BLM-Grand	B. Louthan	Kayenta Heights Boulder Barrier	U-96-BL-0612b
GR	Survey	BLM-Grand	B. Louthan	Poison Spider Road and Parking	U-96-BL-0614b
GR	Survey	CASA	L. Hammack	Cellular Tower and Power Line NW of Crescent Junction	U-96-CH-0241b
GR	Survey	Desert West	K. Lupo	White Wash Filming Location	U-96-WZ-0072b
GR	Survey	4-Corners	C. DeFrancia	Deuel Federal Well No. 2 and Access	U-96-FE-0389b
GR	Survey	4-Corners	C. DeFrancia	Three Mineral Drill Sites in Salt Valley	U-96-FE-0507s
GR	Survey	4-Corners	C. DeFrancia	GCRL Seismosaur Federal Well No. 1	U-96-FE-0555b
GR	Survey	GRI	C. Conner	Cisco Seismic Line	U-96-GB-0268b
GR	Survey	Powers Elevation	G. Newberry	State Land Parcel - Bullfrog	U-96-PA-0053s
GR	Survey	USFS-Manti/La Sal	L. Hunt	Pinhook Gravel Pit	U-96-FS-0234f
GR	Survey	USFS-Manti/La Sal	L. Hunt	Miners Basin Trailhead	U-96-FS-0593f
GR	Survey	Utah Trust Lands	K. Wintch	Cedar Camp Canyon Timber Sale	U-96-UM-0518s
GR	Survey/Test	Utah State University	W. Fawcett	Utah State University Field School 1996 - Polar Mesa	U-96-UJ-0414b,,f
GR/SA	Survey	GRI	C. Conner	Two Film Locations - Determination Tower & Pyramid Butte	U-96-GB-0432b
GR/SA	Survey	USFS-Manti/La Sal	L. Hunt	Monticello Range MOU Compliance-1996	U-96-FS-0725f
IN	Survey	ARCON	G. Norman	Parowan Gap Project	U-96-AK-0413b
IN	Survey	BLM-Cedar City	G. Dalley	Woods Exchange	U-96-BL-0114b
IN	Survey	BLM-Cedar City	G. Dalley	Meadow Spring ROW	U-96-BL-0690b
IN	Survey	BLM-Kanab	D. McFadden	Sandy Creek Riparian Fence	U-96-BL-0374b
IN	Survey	Intersearch	B. Frank	Platt-Gilbert Development Sewer	U-96-IG-0676s
IN	Survey	JBR	R. Crosland	Cedar City 200 E 200 N St. Bridge over Coal Creek	U-96-JB-0058s
IN	Survey	SWCA	F. Miller	UDOT I-15 Frontage Road Near Fremont Wash	U-96-ST-0003b,s
IN	Survey	SWCA	F. Miller	Small Parcel Near Beryl	U-96-ST-0004p,s
IN	Survey	SWCA	K. Quick	LDS Church Survey	U-96-ST-0404p
IN	Survey	UDOT	S. Miller	UDOT SR-56 MP 42 to 43	U-96-UT-0174b,f,s
IN	Survey	UDOT	S. Miller	UDOT SR-56 MP 34.8 to 36.15 South Side Maintenance	U-96-UT-0490b,s
IN	Survey	USFS-Dixie	M. Jacklin	Rudd's Roost Road Update	U-96-FS-0369f
IN/WS	Survey	USFS-Dixie	M. Jacklin	West Side Vegetation Project	U-96-FS-0585f
JB	Survey	Baseline	J. Allison	Ashgrove Cement Plant Pipeline under SR-132 (UDOT)	U-96-BS-0388s
JB	Survey	BLM-Fillmore	N. Shearin	Snake Creek Road Realignment	U-96-BL-0026b

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County	Activity	Organization	Field Supervisor	Project Name	Project Number
JB	Survey	BLM-Fillmore	N. Shearin	Tom's Creek Channel	U-96-BL-0059b
JB	Survey	BLM-Fillmore	N. Shearin	Fish Springs Fence Extension #2	U-96-BL-0180b
JB	Survey	BLM-Fillmore	N. Shearin	West Skunky Springs/South Pine Pipeline	U-96-BL-0215b
JB	Survey	BLM-Fillmore	N. Shearin	Handcart Trek	U-96-BL-0283b
JB	Survey	BLM-Fillmore	N. Shearin	BYU Radar Test	U-96-BL-0322b
JB	Survey	BLM-Fillmore	N. Shearin	South Gilson Fire	U-96-BL-0480b
JB	Survey	BLM-Fillmore	N. Shearin	Black Mountain Fire	U-96-BL-0481b
JB	Survey	BLM-Fillmore	N. Shearin	Eric Fire	U-96-BL-0482b
JB	Survey	BLM-Fillmore	N. Shearin	Round Knoll Fire	U-96-BL-0484b
JB	Survey	BLM-Fillmore	N. Shearin	Boulter Fire	U-96-BL-0485b
JB	Survey	BLM-Fillmore	N. Shearin	Cherry Creek - Poll Fire	U-96-BL-0486b
JB	Survey	BLM-Fillmore	N. Shearin	Leamington Fire	U-96-BL-0487b
JB	Survey	BLM-Fillmore	N. Shearin	Cherry Creek	U-96-BL-0488b
JB	Survey	BLM-Fillmore	N. Shearin	Cane Springs Fence Enhancement	U-96-BL-0683b
JB	Survey	BLM-Fillmore	N. Shearin	Drum Mountain Drilling	U-96-BL-0684b
JB	Survey	BLM-Fillmore	N. Shearin	Quarry Spring Rock Sale	U-96-BL-0685b
JB	Survey	BLM-Richfield	C. Harmon	Radar Roof Guzzler	U-96-BL-0128b
JB	Test, Etc.	JBR	S. Billat	Brush Wellman Survey and Collection/Test at 42Jb507 & 509	U-96-JB-0216b
JB	Survey	JBR	M. Martin-Moore	Brush Wellman Pipeline	U-96-JB-0522b
JB	Survey	Sagebrush	W. Simmons Johnson	Nephi Airport Extension	U-96-SJ-0290p
JB/MD	Survey	BLM-Fillmore	N. Shearin	Wild Horse Traps	U-96-BL-0110b
JB/MD	Survey	BLM-Fillmore	N. Shearin	Little Sahara Complex Fire	U-96-BL-0483b
JB/TO	Survey	BLM-Fillmore	N. Shearin	Death Creek Fire Fence Extension	U-96-BL-0181b
JB/UT	Survey	Baseline	A. Nielson	Central Utah Telephone Fiberoptic from Goshen to Eureka	U-96-BS-0521b,p,s
KA	Survey	BLM-Kanab	D. McFadden	Early Weed Bench Pipeline Extension	U-96-BL-0069b
KA	Survey	BLM-Kanab	D. McFadden	Parunweap Canyon Community Trail Rides	U-96-BL-0132b
KA	Survey	BLM-Kanab	D. McFadden	Mineral Gulch Telephone Line	U-96-BL-0161b
KA	Survey	BLM-Kanab	D. McFadden	Dry Lake Seeding	U-96-BL-0162b
KA	Survey	BLM-Kanab	D. McFadden	Park Wash Gravel Pit	U-96-BL-0165b
KA	Survey	BLM-Kanab	Jacklin/McFadden	Trail Canyon Seeding	U-96-BL-0313b
KA	Survey	BLM-Kanab	D. McFadden	Long Canyon Gap Fence	U-96-BL-0328b

