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Dutch John Excavations: Seasonal Occupations on the North Slope of the Uinta Mountains

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Acknowledgments

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I want to personally thank the Forest Service crew that helped with the initial survey and site recording started just at the end of the Late Prehistoric period when the exchange was mostly just a rumor. The end of the project is finally approaching.

Chapter 1

The Dutch John Privatization

Byron Loosle and Lynne Ingram

Overview

The United States Department of Agriculture Forest Service is in the process of transferring 2,433 acres comprising Dutch John, Utah and surrounding acreage on Dutch John Flat and Dutch John Bench to the Bureau of Reclamation for disposition to Daggett County, Utah. The community of Dutch John is located approximately forty-five miles north of Vernal, Utah, and sixty miles south of Rock Springs, Wyoming, on US Highway 191, in Daggett County. The community was originally located on Forest Service administered public lands, with approximately fifty homes, offices from several agencies, warehouses, a public school, a federal post office, and other support infrastructure, consisting of water, sewer, and gas lines. The land and some offices and warehouses have been administered by the Forest Service, while the homes, other offices, and the community’s infrastructure have been administered by the United States Department of Interior Bureau of Reclamation.

The land was reserved by the authority of the Creative Act of March 3, 1891, and set aside as part of the Ashley National Forest on February 18, 1933. The town of Dutch John was constructed to temporarily house workers and support services for the Flaming Gorge Dam Project between 1957 and 1964. During this construction period, the town housed over 2,000 people. After the completion of the Dam in 1965, Dutch John continued to serve as the residence of approximately 175 people, including federal government employees and others associated with the operation of the Flaming Gorge Dam and reservoir area.

The transfer of land to the Bureau of Reclamation was for administrative convenience. The Bureau of Reclamation may dispose of community infrastructure and lands after the transfer is completed, except for certain facilities and associated land to be retained by the Forest Service. Facilities retained for agency use include the Dutch John Forest Service Workstation, warehouse site, two homes, some road and water line easements, and the hospital location.

The Flaming Gorge Ranger District initially proposed a land exchange in 1992 during the beginning stages of the project (U.S. Forest Service 1995). Daggett County and the State of Utah did not support the proposed land exchange and asked Representative Bill Orson to introduce federal legislation that would address transfer and disposal of 2,450 acres. The Forest Service and Bureau of Reclamation provided input to the proposed legislation with the intent of achieving financial relief from the annual expenses associated with operating and maintaining the Dutch John community infrastructure, and to assist Daggett County in developing an enlarged economic base in an area otherwise dominated by a federal and state land base.

The legislation (Bill S890) was passed and signed by the President on October 30, 1998, becoming Public Law 105-326. On June 26, 1999 a Transfer Order was signed placing the land under Bureau of Reclamation administration.

Dutch John Cultural Resources

Between October 1993 and April 1995 Forest Service crews conducted an intensive archaeological inventory of the proposed exchange area. A total of seventy-seven (77) archaeological sites were identified within the exchange boundary (Table 1.1). Thirty-three (33) sites were determined to be eligible for the National Register of Historic Places. Between April 1995 and September 1998 testing and excavation of the significant sites proceeded as outlined in the Dutch John Mitigation Plan (Loosle et al. 1996). This volume reports the results of those excavations.
Map 1.1. Location of Dutch John within State of Utah.

Plate 1.1. Aerial view of Dutch John area.
Physical Environment

The Dutch John area is an intermediate elevation tableland or marginal bench on the north slope of the Uinta Mountains, connecting the main body of the east-west trending Uinta Mountain chain to the west with the west slope of the Rocky Mountains to the east. Located in extreme northeastern Utah, Dutch John is considered part of the Middle Rocky Mountains physiographic province. The Green River, flowing from Wyoming to the north and entrenched 300 meters (m), or 1000 feet, deep in Red Canyon, descants this tableland and encompasses Dutch John three kilometers (km), or 2 miles, to the west and south, curving east toward Colorado. The project area includes the upper reaches or rim area of Red Canyon to the west. Today Red Canyon is filled west of Dutch John by the impounded waters of Flaming Gorge Reservoir. Elevations at Dutch John range from 1890-2012 m (6200-6600 feet) averaging approximately 1950 m (6400 feet). Open areas on Dutch John Flat are surrounded by small, wooded, rocky ridges and drained by small draws. Springs emerge at the base of the rocky footslopes in several places. Small riparian areas occur in connection with these springs and small perennial streams in some draws.

To the north, elevations rise to more than 2500 m (8,000 feet) before descending into the Upper Green River Basin in southwestern Wyoming. To the east, a long, trough-like depression along the course of the Green River descends to elevations of approximately 1650 m (5400 feet) before the terrain rises again to form the Yampa plateau on the west slope of the Rocky Mountains. To the south the Uinta Mountains rise to more than 2750 m (9000 feet) elevation, separating the Dutch John area from the Uinta Basin to the south. To the west elevation gradually increases to more than 3450 m (12,000 feet) in the Uinta Mountains. Thus Dutch John effectively occupies a pocket in the east end of the Uinta mountains that is drained by the Green River.

Geology

The Precambrian bedrock that forms the Uinta Mountains lies close to the surface over much of the project area, and is the main structural component of many of the rocky ridges. The Uinta Mountain formation consists of Uinta quartzite, a coarse grained brownish red quartzitic sandstone, with some thin interbedded shale layers. The emerging Uinta Mountains uplifted, shattered and shrugged aside sedimentary strata formed since Precambrian time. As a result, in addition to Uinta quartzite bedrock, surface geologic strata dating from late Triassic through late Quaternary time within 5 km of the project area include Chance shales, Nugget sandstone, the Morrison formation silts, sandstones and conglomerates of Dutch John mountain, and Hilliard (Manco) shales (Hansen 1941).

Dutch John Bench is formed of Brown Park formation tuffs, sandstones and clays, surrounded by Ericson formation sandstone, with thin seams of shale, and tributary valley alluvium of silty sands with some gravel lenses. The area is part of the Gilbert Peak erosion surface, a plain that has been faulted, tilted, and dissected by deep canyons since formation, resulting in a dip-slap relief.

Soils

The soils at Dutch John are loamy-skeletal and fine-loamy aridic argiborolls: soils with a relatively high clay content forming slowly over time under dry, cool conditions where mechanical weathering is dominant. At archaeological sites across the project area, the C horizon typically is comprised of sterile reddish or orange sands weathered from the underlying Uinta quartzite bedrock.

Dutch John Bench in the area of the airport has shallow loamy-skeletal soils on a colluvial mantled slope of Brown Park formation tuff, sandstone and clay. Bedrock outcrops account for 20-30% of the surface area. The dominant soils in this area consist of a dark reddish brown flabby loam surface layer over a reddish brown flabby loam subsoil about 20 centimeters (cm) in depth. Underlying this is light reddish brown flabby loam, which is underlain by sterile sand or bedrock at approximately 43 cm below the present ground surface. Approximately 35-40% of sediment volume consists of coarse fragments that are primarily flagstone size quartzites.