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County	Activity	Organization	Field Supervisor	Project Name	Project Number
KA	Survey	BLM-Kanab	D. McFadden	Lake Powell Communications Site	U-96-BL-0329b
KA	Survey	BLM-Kanab	D. McFadden	Sink Valley Shale Pit	U-96-BL-0377b
KA	Survey	BLM-Kanab	D. McFadden	Spencer Fuelwood Sale	U-96-BL-0378b
KA	Survey	BLM-Kanab	D. McFadden	Schoppman Exchange	U-96-BL-0402b
KA	Survey	BLM-Kanab	D. McFadden	Buckskin Wildlife Guzzlers	U-96-BL-0426b
KA	Survey	BLM-Kanab	D. McFadden	Wygaret Access Road	U-96-BL-0534b
KA	Survey	BLM-Kanab	D. McFadden	Buckskin Gulch Fire Rehab	U-96-BL-0535b
KA	Survey	Intersearch	B. Frank	Hansen-State Mineral Lease Survey	U-96-IG-0108s
KA	Survey	La Plata	S. Fuller	Conoco Reese Canyon Federal No. 1 Well	U-96-LA-0526b
KA	Survey	La Plata	S. Fuller	Conoco Reese Canyon Federal No. 2 Well	U-96-LA-0527b
KA	Survey	La Plata	S. Fuller	Conoco Reese Canyon State No. 1 Well and Road	U-96-LA-0528s
KA	Survey	La Plata	S. Fuller	Conoco Reese Canyon State No. 2 Well and Road	U-96-LA-0529s
KA	Survey	NPS-Glen Canyon	C. Goertze	1996 Kaiparowitz Plateau Recon	U-96-NA-0493n
KA	Survey	USFS-Dixie	M. Jacklin	Harris Flat Fence	U-96-FS-0071f
KA	Survey	USFS-Dixie	M. Jacklin	Meadow Canyon Burn	U-96-FS-0304f
KA	Survey	USFS-Dixie	M. Jacklin	Bull Rush Valley Road	U-96-FS-0307b
KA	Survey	USFS-Dixie	M. Jacklin	Muddy Creek NRCS Project	U-96-FS-0312b
KA	Survey	USFS-Dixie	M. Jacklin	Under The Rim/Crawford Pass Trail	U-96-FS-0461f
KA	Survey	USFS-Dixie	M. Jacklin	Virgin River Rim Trail Reroute	U-96-FS-0603f
KA	Survey	USFS-Dixie	M. Jacklin	Strawberry Road	U-96-FS-0604f
KA/SA	Survey	SWCA	L. Neal	Lake Powell Archaeological Survey	U-96-ST-0391n
KA/WS	Survey	NPS-Zion	M. Betenson	Historic Bridges in Need of Repair (Ka4264/Ws2899)	U-96-NA-0735n
MD	Survey	AERC	R. Hauck	Mamba Units 43-22 and 31-22 - Snake Valley	U-96-AF-0302b
MD	Survey	BLM-Fillmore	N. Shearin	Boyd Station Gravel Pit	U-96-BL-0025b
MD	Survey	BLM-Fillmore	N. Shearin	Antelope Spring Bat Gate	U-96-BL-0036b
MD	Survey	BLM-Fillmore	N. Shearin	Saegars Gravel Pit	U-96-BL-0111b
MD	Survey	BLM-Fillmore	N. Shearin	Geodetic Monitor Sites	U-96-BL-0160b
MD	Survey	BLM-Fillmore	N. Shearin	Nielson Placer Mine	U-96-BL-0226b
MD	Survey	BLM-Fillmore	N. Shearin	Red Canyon Rock Quarry	U-96-BL-0291b
MD	Survey	BLM-Fillmore	N. Shearin/E. Kreusch	Continental Lime Amendments 1 and 2	U-96-BL-0330b
MD	Survey	BLM-Fillmore	N. Shearin	Crown Drill Holes	U-96-BL-0422b

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MD	Survey	BLM-Fillmore	N. Shearin	Twin Peaks Fire	U-96-BL-0423b
MD	Survey	BLM-Fillmore	N. Shearin	Eightmile Fire	U-96-BL-0449b
MD	Survey	BLM-Fillmore	N. Shearin	Flowell Fire	U-96-BL-0450b
MD	Survey	BLM-Fillmore	N. Shearin	Red Canyon Rock Quarry 2	U-96-BL-0626b
MD	Survey	BLM-Fillmore	N. Shearin	Centurion Mines Notice Amendment	U-96-BL-0628b
MD	Survey	BLM-Fillmore	N. Shearin	Monument Point Community Pit	U-96-BL-0686b
MD	Survey	BLM-Fillmore	N. Shearin	South Flowell Fire Fence	U-96-BL-0687b
MD	Survey	BLM-Fillmore	N. Shearin	NOLS Camp	U-96-BL-0702b
MD	Excavation	BLM-Fillmore	N. Shearin	1996 Excavation at Thursday Site (42Md1053)	U-96-BL-0739b(e)
MD	Survey	BLM-Richfield	C. Harmon	Cove Fort Big Game Guzzler	U-96-BL-0092b
MD	Survey	BLM-Richfield	C. Harmon	Danish Reservoir Protection Fence	U-96-BL-0093b
MD	Survey	BLM-Richfield	C. Harmon	Cricket Chukar Guzzlers	U-96-BL-0094b
MD	Survey	BLM-Richfield	C. Harmon	Georges Big Game Guzzler	U-96-BL-0095b
MD	Survey	BLM-Richfield	C. Harmon	Pavant Water Developments	U-96-BL-0096b
MD	Survey	BLM-Richfield	C. Harmon	Devil's Kitchen Big Game Guzzler	U-96-BL-0097b
MD	Survey	BLM-Richfield	C. Harmon	Bluegrass Knoll Wildlife Waters	U-96-BL-0126b
MD	Survey	BLM-Richfield	C. Harmon	Marjum Pass Wildlife Waters	U-96-BL-0127b
MD	Survey	SWCA	J. Hirschi	Cox Rock Products Operation	U-96-ST-0189p
MD	Survey	UDOT	S. Miller	UDOT I-15 Burn Rehab No. 182	U-96-UT-0553b,s
MD	Survey	WCRM	C. Wheeler	Cricket Mountain Quarry Expansion 1996	U-96-WE-0519p,s
MO/WB	Survey	JBR	S. Billat	Three Pipeline Segments for Ogden Valley Project	U-96-JB-0167s
MULTI	Survey	Dames & Moore	E. Bassett	Three Coal Mines EM/GA/SV	U-96-DH-0050b,f,p
MULTI	Survey	NW Archaeo. Assoc.	R. Barlow	WorldCom Fiberoptic from Seattle to SLC BO/DV/SL/WB	U-96-NR-0131b,p,s
MULTI	Survey	USFS-Manti/La Sal	S. McDonald	Addendum to Scenic Byways Inventory EM/SP/UT	U-96-FS-0281b,p,s
MULTI	Survey	USFS-Manti/La Sal	S. McDonald	Four Vehicle Waysides on SR-31 and SR-264 CB/EM/SP/UT	U-96-FS-0494p,s
PI	Survey	BLM-Richfield	C. Harmon	Angle Bench	U-96-BL-0112b
PI	Survey	USFS-Fishlake	R. Leonard	Little Table Harrow and Burn	U-96-FS-0428f
PI/SV	Survey	USFS-Fishlake	R. Tuttle	Monroe Eastside Burn	U-96-FS-0718f
PI/WA	Survey	Dames & Moore	E. Bassett	Bullion Abandoned Mines	U-96-DH-0052f,p
RI	Survey	Baseline	J. Allison	Wheatgrass Fire Rehab.	U-96-BS-0520b
RI	Survey	BLM-Salt Lake	D. Melton	Rich County Weather Stations	U-96-BL-0399b

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RI	Survey	BLM-Salt Lake	D. Melton	Old Canyon Waterline	U-96-BL-0409b
RI	Survey	BLM-Salt Lake	D. Melton	DWR Rich County Projects	U-96-BL-0467b,s
SA	Survey	Abajo	W. Davis	Culinary Water Improvement Project for Bluff	U-96-AS-0048b,p,s
SA	Survey	Abajo	K. Montgomery	Holliday Construction Bluff Bench Materials Pit	U-96-AS-0169s
SA	Survey	Abajo	K. Montgomery	UDOT Kane Springs Wash Bridge and Additonal Areas	U-96-AS-0243b,p
SA	Excavation	Abajo	W. Davis/W. Hurst	Excavation at 42Sa18245	U-96-AS-0326b(e)
SA	Collection	Abajo	D. Westfall	UDOT SR-163: Burial at 42Sa23122	U-96-AS-0530p
SA	Excavation	Alpine	S. Chandler	Excavation/Reburial of Remains from Mill Site, Monticello	U-96-A1-0688w(e)
SA	Survey	Arizona State University	N. Mahoney	Cottonwood Wash Survey 1996	U-96-ZU-0741b
SA	Survey	BLM-Grand	B. Louthan	Shumway Lisbon Limestone Mines	U-96-BL-0136b
SA	Survey	BLM-Grand	B. Louthan	Charles Redd Ag/Barn Lease	U-96-BL-0223b
SA	Survey	BLM-Grand	B. Louthan	Mike Wilcox Reservoir Access Road	U-96-BL-0224b
SA	Survey	BLM-Grand	B. Louthan	Bill Groff Boulder Sale	U-96-BL-0606b
SA	Survey	BLM-Grand	B. Louthan	Grand County Gravel Pit Lease Renewal	U-96-BL-0608b
SA	Survey	BLM-Grand	B. Louthan	Continental Minerals Uranium Drilling	U-96-BL-0613b
SA	Monitor	BLM-San Juan	E. Kreusch	1996 Comb Wash Monitoring	U-96-BL-0434b
SA	Survey	CASA	M. Erickson	The Kee Topahah/Louise Begay Homesite	U-96-CH-0014i
SA	Survey	CASA	M. Erickson	Cave Canyon 13-3 Powerline	U-96-CH-0015b
SA	Survey	CASA	N. Hammack	Five Aneth Chapter Homesites	U-96-CH-0083i
SA	Survey	CASA	N. Hammack	Mobil Area Six Pipeline	U-96-CH-0084i
SA	Survey	CASA	N. Hammack	Mobil Area Two Pipeline	U-96-CH-0085i
SA	Survey	CASA	L. Hammack	Section 7 Pipeline for Mobil's McElmo Creek Unit	U-96-CH-0130i
SA	Survey	CASA	L. Hammack	Mobil's Ratherford Unit Section 12 Surface Flow Line	U-96-CH-0151i
SA	Survey	CASA	L. Hammack	Four Red Mesa and Aneth Chapter Homesites	U-96-CH-0152i
SA	Survey	CASA	L. Hammack	Westec Alkali Ridge Wells 8-29, 12-28 and 4-33	U-96-CH-0153b,i
SA	Survey	CASA	L. Hammack	White Mesa Water Line	U-96-CH-0242b,i,p
SA	Survey	CASA	L. Hammack	Sections 12 and 13 and NE ¼ Sec. 24 in Mobil/Ratherford	U-96-CH-0470i
SA	Survey	CASA	M. Errickson	Sixty Homesites and Waterline Exten.-Shiprock (also AZ/NM)	U-96-CH-0492i
SA	Survey	CASA	L. Hammack	Mobil Flow Lines and Power Lines in Red Mesa	U-96-CH-0538i
SA	Survey	CASA	N. Hammack	Mobil Block Survey in Section 21, Ratherford Unit	U-96-CH-0573i
SA	Survey	CASA	L. Hammack	Goulding's Airport Expansion	U-96-CH-0575i