The somewhat concave bedrock basin underlying the community on Dutch John Flat features soils that have developed in deep tributary valley alluvium on gentle to moderate slopes. The surface layer under a (typically) thin organic cover is dark grayish brown loamy sand about 10 cm in depth. The B horizon subsoil is reddish brown loamy fine sand of considerable depth with a pedogenic accumulation of carbonates. Coarse fragments of quartzite comprise 20-30% of sediments by volume. The typical soil profile on Dutch John Flat has clay-loam textures and exceeds 40 inches in depth. The subsurface horizon is predominantly a clay loam overlying a sandy clay loam subsoil.

Plate 1.2a. View S over Dutch John

Plate 1.2b. View SE over Dutch John

Plate 1.2. Two views of Dutch John area.
Map 1.2. All archaeological sites found in the Dutch John Privatization area.

Table 1.1. Dutch John archaeological sites.
Ashley, along with several crew members, descended the Green River in bison hide boats searching for a navigable route to the Pacific Ocean. Starting in the Green River Basin in Wyoming, the exploring party headed through Red Canyon down to Green River, Utah, a distance of more than 300 miles. Ashley kept a journal of the trip, making the first record of exploration of the area. He noted that an Indian road passage along the north bank of the river from an upstream dam. We supposed a party of 100 or more had passed along the road about a month since. This was probably at Little [Browns] Hole in Red Canyon. Further down river in Brown's Hole, they "encamped on a spot of ground where several thousand Indians had wintered during the last season... Many of their lodges remained as perfect as when occupied. They were made of poles two or three inches in diameter, set up in circular form, and covered with cedar bark... Their camps were principally in the thick willows and covered with the bark of cedar" (M. Johnson 1998).

To the American Indians was enhanced by the establishment of trading posts along the Green River. "Sheltered valleys of the Uinta Mountains region became popular winter campsites during the fur trading era" (Lonsdale M. Johnson 1998). Henrys Fork, Little Hole and Dutch John Flats, and Brown's Hole provided somewhat temperate microwaters where winter months were a little easier. During the fur trapping era, Brown's Hole (later to be known as Brown Park) was occupied by Shoshone and Ute Indians, with the Shoshone also occupying the Henrys Fork area.

In 1827, Fort Davy Crockett, a fur trading post in Brown's Hole, was established. Native Americans, who had originally wintered in the temperate valley, remained at the fort, living side by side with the many men, many of whom had Indian wives. Thomas Jefferson Farnham, visiting Fort Davy Crockett in 1839, noted in his journal, "He also were the lodges of Mr. Robinson (Ute Jack), a trader, who usually stations himself here to trade with the Indians and white trappers... When all the "independent trappers" are driven by approaching winter into this delightful retreat, and the whole Snake [Shoshone] village, two or three thousand strong, impelled by the same necessity, pitch their lodges around the Fort, and the dances and merry-making of a long winter are commenced, there is no want of customers..." (Farnham in M. Johnson 1998).

Settlement

John "Dutch John" Hennelema (Henelema, sometimes pronounced Hunslinger), resided at the Dutch John area in the late 1860s. Mark Anson, a long-time resident, remembered that John's real name was Hennelema (or Hensloma) and that he was a native of Schleswig, Germany. His thick accent accounts for his nickname. He wasn't exactly in "OUtiW." when he got there, even though he was from Sciblesvig (Schleswig) Denmark, Germany. Schleswig was a part of Denmark until 1920 when it became part of Germany. Schleswig was a part of Germany from 1864 to 1919, then it returned to Denmark, so John was most likely Danish.

Grazing was the main agricultural use of the Green River Corridor, and remains so today. Sir Griffith Edwards is given credit for introducing the first domestic cattle in 1869, and recorded that the trail from Rock Springs traversed "rich green country." Brown Park is a natural coral, seeded off at both ends by deep canyons, and was first used to winter cattle on the trail west from Texas to the railroad, and also the Overland and Oregon Trails. In 1874, Brown's Park became winter range for the cattle industry of southern Wyoming and northeastern Utah. That year, A. Hatch and Company bought in about 2500 cattle, a large band of horses, and in just a few years the surrounding ranges were fully stocked.

The grazing of tremendous herds brought cattle and horse rustlers, and Brown's Park and Little Hole were used as hideouts. Rustling was relatively easy due to open range grazing and the remoteness of the Brown's Park and Dutch John areas. Gangs working together in the spring made rustling unmarked calves profitable. Outlaws also found the area attractive because it was near the border of the states. They could cross into the neighboring state. The "Wild Punch," one of the groups that worked in the area, eventually received a national reputation.

When the Paninos Family returned to Brown's Park in 1875, they brought at least the appearance of permanent settlers. In 1879, the first wedding occurred in the area between the Paninos' daughter Hettie (Lea) and Lewis Allen of Brown's Park. Around 1882-1884, Allen bought some land and moved his family to the Lone Pine Ranch, in the area now known as...
Greenfields (west across the Green River from Dutch John) Allen opened the land by squatter’s rights until 1893, when he abandoned his ranch and moved his young children to Vernal so they could attend school. Allen became a merchant and the Postmaster as well.

Homesteading and ranching became important in the area after the turn of the century, influenced by government land grant programs in 1906 that promoted homesteading of any forest land more suitable for farming and ranching than other uses (Thompson and Pastor 1995). The Oscar Sweet Ranch was one of the local homesteads under the National Forest Homestead system. Located in Greenfields near the Lone Pine Ranch, it encompasses two pioneer homesteads: Sanford Green’s established in 1907 and Elizabeth Sweet’s (Oscar’s mother), established in 1909. The 397 acre ranch was operated only with horse-drawn equipment until it was purchased by the Forest Service in 1979. Oscar Sweet’s grazing allotments included the Lewis-Allen Allotment, encompassing Little Hole, Dutch John Flat, and adjoining lands (Sweet 1989).

The Government Arrives

National Forest Reserves began in the 1890s. The Uinta Forest Reserve created out of a large tract of public domain land on February 22, 1897, included the Red Canyon and the western side of the Uinta Mountains. Although there were no roads to the area, the building was the first known to exist on the flat. In later years it was moved the Dutch John Post Office to use while fighting forest fires.

In May of 1917 petitions were signed and submitted, and a new county was created north of the Uinta Mountains. Daggett County was named for Ellsworth Daggett, the former Utah surveyor general and first principal owner of the Lucerne Land and Water Company. The creation of Daggett County was effective January 7, 1918, with Wyoming the border on the north, the Uinta Reserve on the east, the 110th meridian on the west, and the county entitled to its own seat in the Utah House of Representatives (M. Johnson 1998). With the creation of the new county, funds for a school in Greenfields, near the 1897 post, were approved in 1919. The school was built on the Swett Ranch by residents of Greenfields (M. Johnson 1998).

Flaming Gorge Dam and Reservoir

In November 1922, an agreement known as the Colorado River Compact was made splitting the water of the Green and Colorado Rivers “equally between the upper-basin states of Wyoming, Colorado, Utah, and New Mexico and the lower-basin states of Nevada, Arizona, and California” (M. Johnson 1998). The Colorado River Compact agreement was not approved by the state legislature until 1947, but the 1947, the Krag Report from the Secretary of the Interior, and the Compact, Congress contained the basic features of what would become the Colorado River Storage Project (CRSP). The Upper Colorado River Basin Compact was approved by Congress in 1949, permitting Utah to divert 1,322,000 acre-feet of the annual yield of the upper basin (M. Johnson 1998).

The Flaming Gorge Dam was one of many projects proposed under the Colorado River Storage Project, but it was by no means the highest priority. In 1949 the Bureau of Reclamation made preliminary studies of three dam sites in the general area—Eagle park, at Horsethoe Canyon, and at Red Canyon” (M. Johnson 1998). After much controversy over Echo Park as a proposed dam site location (the reservoir would inundate Dinosaur National Monument), Congress passed the CRSP bill, signed into law by Dwight D. Eisenhower, April 11, 1956.

For thousands of years only occasional humans walked or rode horses across Dutch John Flat—until the summer of 1957. Dutch John School District, used services for a decade by the Forest Service to conduct forest business on the east side of the Green River, was the only structure on the flat. To this quiet place came construction of a government camp to house the workers planning and constructing Flaming Gorge Dam. The Bureau of Reclamation moved in eight house trailers and twenty-five trucks in 1958 (M. Johnson 1998). Watkinsville (after a senator) was proposed in the name of the new town. William Hurst, Forest Supervisor of Ashley National Forest, proposed that the town be named Dutch John, as local residents called the area (William Hurst 1997, personal communication).

Construction on the dam began in July, 1958. In addition to the houses built under the house trailers, the company also constructed a bunkhouse for 300 men, a cookhouse, and a mess hall. Additional homes were built, and a hospital, post office, and fire station were needed. At the peak, approximately 2000 workers lived at Dutch John. Not only was Dutch John the newest town in the Daggett County, it was also the largest—at least temporarily (M. Johnson 1998).

The diversion tunnel for the dam was completed by March 1959, and the first concrete was poured in September. In November, 1962, storage of water began in the reservoir. By December, the water was 15 feet above the dam, and the work on the dam was completed. In May, 1963, the Dutch John-Linwood access road was closed to through traffic because of the rising water.

Three generations were installed in the dam. The first generator was activated in September 16, 1963, when President Kennedy pressed a key switch in Salt Lake City. In October, the road along the top of the dam was opened to traffic. In November, power from the dam was transmitted to Utah Power and Light Company lines in Vernal. The dam was completed in January, 1964, and dedicated by Ladybird Johnson on August 17, 1964 (CRSP 1963).

Management of the area was divided between several Federal agencies.

"Both the U.S. Forest Service and National Park Service were busy constructing marinas and campgrounds. The National Park Service was charged with construction and maintenance of most of the facilities along the lakeshore, and with administration of the area north of the National Forest boundary. The Forest Service was responsible for development within the Ashley National Forest. This division of responsibility led to interagency rivalry and what some termed the unnecessary duplication of visitor facilities" (M. Johnson 1998).

In an effort to stem interagency rivalry, cut administrative costs, and curtail duplication of services, the entire Flaming Gorge region was made a National Recreation Area (NRA) by Congress in 1965. Administrative responsibility for the 196,000-acre Flaming Gorge NRA was given to the United States Forest Service on January 1, 1969. The act that created the NRA directed the Forest Service, under the supervision of the Secretary of Agriculture, to conserve scenic, scientific, and historic areas; and to promote public outdoor recreation. Responsibility for operating the dam remained with the Bureau of Reclamation. Improved access from Interstate 80 in Wyoming soon made the area extremely popular. Only a few hundred people visited Flaming Gorge in 1957. By 1969 the Forest Service estimated total visitation at 500,000 visitor days (M. Johnson 1998).

A remote and quiet rural community was displaced. "The filling of the reservoir and the building of recreational facilities has destroyed the community of Linwood, flooded spring pastures, and closed off innerwater areas to livestock grazing. Furthermore, increased property values tempted many ranchers to sell out, and their land became recreational property" (M. Johnson 1998).

Before the 1960s, the number of ranches and farms in Daggett County had dropped to forty-nine. Sons and daughters of ranching families continued to live on the land. In 1957, the Land Act created the Flaming Gorge Dam and Reservoir, new industry and construction had an effect on the local economy. Property values rose as developers and speculators bought up land for recreational or commercial enterprises (M. Johnson 1998). Oscar Sweet, who held the grazing permit that extended from Greenfields to Little Hole including Dutch John Flat near the newly constructed campgrounds, was one of the last of the old-time ranchers in the Greenfields area. He had planned to leave his herds and the ranch for his family, especially his son Louis, to run. It became increasingly difficult for him to graze live- stock with the new restrictions on the grazing allotments near recreational sites. In 1968, he reduced his cattle to thirty-three head. In June, 1968, Oscar sold his 397 acres to a developer from Salt Lake City, for $300 per acre. The developer also bought up other property in the Greenfields area, hoping to build condominiums, a trailer park, a motocross course, and tennis courts. Oscar died shortly after selling the ranch, in September, at the age of 78. Emma and her son Louis continued living on the ranch, maintaining the property for the land developer. In the fall of 1970, the property was condemned by the developer, and was sold at a small profit, but the dam did not live city life. She died in May, 1971, at the age of 79. The Forest Service hired attorneys and pushed for condemnation of the developer’s property to protect the scenic and wildlife values of the Greenfields area. (P. Johnson 1970; Johnson, M. Johnson 1998). The case was decided in favor of the government and the land was purchased from the developer for $578 per acre.

Dutch John Today

A local historian of the area sum up changes resulting from the dam in this way.

"Flaming Gorge Dam brought new life to the area when it was very much needed. It brought high-speed roads that vastly improved transportation, and it brought new jobs and business opportunities in recreation and tourism. It also brought the problems of growth, crime, economic insecurity, and social tension that are all part of life in the
modern West. ... Manila has gone from a tiny agricultural village to a tourist town of convenience stores, RV parks, and motels. Linwood is gone entirely beneath the waters of Flaming Gorge Reservoir. Dutch John has risen in its place, but it is still more a feasible housing area than a real town. Greendale has changed from a community of small ranches to a resort, and Brown Park now sees more bird-watchers and river rafters than cowboys and outlaws. And, on a busy summer weekend, there now may be more tourists in the county than there are: residents" (M. Johnson 1998).

Positioned near Interstate 80 on the route between Dinosaur National Monument and Yellowstone National Park, the Flaming Gorge National Recreation Area has a visitation of more than 2 million visitor days. Visitation is also high on the Green River, where rafting and fishing are popular activities during spring and summer months, with operations and rentals based out of Dutch John and the Greendale area.

In Daggett County, "92 percent of all lands are either owned by the federal or state governments" (M. Johnson 1998). While visitation is high, the projected population in 1980 for Daggett County was 803 people, and in reality, today, only about four hundred people live in or near Dutch John and Manis, the County Seat. Without private land and ownership, little additional growth can occur.

Dutch John was originally planned to be turned over to the private sector. "Lots for businesses and residential purposes in Dutch John will be sold sometime in the future," J.R. Walton, USBR construction engineer for the Flaming Gorge project said this morning. He said, however, that no applications are yet to be received and that plans have not progressed far enough to permit answering any inquiries, nor to permit filing of applications" (clipping from local newspaper, August, 1959). Forty years later, this process has actually begun.

The federal government has provided relatively low-cost housing for its employees in the remote townsite of Dutch John, but over the years alternatives to limited private housing have been sought. Both the Bureau of Reclamation and the U.S. Forest Service have worked to privatize the townsite and surrounding area, attempting to open up the National Forest land and the Bureau of Reclamation housing to private ownership and economic development. This document is part of preparations to mitigate the cultural resources of the Dutch John and surrounding areas in support of private ownership and management.