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County	Activity	Organization	Field Supervisor	Project Name	Project Number
SA	Survey	CASA	M. Errickson	Six Sand Sources in Mobil's Ratherford Unit	U-96-CH-0592i
SA	Survey	CASA	N. Hammack	NAHIS Fifty Homesites and 3.1 Miles of Waterline Extension	U-96-CH-0597i
SA	Survey	CASA	L. Hammack	The Begay/Ben/Nez Powerline for UP&L	U-96-CH-0650i
SA	Survey	CASA	D. Loebig	Sections 17 and 20 in Mobil Ratherford Unit	U-96-CH-0716i
SA	Survey	CASA	D. Loebig	Mobil Sections 18 and 19	U-96-CH-0717i
SA	Excavation	University of Colorado	M. Bond	Excavation at Bluff Great House, 42Sa22674	U-96-CJ-0284p(e)
SA	Excavation	Edge of the Cedars	T. Prince	1996 Hogan Excavation at Edge of the Cedars, 42Sa700	U-96-UD-0471s(e)
SA	Survey	4-Corners	C. DeFrancia	Knockdhu Well Pad and Access	U-96-FE-0039b
SA	Survey	4-Corners	C. DeFrancia	Aultmore No.1 Well	U-96-FE-0263b
SA	Survey	4-Corners	C. DeFrancia	Knockando Well	U-96-FE-0264b
SA	Survey	4-Corners	C. DeFrancia	Knockdhu Federal No. 1 Pipeline	U-96-FE-0237b,p
SA	Survey	4-Corners	C. DeFrancia	Knockdhu No. 2 Well	U-96-FE-0390b
SA	Survey	4-Corners	C. DeFrancia	Spanish Valley Gravel Quarry	U-96-FE-0513s
SA	Survey	4-Corners	C. DeFrancia	Aultmore No. 1-24X Well	U-96-FE-0514b
SA	Survey	4-Corners	C. DeFrancia	Mountain Gravel Spanish Valley 18-B Materials Site	U-96-FE-0533s
SA	Survey	4-Corners	C. DeFrancia	Nos. 3 and 5 Knockdhu Units	U-96-FE-0677b,s
SA	Survey	4-Corners	C. DeFrancia	No. 4 Knockdhu Unit	U-96-FE-0678b
SA	Survey	La Plata	S. Fuller	Cherokee Federal 43-14 Well	U-96-LA-0208b
SA	Survey	Montgomery	J. Montgomery	Doward Productions Shafer Basin Film Location	U-96-MQ-0441b
SA	Survey	Montgomery	K. Montgomery	Key Construction Materials Pit	U-96-MQ-0544s
SA	Damage Assess	Navajo Nation	N. Coulam	Looting at Site UT-C-41-115 (42Sa23208)	U-96-NK-0738i
SA	Survey	NPS-Canyonlands	N. Coulam	Murphy Point Campsite, Island-in-the-Sky District	U-96-NA-0637n
SA	Survey	NPS-Canyonlands	N. Coulam	Cave Springs Barrier-Free Trail	U-96-NA-0638n
SA	Survey	UDOT	S. Miller	UDOT SR-95 Maintenance between MP 118 and 121	U-96-UT-0171b,s
SA	Survey	UDOT	S. Miller	UDOT SR-46 Maintenance at Various Locations	U-96-UT-0172b,s
SA	Survey	UDOT	S. Miller	UDOT SR-191 MP 108.4, 108.7 and 109.8-110.11 Maint.	U-96-UT-0498b,s
SA	Survey	USFS-Manti/La Sal	L. Hunt	King Edward Mine Rehabilitation	U-96-FS-0029f
SA	Survey	USFS-Manti/La Sal	L. Hunt	Shumway Mining Claims in North Whiskers Draw	U-96-FS-0067f
SA	Survey	USFS-Manti/La Sal	L. Hunt	DOE Slope Stability Assessment vic. Dry Wash Reservoir	U-96-FS-0129f
SA	Monitor/Survey	USFS-Manti/La Sal	L. Hunt	South Elks Salvage Road Improvements	U-96-FS-0233f
SA	Survey	USFS-Manti/La Sal	D. Harber	Tony Mine Shaft Closure	U-96-FS-0594f

ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY
1996 PROJECT NUMBERS ASSIGNED

County	Activity	Organization	Field Supervisor	Project Name	Project Number
SA	Survey	USFS-Manti/La Sal	G. Denton	Recreational Lakes Survey	U-96-FS-0595f
SA	Survey	USFS-Manti/La Sal	G. Denton	South Long Point Salvage Sale	U-96-FS-0596f
SA	Survey	USFS-Manti/La Sal	L. Hunt	Lewis Lodge Rim Survey	U-96-FS-0719f
SA	Survey	USFS-Manti/La Sal	D. Keller	Reconnaissance in Dark and Woodenshoe Canyons	U-96-FS-0720f
SA	Survey	Utah Trust Lands	K. Wintch	Hart's Point Road Work Evaluation	U-96-UM-0682s
SA	Test	Woods Canyon	J. Fetterman	Testing at Site 42Sa12603 (ML-956) - Cream Pots	U-96-WN-0721f
SL	Survey	Baseline	A. Nielson	UDOT Jordan River and E. Jordan Canal Bridges Replacement	U-96-BS-0089s
SL	Survey	Baseline	A. Nielson	Jordan River Blvd. in Midvale (UDOT)	U-96-BS-0090p,s
SL	Test	Baseline	J. Allison	Salt Lake Airport 1996-1997 Test Excavations	U-96-BS-0662s
SL	Survey	Dames & Moore	E. Bassett	Jordan River Bike Path Phase II	U-96-DH-0124s
SL	Survey	Dames & Moore	E. Bassett	Midvale Pioneer Cemetery Delineation Study	U-96-DH-0446p
SL	Survey	Sagebrush	M. Polk	UDOT Bangerter Highway/Redwood Road Project	U-96-SJ-0380p,s
SL	Survey	Sagebrush	M. Polk	UDOT Draper Bridge Survey	U-96-SJ-0435s
SL	Survey	Sagebrush	S. Ellis	UDOT I-15 Wetlands Mitigation	U-96-SJ-0438p
SL	Survey	Sagebrush	S. Ellis	Sitex 94th South Parcel, Sandy City	U-96-SJ-0693p
SL	Survey	Sagebrush	S. Ellis	138th South Frontage Roads (UDOT)	U-96-SJ-0694p,s
SL	Survey	UDOT	R. Rood	UDOT Jordan River Bridge, East Jordan Canal	U-96-UT-0355s
SL	Survey	UDOT	R. Rood	UDOT SR-210 and Wasatch Blvd.	U-96-UT-0447s
SL	Survey	UDOT	R. Rood	UDOT Surplus Properties-Saltair and Sugarhouse	U-96-UT-0448s
SL	Survey	UDOT	R. Rood	UDOT 5600 West Proposed Wetlands	U-96-UT-0508s
SL	Survey	UDOT	R. Rood	UDOT 5300 South Land Sale	U-96-UT-0537
SL	Survey	USFS-Wasatch/Cache	C. Thompson	Brighton 5-Year Plan	U-96-FS-0297f
SL	Survey	USFS-Wasatch/Cache	C. Thompson	Snowbird 5-Year Plan	U-96-FS-0298f
SL	Survey	USFS-Uinta	S. Nelson	Pacific Corp Pipeline	U-96-FS-0341f
SM	Survey	Baseline	A. Nielson	Oakley – Weber River Bridge (UDOT)	U-96-BS-0087s
SM	Survey	Baseline	A. Nielson	Union Pacific RR Bridge, Henefer (UDOT)	U-96-BS-0088s
SM	Survey	BLM-Salt Lake	D. Melton	Transwasatch Road Improvement	U-96-BL-0245b,p
SM	Survey	BYU-OPA	R. Talbot	BOR Rockport State Park Improvements	U-96-BC-0346w
SM	Survey	Dames & Moore	E. Bassett	Black Hawk Mining Site	U-96-DH-0458p
SM	Survey	UDOT	R. Rood	Weber River Bridge Replacement	U-96-UT-0353s
SM	Survey	UDOT	R. Rood	Weber River Bridge Area	U-96-UT-0407s