Plate 1.3. Flaming Gorge Dam.

Chapter 2

Research Context

Byron Loosle

A Border Area

Dutch John culture history is unusual in that it is a border region between the Plains and Great Basin cultural areas. As such, the area probably would have experienced only occasional and transitory use, rather than intensive or sedentary occupations. Even the late prehistoric Fremont appear to have established only temporary camps within the project area. Dutch John may also contain evidence of mountain adapted cultures, but these have not been defined adequately for this area. Although elements of both Plains and Great Basin cultural areas are present, Plains material is the most common, especially during the Archaic period. Initial survey results suggested a possible Paleoindian occupation, an extensive Archaic presence, a few Fremont era sites, some light Late Prehistoric use, and a very limited historic presence prior to the town's creation.

In the Dutch John Mitigation Plan (Loosle et al. 1996) a series of research objectives was outlined based upon the results of our survey work. Many of the questions addressed basic issues because the Dutch John area is so poorly understood. Upland (upper foothills, mountain slopes) locations at this latitude like Dutch John have not been studied extensively in comparison to the broad intermountain basins. This project offers the opportunity to explore uplift utilization by groups from the Green River and Uinta Basins. The project area's homogenous environment means that changes in environment or cultural practices through time should be more apparent.

The research goals were primarily derived from a recent overview of southwestern Wyoming (Thompson and Pastor 1995), and the Crescent Pipeline Report (McKibbin 1992) because of the similarities between the areas. The original research topics from the Mitigation Plan are presented here. These domains were important in establishing the data recovery strategy and choosing the samples to be processed and dated. Chapter Nine presents research contributions to a regional culture history. The discussion of the excavation results in subsequent chapters will not mirror the following format strictly, because as with any project, the recovered data does not always provide the necessary information nor match the anticipated results.

Research Domains

Subsistence

The primary research topic, subsistence, "...concerns the resources that people used as food. It also relates to the means of obtaining those resources, the kinds of resources utilized versus those available, and the possible reasons for people's choices and preferences. Subsistence is associated with past environments, settlement patterns, mobility, and social organization." (Billat et al. 1992:24).

The primary data source for this research topic is ecofacts, and some other artifact and nonstructural feature classes provide indirect evidence. Therefore, "pollen and macrobotanical evidence from food processing or storage artifacts, features, and structures should" (Billat et al. 1992:25-26) provide evidence of the utilization of wild or domesticated plant foods. Further, "the presence of particular food related tool types, such as projectile points, grinding stones, storage vessels, and other items", serve as indicators of shifts in resource procurement activities. Additional subsistence information is obtained from the identification of faunal species and bones with any human caused butchering or processing marks. Recent evidence suggests tubers may have been very important in southwestern Wyoming subsistence (Smith and McNees 1999; Francis 1995). Cultural fill samples from the project area will be examined in the attempt to identify starch residue from tuber processing, which is not identified during standard pollen and macrofossil analysis.

Questions: (based on Thompson and Pastor 1995).
1. Can the morphology and function of specific artifacts and features be correlated with: (a) particular subsistence activities (e.g. processing, storage); (b) the type of resource being exploited (e.g. specific wild or domesticated plants and animals)?
2. Did subsistence primarily focus on domesticated or wild plant and/or animal foods for the sites of the (a) Fremont. (b) Late Prehistoric Periods?

3. Clarification of subsistence patterns and resource exploitation for the Paleoindian and Archaic Periods, which are not well documented for northeastern Utah.

4. "Quantifying the amount or intensity of groundstone use in a specific component will allow a measurement of relative importance to the overall subsistence practices. Is there an increase in groundstone use in the Archaic compared to Paleoindian as suggested by some researchers" (Thompson and Pastor 1995:46); or Archaic to Fremont/Late Prehistoric?

5. What kinds of archaeological evidence serve as indicators of temporal shifts in subsistence patterns? More specifically, do frequencies or types of specific site constituents (other than groundstone) indicate shifts in subsistence activities or kinds of resources exploited?

Data Needs. Required data sources are botanical and zoological evidence (pollen and macrobotanical remains, bone, carbon, wood, other faunal evidence) which may be obtained from: (a) general site location; or (b) food processing, storage, or refuse features, as well as within structural features (e.g. house floor). Classification and absolute dating of scientific samples is necessary. Pollen and soil samples will be collected for sites in project area.

Project Results. Subsistence questions are primarily addressed in Chapter Six (Fossil Analysis) and Chapter Seven (Slab-Lined Basins).

Chronology. The second research topic to be considered is chronology. Although subsistence is the primary research topic for this design, establishing chronology is fundamental for "archaeological research in any region because it provides the framework for most other descriptions and inferences regarding the past" (Billat et al. 1992:23). Analysis of this topic allows the researcher "to refine local chronologies and assess the degree of reoccupation of the study sites" (Billat et al. 1992:23). For northeastern Utah the transitions between cultural phases are often represented by a sparse body of information, frequently due to gaps in archaeological data recovery. A series of dates, diagnostic artifacts, or other temporal indicators is needed to clarify period affiliation for cultural material. This project hopes to clarify chronology for the prehistoric cultures of Dutch John and northeastern Utah in general.

Questions. The following research questions are derived from McKibbin (1992) and Thompson and Pastor (1995).

1. Considering the chronological sequence for southwestern Wyoming, does the data investigated within the project area conform or deviate?

2. What are the dates, as well as associated chronological indicators and stratigraphic sequence, for the cultural period/phase transitions from: (a) Paleoindian to Early Archaic; (b) Early to Middle Archaic; (c) Archaic to Fremont; (d) Terminal Fremont?

Data Needs. Relative or absolute dates from various data sources such as: artifact classes (e.g. lithic, ceramic); botanical and zoological evidence (e.g. pollen, plants, seeds, bone, wood); certain feature types (food processing, storage, refuse, or structural). Some dating techniques which may be utilized include: radiocarbon dating, protein residue analysis, and seriation.

Project Results. Chronology issues are discussed in Chapter Nine (Culture History). Wilson (1997) used data from Dutch John in her projectile point chronology, which is briefly summarized in Chapter Three (Methodology).

Artifactual Technology and Feature Form/Function. McKibbin refers to this research design topic as "Material Culture Studies", and she explains the significance of this focus for northeastern Utah:

"Basic description of material culture within a chronological framework has been identified as a research concern in northeastern Utah by the Vernal District BLM. Specific needs have been identified for tool typologies, hearth and storage feature form and function, structural remains, and rock art styles. This data gap can be filled through a systematic effort to excavate components of various ages and functions and by presenting clear, accurate descriptions. Lithic source and distribution studies are also needed. Source areas for the major raw material types need to be identified and distributions need to be mapped. Where such information is available, much can be learned concerning size of territory, scheduling of resource procurement, and mobility strategies" (McKibbin 1992:13).

The primary artifactual technology to be examined for the project area is lithics (and possibly ceramics.) Technological attributes of concern are form, manufacture, decoration, method of use (tool type), material composition, etc. Artifacts will be examined for: number present per site, form, and function.

Questions. 1. What are the lithic sources utilized for the project area? If they are local, do they indicate "lithic procurement locations within that site's catchment area" (Billat 1992:20)? If resources were not procured locally, trade activities or travel routes are indicated.

2. Clarification of Paleoindian point complexes in the project area to better establish "baseline data" for northeastern Utah (Thompson and Pastor 1995:26).

3. Are there other "diagnostic tools in Paleoindian assemblages", such as spurred end-scapers (Rogers 1986) or borers (Thompson and Pastor 1995:27).

4. Thompson and Pastor (1995:46) have suggested "that pit structures, or some type of habitation, were used throughout the prehistoric occupation of the Wyoming Basin." What are the structural form, function, and cultural affiliation of habitation features in Dutch John? What do the Fremont brash structures indicate about the mobility patterns of Fremont occupations in northeastern Utah?

5. What is the feature of "certain feature types (slab-lined and cobbled filled)?" For the Fremont occupations, what does hearth form and function reveal about "intensification in resource extraction and processing"? (Thompson and Pastor 1995:51,58)

Data Needs. Lithic sourcing requires either a comparative sample or previously documented descriptions of local quarry deposit material types. "Some sophisticated physical sourcing techniques may be utilized to source lithic materials, especially obsidian, but we anticipate using visual characteristics as the primary means of sourcing cryptocrystalline silicate materials" (Loosle et al. 1996:23).

Project Results. This was the most difficult domain to address because of limited data. No Paleoindian occupations were identified through the excavations. Lithic procurement and artifact morphology are not discussed any summarized form outside of Chapter Four (individual site reports) because no generalized patterns were noted with the limited data. Chapter Seven (Slab-Lined Basins) and Chapter Eight (Fremont Brash Structures) discuss the two architectural forms for which sufficient data was recovered.

Paleoenvironment. "Obtaining better control over the sequence of prehistoric climatic changes, vegetation patterns, geomorphological processes and the subsidies of the shape of the landscape are of obvious interest to reconstruction of site histories and interpretation of lifeways at any given time" (McKalf and McKibbin 1992:12). Billat further adds that "paleoenvironmental data underlies to varying degrees questions about settlement, subsistence, technologies, and logistical organization" (Billat et al. 1992:34).

Questions. How did any climatic changes affect the human use of Dutch John, and to what degree may have paleo-environmental conditions affected cultural changes?

Data Needs. Reconstruction of paleoenvironmental conditions may be achieved through analysis of botanical evidence, specifically "climatically sensitive pollen columns, .. localized geomorphic studies, alluvial chronologies and sediment analysis" (McKalf and McKibbin 1992:12-13). These pollen and soil samples which are collected from sites as subsistence data sources will also be utilized for this research topic.

Project Results. The paleoenvironment is discussed in Chapter Five.
Chapter 3
Project Methodology
Kelda Wilson and Byron Loose

Mitigation Plan
Between October 1993 and April 1995 Forest Service crews conducted an intensive archaeological inventory of the proposed exchange area. A pedestrian survey using 15 meter intervals covered the entire project area. A total of 77 archaeological sites were identified within the exchange boundary, of which 71 were newly identified sites. Sites included 74 prehistoric, 1 historic, and 2 sites with both historic and prehistoric components. In consultation with the State Historic Preservation Office 33 sites (Table 3.3) were determined to be eligible for the National Register of Historic Places (Loosle et al. 1996).

A plan was developed which outlined steps for mitigation of the project area (Loosle et al. 1996). It included additional documentation of one site, data recovery at several sites, public involvement, publication of professional and public reports, and preparation of educational materials. The mitigation plan was approved and signed by the Forest Service, Utah State Historical Preservation Officer, National Council on Historic Preservation, and Bureau of Reclamation in 1997. Aspects of public involvement have been completed previously (detailed below). This report finishes the professional reporting requirements of the plan. As the land exchange proceeds, an overview of northeastern Utah prehistory for the general public, school educational kits and displays will be completed.

Public Involvement
From the beginning of this project a concerted effort has been made to involve the public in all phases of research. This was done to educate individuals about Utah prehistory and the importance of preserving and protecting that heritage while providing enjoyable activities for the participants.

Nonprofessional archaeologists have been involved in this project from the beginning. Most of the archaeological inventory was conducted by Forest Service personnel under the direct supervision of the forest archaeologist and Forest Service archaeological technicians.

Plate 3.1. Escape Club from Vernal Junior High School at 42Da599.
A few public volunteers participated in the inventory. Data recovery involved many more public volunteers. Local residents of Dutch John and the Uinta Basin participated extensively, college archaeological interns spent most of their summers in Dutch John, four Elderhostel groups sponsored by Utah Valley State College assisted, as well as the Vernal Junior High Escape Club on at least four occasions. Over 200 individuals experienced archeological data recovery first hand. Artifact preparation and analysis was also facilitated by volunteers. All the artifact cleaning was done by volunteers, primarily by Utah Statewide Archaeological Society members. The Ashley National Forest hosted two Passport to Time projects in January and February of 1997 to provide analysis, illustrations and cleaning of artifacts.

Volunteers from California, Utah, Montana, and Massachusetts participated. In all over 250 individuals have participated in different aspects of the Dutch John Archaeological Project.

The Ashley Heritage staff has provided yearly updates on progress of the project to residents of Dutch John. In 1999 we provided a preliminary overview of the data recovery results during Utah Prehistory Week as part of a lecture series at the Utah Field House of Natural History in Vernal. The same presentation was made to a standing room only crowd of over 60 in the Daggett County Courthouse in June 1999.

Plate 3.2. Elderhostel crew excavating at 42Da599.

Native American Consultation

In April 1993, Ms. Breny Chapoose of the Northern Ute Tribe Cultural Rights and Protection Office and Mr. Clifford Duncan, Ute tribal elder, visited the Dutch John locality. As part of that visit they were shown some of the sites that had been recorded during the inventory. Ms. Chapoose asked to be kept apprised of the project’s progress and Mr. Duncan asked if he could do some exploring in the area on his own. No concerns or traditional properties were identified during this visit. Mr. Duncan revisited the Dutch John area on May 14, 1998, to examine some pinyon-juniper push over units and other forest service projects near the excavation area. During this visit we stopped at some of the sites which had been excavated and discussed results. Mr. Duncan was interested in the early dates that had been obtained from some of the sites and the long time depth they represented. No traditional properties were identified nor concerns about the project expressed during this visit.

A draft report of the data recovery was provided to the Ute Tribe Cultural Rights and Protection Office and the newly established Ute Cultural Committee for comment. We will also work closely with the Cultural Committee as educational materials are developed.

Letters to Mr. Hansen Wine and Mr. Del Clair in Fort Washakie, Wyoming soliciting input from a Shoshone perspective, included an offer to visit the Dutch John area with them if desired, and the offer of a copy of the draft document.

Data Recovery

The Mitigation Plan assigns a priority of high, medium, low, or none to sites for data recovery, based upon suspected site age, site type, nature of deposits, and features noted. Priority for 15 of the sites was listed as high, for 7 sites as moderate, and for 11 sites as low.

Data recovery at 42Da604, a hunting blind on bedrock with no possibility of buried deposits, comprised additional documentation. Dimensions and photographs of 2 slab-lined basins at 42Da313, excavated prior to this project, also comprise additional documentation. Data recovery at the other sites consisted of excavation. Excluding 42Da604 which proved to be on bedrock, 14 high priority sites were excavated, as were 4 moderate priority sites (Table 3.1, adapted from Looisle et al. 1996). The results of these excavations are presented in the following chapters.