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County	Activity	Organization	Field Supervisor	Project Name	Project Number
SM	Survey	UDOT	R. Rood	Wasatch Remote Weather Station	U-96-UT-0468s
SM	Survey	UDOT	R. Rood	UDOT Henefer RR Bridge	U-96-UT-0695s
SM/WA	Survey	BYU-OPA	R. Talbot	Jordanelle Land Exchange	U-96-BC-0679w
SP	Survey	USFS-Manti/La Sal	R. Matthies	Patton Trailhead Development	U-96-FS-0182f
SP	Survey	USFS-Manti/La Sal	B. Blackshear	Willow Creek Gravel Pit	U-96-FS-0267f
SP	Survey	USFS-Manti/La Sal	B. Blackshear	Wales Fence Reconstruction Project	U-96-FS-0415f
SP	Survey	USFS-Manti/La Sal	B. Blackshear	Ephraim Canyon Road Closures	U-96-FS-0657f
SP/SV	Survey	USFS-Manti/La Sal	S. McDonald	1995 Annual Report for South Manti Timber Sale	U-96-FS-0168f
SV	Survey	AERC	R. Hauck/G. Hadden	Mining Subsidence Zone in Box Canyon	U-96-AF-0443f
SV	Survey	AERC	R. Hauck	Two Drill Locations in the Big Ridge Locality	U-96-AF-0549f
SV	Survey	Intersearch	B. Frank	Koosharem-Kunz Land Survey	U-96-IG-0285i
SV	Survey	NPS-MWAC	K. Cannon	Evaluation of 42Sv2298	U-96-NA-0411f
SV	Survey	Senco-Phenix	J. Senulis	Clear Creek Canyon Forty Acre Trust Lands Block	U-96-SC-0453s
SV	Survey	UDOT	S. Miller	UDOT Stockpile for the SR-50/SR-260 Junction	U-96-UT-0465b,s
SV	Survey	USFS-Fishlake	R. Leonard	The Gooseberry Chaining	U-96-FS-0266f
SV	Survey	USFS-Fishlake	T. Cartwright	Rock Springs Dixie Harrow	U-96-FS-0357f
SV	Survey	USFS-Fishlake	R. Leonard	Bell Rock Ridge Harrow	U-96-FS-0429f
SV	Survey	USFS-Fishlake	R. Leonard	Buffalo Skull from Coal Mine Creek	U-96-FS-0525f
SV	Survey	USFS-Fishlake	R. Leonard	Sevier Creek Harrow Burn	U-96-FS-0727f
SV	Survey	USFS-Fishlake	R. Leonard	Salina Creek Dixie Harrow	U-96-FS-0729f
TO	Survey	Baseline	J. Allison	Access Road Alt. No. 4 near the Grassy Mountain Facility	U-96-BS-0001b
TO	Survey	BLM-Salt Lake	M. Brewster	Leppy Peak Material Pit Expansion	U-96-BL-0017b
TO	Survey	BLM-Salt Lake	M. Brewster	National Guard Forward Arming and Refueling Point	U-96-BL-0018b
TO	Survey	BLM-Salt Lake	M. Brewster	Cedar Mountain Wildlife Guzzlers	U-96-BL-0020b
TO	Survey	BLM-Salt Lake	D. Melton	Hidden Treasure II Drill Holes	U-96-BL-0145b
TO	Survey	BLM-Salt Lake	D. Melton	BHP West Dip Project	U-96-BL-0146b
TO	Survey	BLM-Salt Lake	D. Melton	Twelve Mile Fence	U-96-BL-0147b
TO	Survey	BLM-Salt Lake	D. Melton	Mercur West Dip Project	U-96-BL-0175b,p
TO	Survey	BLM-Salt Lake	D. Melton	Dump Closures	U-96-BL-0183b
TO	Survey	BLM-Salt Lake	D. Melton	Deep Creek Test Wells	U-96-BL-0184b
TO	Survey	BLM-Salt Lake	D. Melton	FARP	U-96-BL-0185b

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County	Activity	Organization	Field Supervisor	Project Name	Project Number
TO	Survey	BLM-Salt Lake	R. Macpherson	Stansbury Island Survey	U-96-BL-0382b
TO	Survey	BLM-Salt Lake	D. Melton	Lower Sunshine Drill Hole	U-96-BL-0392b
TO	Survey	BLM-Salt Lake	D. Melton	Watson Wild Horse Trap	U-96-BL-0400b
TO	Survey	BLM-Salt Lake	D. Melton	Dugway Mountains Drillholes	U-96-BL-0431b,p
TO	Survey	BLM-Salt Lake	D. Melton	BHP Tetzlaff Peak Project	U-96-BL-0442b
TO	Survey	BLM-Salt Lake	D. Melton	Silverado Canyon Drill Holes	U-96-BL-0511b
TO	Survey	BLM-Salt Lake	D. Melton	Sheep Rock EFR	U-96-BL-0512b
TO	Survey	BLM-Salt Lake	D. Melton	The Timm Exchange	U-96-BL-0523b
TO	Survey	BLM-Salt Lake	D. Melton	Davis Knolls EFR	U-96-BL-0640b
TO	Survey	Dames & Moore	E. Bassett	Dugway/Wig Mountain Survey	U-96-DH-0045m
TO	Survey	Desert West	K. Carambelas	Low Communication Towers	U-96-WZ-0576b
TO	Survey	Dugway PG	K. Callister	Fiberoptic Line from Wig Launch Site to CALCM Area	U-96-DU-0125m
TO	Survey	Dugway PG	K. Callister	Proposed Firing Points West of Granite Peak	U-96-DU-0170m
TO	Survey	Dugway PG	K. Callister	Site Recordation at Black Point	U-96-DU-0198m
TO	Survey	Dugway PG	K. Callister	Air Combat Comm. Mini-Mules Site Nos. 9, 4 & 8	U-96-DU-0393m
TO	Survey	Dugway PG	K. Callister	1996 North Little Davis Mountain Burn	U-96-DU-0622m
TO	Excavation	Dugway PG	D. Madsen	Excavation at Camel's Back Cave, 42To392	U-96-DU-0737m(e)
TO	Survey	Hill AFB	D. Weder	WSEP Fiber Optic Line	U-96-HL-0123m
TO	Survey	Hill AFB	D. Weder	JDAM Target	U-96-HL-0303m
TO	Survey	Hill AFB	D. Weder	Three GPS Jammers	U-96-HL-0440m
TO	Survey	Sagebrush	H. Weymouth	Tooele Army Depot '96	U-96-SJ-0395m
TO	Survey	USFS-Uinta	M. Depietro	Larry's BLM/FS Pipeline and Trough	U-96-FS-0259b,f
TO	Survey	USFS-Uinta	M. Depietro	Little Valley Pipeline Extension and Riparian Exclosure	U-96-FS-0260f
TO	Survey	USFS-Uinta	C. Thompson	Dog Hollow Homestead	U-96-FS-0319f
TO	Survey	Weber State University	B. Arkush	Utah Test and Training Range 1996	U-96-WC-0506m
TO/NV	Damage Assess	Weber State University	B. Arkush	Vandalism Assessment for Four Sites on the UTTR	U-96-WC-0138m
TO/NV	Test	Weber State University	B. Arkush	Test Excavation of Three Prehistoric Sites on the UTTR	U-96-WC-0734m
UN	Survey	AERC	R. Hauck	Gas Pipeline in the Evacuation Creek Locality	U-96-AF-0142b
UN	Survey	AERC	R. Hauck	Borrow Area on Indian Bench	U-96-AF-0210p
UN	Survey	AERC	R. Hauck	Two Well Locations - Asphalt Wash/Atchees Wash	U-96-AF-0236b
UN	Survey	AERC	R. Hauck	Federal Unit No. 17-6 in the Atchee Wash Locality	U-96-AF-0256b

ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY
1996 PROJECT NUMBERS ASSIGNED

County	Activity	Organization	Field Supervisor	Project Name	Project Number
UN	Survey	AERC	R. Hauck/G. Hadden	Rockhouse Units 17 and 18 in the Saddletree Draw Locality	U-96-AF-0300b
UN	Survey	AERC	R. Hauck	Two Monument Federal Wells in the Eightmile Flat Locality	U-96-AF-0364b
UN	Survey	AERC	R. Hauck	Five Monument Federal Wells in the Pariette Bench Locality	U-96-AF-0397b
UN	Survey	AERC	R. Hauck	Gravel Pit in the Buckskin Hills	U-96-AF-0412s
UN	Survey	AERC	R. Hauck	Three Wells in the Eightmile Flat-Pariette Draw Locality	U-96-AF-0444b
UN	Survey	AERC	R. Hauck	Nine Wells, Access and Pipelines in the White River Locality	U-96-AF-0557i
UN	Survey	AERC	R. Hauck	Wells and Pipelines in the White River Locality	U-96-AF-0701i
UN	Survey	AIA	J. Truesdale	Del Rio Pipeline	U-96-AY-0649i
UN	Survey	BIA	N. Crozier	UOIR Consolidated 19	U-96-BI-0707i
UN	Survey	BIA	N. Crozier	UOIR Consolidated 20	U-96-BI-0708i
UN	Survey	BLM-Vernal	B. Phillips	Wild Rose Water Flood	U-96-BL-0158b
UN	Survey	BLM-Vernal	B. Phillips	Uintah County Landfill Extension	U-96-BL-0197b
UN	Survey	BLM-Vernal	E. Moncrief	Big Brush Creek	U-96-BL-0247b
UN	Survey	BLM-Vernal	R. Fowler	Davis Canyon Corral	U-96-BL-0348b
UN	Survey	BLM-Vernal	B. Phillips	Barry Gale Sand Test Pits	U-96-BL-0349b
UN	Survey	BLM-Vernal	L. Moncrief	Gate Canyon Building Stone EA	U-96-BL-0464b
UN	Survey	BLM-Vernal	B. Phillips	Chevron U.S.A. Red Wash Unit No. 261	U-96-BL-0598b
UN	Survey	BYU-OPA	R. Talbot	Steinaker Phase 2	U-96-BC-0580w
UN	Survey	Dames & Moore	E. Bassett	Domestic Sewage Disposal Facility at Ft. Duchesne	U-96-DH-0579i
UN	Survey	GRI	C. Conner	No. 1 State Well and Related Access	U-96-GB-0368s
UN	Survey	JBR	S. Billat	James Allen Power Line near Steinaker Reservoir	U-96-JB-0439b,p,w
UN	Survey	Metcalf	K. Pool	Water Injection Line Between Ute Wells 15-1 and 21-3B	U-96-MM-0019i
UN	Survey	Metcalf	D. Barclay	Chandler Glen Bench 8-19 Access and Pipeline	U-96-MM-0073b,i
UN	Survey	Metcalf	D. Barclay	Ute Tribal 22-4-I Access Road	U-96-MM-0086i
UN	Survey	Metcalf	D. Barclay	Chandler Baser Wash Federal Well 10-18-7-22	U-96-MM-0104b
UN	Survey	Metcalf	D. Barclay	Chandler Sage Grouse Federal Well 6-14-8-22	U-96-MM-0105b
UN	Survey	Metcalf	D. Barclay	Chandler Larson Federal Well 12-3-8-23	U-96-MM-0106b
UN	Survey	Metcalf	D. Barclay	Chandler Toll Station State 8-36-8-21	U-96-MM-0122b
UN	Survey	Metcalf	D. Barclay	Gerrity Oil and Gas Antelope Federal Well 20-3	U-96-MM-0150b
UN	Survey	Metcalf	J. Scott	Glen Bench 15-19-8-22 Well	U-96-MM-0193i
UN	Survey	Metcalf	J. Scott	Del-Rio Resources Orion 32-1A Project	U-96-MM-0194i

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County	Activity	Organization	Field Supervisor	Project Name	Project Number
UN	Survey	Metcalf	J. Scott	Chandler Glen Bench Unit 5-30-8-22	U-96-MM-0200i
UN	Survey	Metcalf	J. Scott	Coastal Compressor Site No. 3	U-96-MM-0350b
UN	Survey	Metcalf	J. Scott	Coastal Compressor Sites in Section 17, T9S, R21E	U-96-MM-0351i
UN	Survey	Metcalf	J. Scott	Coastal Compressor Site No. 5	U-96-MM-0352b
UN	Survey	Metcalf	M. Metcalf	Enserch Exploration 44-18I and 34-18I	U-96-MM-0387b
UN	Survey	Metcalf	D. Barclay	Snyder Leland Bench Gathering System	U-96-MM-0469i
UN	Survey	Metcalf	C. Graham	Chandler Pipeline from Sage Grouse Federal Well 6-14-8-22	U-96-MM-0539b,s
UN	Survey	Metcalf	C. Graham	Chandler Purdy Prospects 3-35-7-21 and 6-34-7-21	U-96-MM-0545b
UN	Survey	Metcalf	C. Graham	Chandler Tribal 4-30 Tie-In Pipeline	U-96-MM-0548i
UN	Survey	Metcalf	J. Scott	NBU No. 4 to F8 10" Pipeline and CIGE 4" Gathering Line	U-96-MM-0571i
UN	Survey	Metcalf	J. Scott	CIGE 28 to CIGE 133 Pipeline	U-96-MM-0572s
UN	Survey	Metcalf	C. Spath	Snyder's Stirrup State No. 32-6 Well and Access	U-96-MM-0602s
UN	Survey	Metcalf	K. Pool/J. Scott	Chandler Purdy Federal Well 6-34-7-21	U-96-MM-0642b
UN	Survey	Metcalf	D. Barclay	Coastal NBU 236, 237-Alt. 1 and 238-Alt. 1 Wells	U-96-MM-0643b
UN	Survey	Metcalf	D. Barclay	Coastal NBU 239, 240 and 242 Wells	U-96-MM-0644b
UN	Survey	Metcalf	J. Scott	Coastal NBU 243, 244 and 245 Wells	U-96-MM-0645b
UN	Survey	Metcalf	K. Pool/J. Scott	Coastal NBU 246, 247 and 249 Wells	U-96-MM-0646b,s
UN	Survey	Metcalf	D. Barclay	Coastal CIGE 189, 190 and 195 Wells	U-96-MM-0647s
UN	Survey	Metcalf	Barclay/Pool/Scott	Coastal CIGE 193, 194 and 196 Wells	U-96-MM-0648b
UN	Survey	Metcalf	Barclay/Scott/Pool	Coastal CIGE 197, 198, 199, 200, 201 and 202 Wells	U-96-MM-0652i
UN	Survey	Metcalf	D. Barclay	Coastal NBU 252, 254, 255 and 256 Wells and Access	U-96-MM-0653i
UN	Survey	Metcalf	D. Barclay/J. Scott	Coastal CIGE 204 and 205 Wells	U-96-M M-0654s
UN	Survey	Metcalf	D. Barclay/J. Scott	Coastal NBU 257,258, 259, 263 and 265 Wells	U-96-MM-0655s
UN	Survey	Metcalf	D. Barclay	Coastal NBU 206, 260, 262 and 264 Wells	U-96-MM-0656b
UN	Survey	Metcalf	D. Barclay	Eight Coastal Morgan State Wells: 6 through 13-36	U-96-MM-0680s
UN	Survey	Metcalf	M. Metcalf	JPS AeroConsultants Vernal-Uintah County Airport	U-96-MM-0692b,s
UN	Survey	Metcalf	D. Barclay	Flying J Oil and Gas Gusher No. 12-24 Well	U-96-MM-0710b
UN	Survey	Sagebrush	H. Weymouth	Wild Rose Well 13-28	U-96-SJ-0120b
UN	Monitor	Sagebrush	H. Weymouth	Monitor for Wild Rose Well 12-24	U-96-SJ-0121b
UN	Survey	Sagebrush	M. Polk	Five Wells and Associated Access Roads and Pipelines	U-96-SJ-0228b
UN	Survey	Sagebrush	H. Weymouth	Flu Knolls Federal Well No. 23-3 and Access Road	U-96-SJ-0379b,s