Excavation Strategy

Sites excavated were subjected to the following process. After identification of features visible on the surface, subsurface features or data units were located through systematic probing using an Oakfield soil probe every one to three meters in areas containing soil depth (over much of the project area, especially on Dutch John Bench, bedrock is either exposed, or lies a few centimeters under the surface). It is believed that any concentrated cultural deposits at these sites were identified through this systematic probing. Although some features and cultural stains were visible on the surface, most were located using the soil probe.

If the outline of a feature could be defined on the surface, as in the case of a slab-lined basin or cist, the interior of the feature was fully excavated. In some cases surface areas of sites were lightly skimmed with a shovel to identify the outline of stains visible on the surface or located with a soil probe. In some instances test pits were placed over stains and excavated until the feature outline was defined, then excavation proceeded within the feature. Early in the project shovel-skimming was frequently employed, especially around features like slab-lined basins, in an attempt to locate possible associated features. With one exception skimming was not successful in identifying additional features. Additionally, at 42Da364, 599 and 617, extensive test pit excavation failed to reveal artifact or feature concentrations not identified by soil probes. For these reasons the soil probe was relied on more extensively during the later half of the project.

Excavation generally focused on features, like slab-lined basins, hearths or roasting pits, because initial shovel-skimming was not successful in identifying activity areas adjacent to features. In excavation of a feature such as an isolated hearth or slab-lined basin, a one meter test pit typically was placed over the feature. This test pit was expanded using adjacent one meter excavation units if warranted by the feature or associated subsurface deposits. First, one half of the feature was removed (or one quarter if the feature was large enough), and a feature profile drawn. The second half of the feature was then excavated. If possible this second half was removed following natural stratigraphic levels. Pollen and macrofossil samples were collected from this second half near the bottom of the feature.

Grid systems were established at 42Da364, 599, 614, 685, 690 and 696 due to indications of large features or extensive cultural deposits. At these sites an initial test pit was dug to identify subsurface strata, then the excavation followed the natural levels identified. All artifacts recovered during excavations were collected. Soil was screened through 1/4 inch mesh. Recovered artifacts were bagged and labeled according to site, feature and level. Only diagnostic artifacts were collected from the surface of the sites. Charcoal, soil and pollen samples were frequently collected from excavation areas. It is believed that most significant cultural deposits identified during the survey have been removed at the excavated sites, with some exceptions noted in the individual site reports (for example, the cultural deposits in 42Da599 Area C were tested, but not completely excavated).

Material Culture Analysis

The material culture remains recovered during excavations were analyzed following the methodologies described below.

Radiocarbon Dates

Radiometric ages for sites/features are tabulated in the report for each site. The column "Radiocarbon age" tabulates the conventional 14C age and 1 sigma standard error. The column '2 sigma' tabulates the 2-sigma calibrated calendric ranges. The column "Midpoint" tabulates intercepts of radiocarbon age with the calibration curve. Beta Analytic estimated the 21/2C value for some samples and measured this value for others. When the measured value for 5 samples was applied as a correction, the corrected dates were more recent (younger) by 20-60 years. In only one case the conventional 14C age of
1960±40 BP for 42Da602 Hearth 2 (FS-18) corrected to 1920±40 BP did the δ¹³C corrected age exceed the 1-sigma range for the conventional ¹⁴C age. The conventional ¹⁴C age is generally used in discussion throughout the remainder of this document.

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<th>Proposed Mitigation</th>
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Key: LS - Lithic scatter  
HA - Habitation  
QU - Quarry  
RS - Rockshelter  
TS - Trash scatter (Historic)  
HB - Hunting Blind

Proposed Mitigation:  
1 - Test (skim or probe) site and excavate features  
2 - Test (skim or probe) to define feature parameters, excavate as needed  
3 - Excavate features  
4 - Test isolated areas  
5 - Additional documentation of area prehistory  
6 - Completed- no further data recovery or analysis planned as part of this project

Table 3.1. Significant sites.
Debitage

The debitage was analyzed by sorting it into material types as well as flaking stages. As Passport in Time volunteers were utilized for much of the lithic analysis, the process was kept relatively simple. Sorting into flaking stages followed the IMACS User’s Guide (1992). All of the volunteers had sorted their bags of debitage a professional staff member would examine the sorting to verify the classification or make determinations of difficult pieces.

Flaking stage definitions (from IMACS User’s Guide).
1. Primary or decoration. Any nonutilized flakes produced from core reduction with large amounts (over 50%) of cortex on the dorsal surface, and greater than 30 mm in size.
2. Secondary. Any nonutilized flakes produced from core reduction with little cortex on the dorsal surface compared to large primary flakes, and between 15 and 30 mm in size.
3. Tertiary, or primary thinning. Any nonutilized flake from core reduction with less than 1% cortex on the dorsal surface and or three or more dorsal flake scars, and less than 15 mm in size.
4. Shatter. Unmodified piece of material produced from core reduction without definite flake attributes.
5. Core

Material Classification. Debitage was sorted into 7 categories based on visual attributes. These categories were: Dutch John chert, Tiger chert, Sheep Creek quartzite, Uinta quartzite, moss agate, Obsidian, and other. Based on recent information from BLM archaeologist Blaine Phillips (1999, personal communication), it is apparent that at least some of the lithic material tabulated under the “other” category in Red Creek quartzite, which is also described (6) below. Retrangement of debitage from selected sites indicates Red Creek quartzites do not comprise a significant portion of debitage originally classified as “other”, either by site or by time period. Therefore, the lithic assemblage was not reanalyzed to quantify Red Creek quartzite.

1. Dutch John chert. This material was quarried from thin bands within the Uinta Mountain quartzite at 42Da162. The bands are generally thin (less than 2 centimeters) and of poor quality. This may explain why it is seldom found as a finished tool. The material is generally opaque with a slightly waxy feel. A variety of colors were noted including tan, grey, variegated, and red. Gold and red seem to be the most common colors. This material seems to be very common at sites near the quarry site (42Da130), but occurrences drop off significantly at sites more than 500 meters away.

2. Tiger chert. Tiger chert was quarried near the Pine Springs Site (48 Sw101) in southwestern Wyoming (Sharrick 1989) and was brought to the Sheep Creek area by at least 40 km (25 miles) northwest of Dutch John. Tiger chert is one of the most dramatically patterned cherts in Wyoming. It produces some of the most attractive projectile points. The bands are thin, and edgeael or smooth. Found in abundance to Thomas (1981:1:1) “Use-life modification, in other words, is systematic: length, width, and particularly weight, are systematically reduced during projectile point use-life, and they are thus relatively uninfluenced.”

3. Sheep Creek quartzite. This light colored quartzite is another material that was important to north slope inhabitants. This material is a well cemented, fine grained quartzite that produces a nice conoidal fracture. The most common color is a tan or cream, with light grey also frequently encountered. These colors are sometimes banded. Colors such as dark grey, white, and even red were occasionally noted. Lag deposits of this material were extensively quarried in Sheep Creek Canyon and its drainages on the north slope of the Uintas, approximately 25 km (18 miles) west of the Dutch John area. Bilbee (1997, personal communication) feels the color and quality of the Sheep Creek quartzite are unusual for Uinta Mountain quartzite and suspects it was formed along the fault zone in Sheep Creek Canyon where water percolation and pressure formed its unique qualities.

4. Uinta quartzite. The core of the Uinta mountains is formed by a dense, well cemented purple or maroon quartzite. The core typically has a very consistent texture and is used in many ways, including ground stone artifacts. However, there are a few locations in the Dutch John area (42Da504, 42Da707) and some flakes produced from quarrying Dutch John chert at 42Da712 where an outcrop of this quartzite was of good enough quality that it was flaked and utilized for chipper stone tools. These outcrops are not common in Uinta Mountain quartzite, however, and the flakes are produced have a pronounced glossy sheen.

5. Moss agate occurs as river cobbles in the canyon of the Green River adjacent to Dutch John, and in formations to the north in Wyoming. This material is a light or milky color, variably translucent, with dark, denticular inclusions.

6. Obsidian. This volcanic glass is rare in this area and provides useful information about prehistoric exchange routes and mobility patterns.

7. Other. This category includes material that did not fit into one of the previous categories. This material was often river cobbles or heavily burned pieces that were otherwise unidentifiable.

8. Red Creek Quartzite. This material is metamorphosed to a greater degree than much of the local quartzite, resulting in a material with fewer inclusions, a more homogenous appearance and a relatively fine medium grain structure, and a more consistent surface. Color is light, typically white to light yellow, brown, tan or pinkish. This material occurs both as cobbles along the Green River, and as rock outcrops a few kilometers north of Dutch John in east through Brown Park.

Projectile Points

At the peak of the precessional movement in archaeology, a significant effort was made to quantify projectile point morphology using a number of measurements (as many as 24) that could then be analyzed using regression or other statistical methods to classify projectile points (e.g. Thomas 1970; Wilde 1985; Holmer 1978; Plagias and Vieyra 1984). It was expected that differences between point types could be clearly identified, and that even that morphological distinctions between areas could be isolated. Increased analysis provided the opposite result, obliterating some perceived differences. For instance, no clear morphological distinction could be justified between the Eastgate and Rose Spring types (Thomas 1981) and today they are generally considered a single type.

The intense scrutiny did help refine methodology. Thomas (1981:14) found that in measuring and classifying projectile points, certain attributes are not reliable indicators of point type. For example, over the life of a projectile point many things can cause a point to change. A point that is once a biauricular, and edgeael or smooth, may become a trauel or tanged point to Thomas (1981:1:1) “Use-life modification, in other words, is systematic: length, width, and particularly weight, are systematically reduced during projectile point use-life, and they are thus relatively uninfluenced.”

This is further underscored by the fact that a variety of points of the same type are the most consistent and distinguishing morphological attributes on the projectile point. Looe’s (1968) found that a single measurement of the notch opening was most critical for classification of Mesa Verde Anasazi projectile points.

The projectile points from this project were classified according to Wilson’s (1997) study of projectile points on the Ashley National Forest (Figure 3.1). Wilson typed a collection of 232 projectile points found all over the Forest, including the Dutch John area. Using radiocarbon dates from neighboring sites (Deluge Shelter, Pine Spring, and the Tailsferro Site), she developed a projectile point chronology for the eastern Uinta Mountain area. The study was initiated for two purposes, to use new technology to eliminate human error in measurement and attempt to identify differences between Plains and Great Basin style points. One of the largest variables in measuring point attributes is human error while measuring. The study collection was converted from videotape to digital images on a computer eliminating any subjectivity created by human manipulation. However, the type assignments were made by visual inspection of the images. This method was found to be just as accurate as any other and it was hoped that a simplified method could be established for field archaeologists. Points were classified based on two main attributes: notching style and neck width.

Wilson’s (1997) second objective of distinguishing between Great Basin and Plains types was also not realized. As with the Rose Springs type mentioned above, careful comparison of points between regions fails to isolated identifiable differences. Lohse (1995) points out that several projectile points are morphologically identical, yet are given different names in different regions. For example, the Elko point of the Great Basin is morphologically indiscernible from Pelican Lake of the Plains.
Wilson and this report tend to use the Great Basin names for point types because they have been quantified and described more adequately. It may also represent our own bias in training and area of expertise.

This study will focus on presenting data from the Uinta Mountains and refining Wilson's typology. As Metcalfe (1987) argues in the Wyoming Basin, after the establishment of regional patterns, we should be looking at our study areas on a more local level of detail. If we are to illuminate the past lifeways of specific areas, we must study them more finely rather than only relating material culture to broad regions which may not contain the unique differences found in small locales. For this reason it is also necessary to define a projectile point sequence for this specific area of the eastern Uintas rather than rely on chronologies derived from larger areas like the northeastern Plains or the Great Basin (e.g. Ireland 1983; Holmer 1978; Thomas 1981), which we have been doing for years. Some comparison is made to these broad regional chronologies in this section, but this is not an emphasis of this report.

Five categories of notching were found in the study collection: unnotched, Side-notch, Corner-notch, indented base, and stemmed. These notching styles are generally very easily distinguished from each other. Unnotched points have no notches at all. Side-notch points have straight segments between the notches and the bases which are roughly parallel to the long axis of the artifact. Corner-notch points, instead of having straight segments between the notches and bases, have continuous curved lines from the bottoms of the bases all the way through the notches. Indented base points have single notches on the bases of the artifacts. Stemmed points have stems on the bases, indicated by segments that are narrower than the blades and may essentially be very long corner notches.

Neck width measurements were used to distinguish two main classes of points: large points which are considered to be spear or dart points and small points which are arrow points. Researchers have shown that the neck width of points corresponds with the size of the point, which in turn correlates with point function (Coats 1972; Fenenga 1953). Thomas (1978) found that the mean neck size for arrow points is 10 mm, while for dart points it is 13.7 mm. Fawcett (1978) reports that many studies have applied neck width measurements, and have shown that the division between arrow and dart points occurs consistently at a neck width of one centimeter. Paleindian points usually have neck widths greater than two centimeters. Thus, in this study, points with neck widths of less than or equal to one centimeter are categorized as small (arrow points), while points with neck widths of greater than one centimeter are classified as large (spear and dart points).

The following discussion summarizes Wilson's (1997) eastern Uintas Mountains chronology. As Wilson's study area includes the Deseret Basin and the chronology applies to the projectile point assemblages found at Dutch John as well. Laccadate and large stemmed points were omitted from the study except to state that they occur between 12,000 and probably 8000 BP.

Two styles of stemmed indented base points were defined for the eastern Uintas: Pinto and McKeans. A stemmed indented base, or bifurcate stemmed point, has a basal notch and shoulders. Pinto shoulderled has a shallow, narrow basal notch, with tendons of the stem extending upward toward the base, and the stem extends upward toward the base, and the stem extends upward. The blade is triangular with slightly concave to convex edges. The notches form square to sloping shoulders. The stem is parallel to expanding and is narrower than the blade. In the eastern Uintas, the Pinto occurs from 7000 BP or earlier, to 6200 BP.