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County	Activity	Organization	Field Supervisor		
UN	Survey	Sagebrush	H. Weymouth	Tar Sands Federal Wells 6-33 and 12-33, Pipelines and Roads	U-96-SJ-0659b
UN	Survey	Sagebrush	H. Weymouth	Inland Pipeline between Wells 1-25 and 9-25	U-96-SJ-0661b
UN	Survey	Senco-Phenix	J. Senulis	Flowline in the Red Wash Oil and Gas Field	U-96-SC-0190b
UN	Survey	Senco-Phenix	J. Senulis	Brennan Basin Oil and Gas Field Expansion-USF&W Lands	U-96-SC-0331w
UN	Survey	Senco-Phenix	J. Senulis	Brennan Basin Oil and Gas Field Expansion Phase 1-Part 2	U-96-SC-0332b
UN	Survey	Senco-Phenix	J. Senulis	Leland Bench Seismic	U-96-SC-0454i,p
UN	Survey	Senco-Phenix	J. Senulis	Chevron Red Wash Units 259 and 260 and Access	U-96-SC-0551s
UN	Survey	Senco-Phenix	J. Senulis	Chevron Red Wash Unit 207 Well Pad	U-96-SC-0552b
UN	Survey	Senco-Phenix	J. Senulis	Powerline for Red Wash 43/173/259/260/261/303 Wells	U-96-SC-0663b,s
UN	Survey	USFS-Ashley	K. Wilkins	East Park Salvage Sales	U-96-FS-0229f
UN	Survey	USFS-Ashley	B. Loosle	Key Squires Pipeline for NRCS	U-96-FS-0230p
UN	Survey	USFS-Ashley	D. Wilson	Gravel Pit Salvage Sales	U-96-FS-0239f
UN	Survey	USFS-Ashley	K. Malmstrom	South Charleys Park Timber Sale	U-96-FS-0277f
UN	Survey	USFS-Ashley	K. Malmstrom	Dodds Hollow	U-96-FS-0279f
UN	Survey	USFS-Ashley	K. Malmstrom	Phoneline Pipeline	U-96-FS-0280f
UN	Survey	USFS-Ashley	K. Malmstrom	Range Study Restroom	U-96-FS-0286f
UN	Survey	USFS-Ashley	K. Malmstrom	North and South Fork Road Improvement	U-96-FS-0288f
UN	Survey	USFS-Ashley	K. Malmstrom	Frenches/Alma Taylor Sales	U-96-FS-0289f
UN	Survey	USFS-Ashley	K. Malmstrom	Dry Fork Flume	U-96-FS-0361f
UN	Survey	USFS-Ashley	K. Malmstrom	Big Lake Burn	U-96-FS-0420f
UN	Survey	USFS-Ashley	B. Loosle	High Uintas Lightning Park PIT Survey	U-96-FS-0430f
UT	Survey	Baseline	A. Nielson	Central Telephone - Sheep Creek to Thistle	U-96-BS-0282b,p
UT	Survey	Baseline	J. Allison	Central Telephone - Clear Creek to Sheep Creek	U-96-BS-0321s
UT	Survey	Baseline	A. Nielson	Five Historic Bridges and Surrounding Areas	U-96-BS-0333p,s
UT	Survey	Baseline	A. Nielson	Inventory of Mapleton Lateral	U-96-BS-0696w
UT	Survey	BLM-Salt Lake	D. Melton	Clay Canyon Drill Holes	U-96-BL-0205b
UT	Survey	BLM-Salt Lake	D. Melton	Wiley Community Pit	U-96-BL-0206b
UT	Survey	BLM-Salt Lake	D. Melton	Clay Canyon II Drill Holes	U-96-BL-0510b
UT	Survey	BYU-Museum	S. Baker	Murdock Canal Bridge Survey	U-96-BC-0691w
UT	Survey	BYU-OPA	S. Baker	Mapleton Canal Bridge Survey	U-96-BC-0195w
UT	Survey	BYU-OPA	R. Talbot	CUP Diamond Fork Pipeline for BOR	U-96-BC-0209f

ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY
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County	Activity	Organization	Field Supervisor	Project Name	Project Number
UT	Survey	Montgomery	J. Montgomery	Hobble Creek Road in Springville	U-96-MQ-0433p,s
UT	Survey	UDOT	S. Miller	UDOT White River Bridge Replacement Addendum	U-96-UT-0262p,s
UT	Survey	UDOT	R. Soper	UDOT Two Bridges in Spanish Fork Canyon	U-96-UT-0457s
UT	Survey	USFS-Manti/La Sal	B. Blackshear	Yellow Brush/Water Hollow Water Development Project	U-96-FS-0722f
UT	Survey	USFS-Uinta	S. Nelson	American Fork Parkway Trail	U-96-FS-0265f,p
UT	Survey	USFS-Uinta	C. Thompson	Lone Peak Wilderness Mine Survey	U-96-FS-0296f
UT	Survey	USFS-Uinta	C. Thompson	Canyon Rock	U-96-FS-0316f
UT	Survey	USFS-Uinta	C. Thompson	Santaquin Mines	U-96-FS-0317p
UT	Survey	USFS-Uinta	S. Nelson	Guy Wall Mine	U-96-FS-0318p
UT	Survey	USFS-Uinta	S. Nelson	Camp Diamond Test Hole Wells	U-96-FS-0600f
UT	Survey	USFS-Uinta	S. Nelson	Pleasant Grove RD-Timpanogos Cave Exchange	U-96-FS-0616b
UT	Survey	USFS-Uinta	S. Nelson	North Fork Prescribed Burn	U-96-FS-0617f
UT	Survey	USFS-Uinta	S. Nelson	Forest Lake Survey	U-96-FS-0618f
WA	Survey	Dames & Moore	E. Bassett	Ridgetop Abandoned Mines	U-96-DH-0051f,p
WB	Survey	Sagebrush	M. Polk	UDOT 5600 South Intersection in Roy	U-96-SJ-0416p
WB	Survey	Sagebrush	M. Polk	UDOT 6000 South Detour in Roy	U-96-SJ-0417p
WB	Survey	Sagebrush	H. Weymouth	Defense Depot in Ogden	U-96-SJ-0621m
WB	Survey	Sagebrush	M. Polk	30th/31st Streets in Ogden (UDOT)	U-96-SJ-0724p,s
WB	Survey	USFS-Wasatch/Cache	T. Scott	Skyline Section of the Mount Ogden Trail	U-96-FS-0667f
WN	Survey	BLM-Richfield	C. Harmon	Ken Garrett ROW	U-96-BL-0027b
WN	Survey	BLM-Richfield	C. Harmon	Wayne County Water Conservancy District Drilling	U-96-BL-0068b
WN	Survey	BLM-Richfield	C. Harmon	Capitol Reef Riprap	U-96-BL-0091b
WN	Survey	BLM-Richfield	C. Harmon	Torrey Drift Fence	U-96-BL-0714b
WN	Survey	BLM-Richfield	C. Harmon	Grover Irrigation Amendment	U-96-BL-0715b
WN	Survey	CASA	M. Erickson	Rangeland Teasdale No. 1 Well	U-96-CH-0515b,s
WN	Survey	CASA	N. Hammack	Rangeland Pipeline	U-96-CH-0574b,p
WN	Survey	NPS-Capitol Reef	L. Kreutzer	Computer Network Trench	U-96-NA-0042n
WN	Survey	NPS-Capitol Reef	L. Kreutzer	Renovation of the Cathedral Mine Cabin	U-96-NA-0043n
WN	Survey	NPS-Capitol Reef	L. Kreutzer	Upper South Desert Overlook Road Closure	U-96-NA-0049n
WN	Survey	NPS-Capitol Reef	L. Kreutzer	Scenic Drive Rehab	U-96-NA-0064n
WN	Survey	NPS-Capitol Reef	L. Kreutzer	Ackland Springs and Archaeological Site Fencing	U-96-NA-0159n

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WN	Survey	NPS-Capitol Reef	L. Kreutzer	Pleasant Creek Road to Sleeping Rainbow Ranch	U-96-NA-0699n
WN	Damage Assess	NPS-Capitol Reef	N. Coulam	Looting Damage at 42WN2014 in Capitol Reef National Park	U-96-NA-0740n
WN	Survey	SWCA	K. Quick	SCUTA Fiber Optic Line from Loa to Bicknell	U-96-ST-0340b,s
WS	Excavation	Baseline	J. Allison/A. Nielson	Excavation at Site 42Ws3105	U-96-BS-0060s(e)
WS	Survey	Baseline	A. Nielson	Washington City Water Pipeline	U-96-BS-0115p,s
WS	Excavation	Baseline	J. Allison/A. Nielson	Excavation at Sites 42Ws2722 and 2743	U-96-BS-0176p,s(e)
WS	Survey	Baseline	A. Nielson	UDOT SR-59 Apple Valley Egress	U-96-BS-0203p,s
WS	Survey	Baseline	A. Nielson	UDOT Kephart SR-9 Egress near Rockville	U-96-BS-0220p,s
WS	Survey	Baseline	J. Allison	UDOT SR-9 North Side Egress West of Rockville	U-96-BS-0320s
WS	Survey	Baseline	J. Allison	US West Fiberoptic Reroute along SR-59	U-96-BS-0323s
WS	Survey	Baseline	A. Nielson	SR-9 Egress in Springdale (UDOT)	U-96-BS-0658p,s
WS	Survey	BLM-Cedar City	G. Dalley	Roger's Rock Sale	U-96-BL-0664b
WS	Survey	BYU-OPA	R. Talbot	WCWCD Anderson Junction Waterline	U-96-BC-0370b
WS	Survey	BYU-OPA	L. Richens	Washington County LaVerkin Water Line	U-96-BC-0472b,s
WS	Survey	BYU-OPA	R. Talbot	Harrisburg/Quail Creek Land Acquisition	U-96-BC-0705b
WS	Excavation	DRI-Las Vegas	L. Perry/D. Valentine	Excavations at 42Ws1146 and 1148, White House Ruins	U-96-DA-0187p(e)
WS	Survey	Intersearch	B. Frank	Alpha Engineering Dixie Drive Extension	U-96-IG-0037s
WS	Survey	Intersearch	B. Frank	Ross-Veyo Access Road	U-96-IG-0107b
WS	Survey	Intersearch	B. Frank	Ross-Staheli Pipeline Easement	U-96-IG-0177b
WS	Survey	Intersearch	B. Frank	Welch-Veyo BLM Easement	U-96-IG-0344b
WS	Survey	Intersearch	B. Frank	Ross-Washington Fields Powerline	U-96-IG-0675b
WS	Survey	JBR	L. Billat	UP&L Middleton Powerline Realignment	U-96-JB-0016b
WS	Survey	JBR	S. Billat	Dammeron - Sand Cove 69/34.5 KV Line near Veyo	U-96-JK-0202b
WS	Survey	Knight & Leavitt	R. Leavitt	Two Parcels near Bloomington Hills for Trust Lands	U-96-KG-0581s
WS	Survey	NPS-Zion	B. Frank	Fenceline Survey South of Paradise Canyon Ranch	U-96-NA-0191n
WS	Survey	Senco-Phenix	J. Senulis	Hurricane Block (NE/NW 1/4 of Section 14 in T42S, R14W)	U-96-SC-0006s
WS	Excavation	Southern Utah University	B. Frank	1996 SUU Field School Excavations at 42Ws3119	U-96-SE-0736b(e)
WS	Survey	SWCA	K. Quick	Mt. Fuel Pipeline, St. George to Central	U-96-ST-0624b,p,s
WS	Survey	UDOT	S. Miller	UDOT SR-18 MP 26 to 28	U-96-UT-0173f,s
WS	Survey	UDOT	S. Miller	UDOT SR 18 MP 29 to 30 Maintenance	U-96-UT-0497f,s
WS	Survey	USFS-Dixie	M. Jacklin	Pinto Road Reroute	U-96-FS-0459f

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WS	Survey	USFS-Dixie	M. Jacklin	Pine Valley Dump Station	U-96-FS-0460f
WS	Survey	USFS-Dixie	M. Jacklin	Commanche Springs Cabins	U-96-FS-0586f
WS	Survey	USFS-Dixie	M. Jacklin	Browse Guard Station Restoration	U-96-FS-0605f
WS	Survey	Utah Trust Lands	K. Wintch	Sunset Hills and Santa Clara Parcels	U-96-UM-0731s
WS	Survey	Utah Trust Lands	K. Wintch	Lower Atkinville Wash Parcel	U-96-UM-0732s
WS	Survey	Utah Trust Lands	K. Wintch	Red Hawk Parcel	U-96-UM-0733s

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O'Connell, James F., Kristen Hawkes, and Nicholas Blurton-Jones
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