McKean is often confused with Pinto, but it is morphologically and temporarily distinct from the latter. The McKean found in the Uintas corresponds with what Mulloy (1954) has called the Duncan and Hauna types. The Duncan type is a stemmed point that is sloping shoulders and a poorly defined stem (Lohse 1955), while the Hauna has more distinct shoulders and a slightly expanding stem (Frisen 1991:91). Morphologically this McKean is similar to the Gatecliff Split-stem point component in the Great Basin (Thomas 1981), however in the study collection this point matches the time range of the McKean in the Northwest Plains. From 3000 to 3000 BP (1995:23). This form of bifurcate stemmed point appears to be connected with the Plains rather than the Great Basin.

Two types of large side-notch points were found in the study collection: Northern Side-notch and Elko Side-notch. The Northern Side-notch point is characterized by high notches - high enough so that there is a straight edge below the notch (Holmer 1986:104). It has a triangular blade with slightly convex lateral edges, notches that are perpendicular to the edges, and a base that is almost as wide as the blade and is usually concave. In the eastern Uintas the Northern Side-notch occurs from 5500 to 3200 BP.

Elko Side-notch is the second large side-notch point in this area. It is characterized by a triangular blade with straight to slightly convex lateral margins, and a straight to slightly convex base. The distal portion of the notches is perpendicular to the lateral edge, and the proximal side slopes toward the base. The notches are so low that the lower portion forms a point with the base. The base is frequently almost as wide as the blade. These points are more narrow than the Northern Side-notch points, so the notches are lower on the sides and form a shorter stem. This point style is contemporaneous with the Elko Corner-notch. Holmer (1986) demonstrated that Elko Corner and Side-notch points exist on two ends of a continuum, and are therefore really the same type. When the notches are asymmetrical, it can be difficult to distinguish the corner and side-notch varieties. The Elko points dates from 3700 to 1000 BP in the study area.

The large corner-notch points in the study collection were all classified as Elko Corner-notch. This style has a triangular point with straight to slightly convex edges. The corner notches create an expanding stem that is narrower at the base than the maximum blade width, and the base is slightly concave to slightly convex (Holmer 1978). These points are morphologically indistinguishable from the Pelican Lake point of the Plains. The Elko Corner-notch points in the study area display an unusually long base, a feature that has been noted by Holmer (1997, personal communication) in the Bonneville Basin, but nowhere else in the Great Basin. The temporal occurrence of these points in the eastern Uintas is 3700 to 1000 BP.

All of the small corner-notch points in the study collection were classified as Rose Spring. This style is the first arrow point to occur in the archaeological record in this area, and is associated with the Fremont. The Rose Spring is a narrow triangular point with sides that are either parallel or expanding toward the base (Holmer and Weder 1980), and have corner notches. In the eastern Uintas, they occur from 1500 to 150 BP. This point has also been called Eastgate, and Thomas (1981:19) argues that the Rose Spring and the Eastgate should be combined into the Rosegate series, as they grade into each other and are contemporaneous.

There are two styles of small side-notch point in this area. Generally they replace the small corner-notch points. The Uinta Side-notch point is the early side-notch point in this area. It is a small triangular point with low side notches and irregular outlines that are often crude and asymmetrical (Holmer and Weder 1980). In the eastern Uintas, the Uinta Side-notch point dates from 1300 to 900 BP.

The Desert Side-notch is the post-Fremont form of small side-notch point. This style has high side notches and a pronounced basal notch. In the eastern Uintas this style dates from 1000 to 250 BP and is associated with Late Prehistoric and Ute and Shoshone occupations of this area.

The Cottontop Triangular, although not included in the study, is mentioned as an unnotched small triangular point that is generally contemporaneous with the Desert Side-notch, occurring from 1000 to 200 BP.

Chipped Stone Tools

Chipped stone tools can be classified using morphological characteristics or manufacturing process. We chose to follow this approach because most individuals are familiar with morphological types and functional interpretations can be made from typology. Attributes of each recovered stone tool were recorded, including metrics (length, width, thickness, and mass), manufacturing attributes, function, and context. The style may be recorded as a point or a blade. The tool type is recorded as part of the style, regardless of tool type or tool form. Metric measurements were to the nearest millimeter or gram. Measurements were recorded for intact dimensions of a tool. For instance, a tool description may list width and thickness but no length. This indicates that some portion of the tool (tip or base) is missing and an accurate length could not be measured.

Bifaces were classified by reduction stage using McKibbin’s modifications of Abler’s system (McKibbin 1992:20-24). Stage descriptions below are quoted from McKibbin (1992:21-22).

Stage 1 (S-1). Displays only initial thinning beyond the unmodified nodule or core stage. Thinning may be incomplete. Shape is irregular, edges are highly sinuous. No secondary edge modification, besides platform preparation, is present. Cross-section is thick and irregular.

Stage 2 (S-2). Thinning is more comprehensive, resulting in a thinner and more regular cross-section, a reduction in edge sinuosity, and a somewhat more symmetrical outline. No secondary edge modification is present.

Stage 3 (S-3). Cross-section is thin and regular, shape is symmetrical. Nearly all edge sinuosity is lost and secondary edge retouch has occurred.

Stage 4 (S-4). "Finished" bifaces. These tools have thin symmetrical cross-sections, lack edge sinuosity, have prepared edges, and may have hafting modifications. Outline is symmetrical and commonly patterned.
Non-Chipped Stone Tools

This category includes groundstone as well as hammerstones. Artifacts were measured for maximum length, width and thickness. Only measurements for complete segments were recorded. The length, width, and depth of the use area were recorded for manos. Material type, overall shape, and presence of use were also recorded. The location (face, edge or end) and type of wear (pecked, ground, crushing, and polish) were identified. The shape of the use face (concave, convex, or flat) was recorded. If possible, use wear situations were described as latitudinal (perpendicular to the long axis) or longitudinal (parallel to the long axis). Thermal alteration or other unique or significant attributes were also noted.

 manos greater than 11 cm in length, with opposing longitudinal edges tending more toward straight and parallel than toward convex were classified as two handed manos. Manos measuring (commonly) less than 11 cm in length with opposing longitudinal edges: tending more toward convex than toward straight and parallel, resulting (commonly) in an ovate shape in plan view, were classified as one handed manos

When the artifact was fragmentary, the shape of the ground surface was used to differentiate manos from metates. The unknown groundstone category included pieces that exhibited some use, but were too incomplete to type any further.

Ceramics

Pottery is relatively rare in the Dutch John area so no formal ceramic classification process was established prior to excavation. Once ceramics were uncovered they were described based on temper, decoration, color, paste and sherd thickness, and classified according to established typology (e.g. D.B. Madsen 1986; R.E. Madsen 1977). Sherds were sent to David Hill for petrographic analysis in 1998 and 1999 (Appendix Three). Discussions of Hill’s data with local geologist Sue Ann Bithey led to some tentative conclusions regarding possible sources of ceramic materials. Results are discussed in applicable chapters.

Faunal Analysis

Faunal analysis was conducted by Andrew Ugan at the University of Utah. Bone from each site was washed, counted, weighed, and identified to the most specific taxonomic level possible, then encoded following the format suggested by Shaffer and Baker (1992). Taxonomic identification of archaeological material included comparison to specimens at the University of Utah’s zooarchaeology lab. For difficult specimens, particularly the accurate identification of artiodactyls, reference was made to Lawrence (1951) and Ford (1990); for species level distinctions among Neotoma, Griswold (1985) was helpful.

For each specimen, information regarding the anatomical element, the identifiable portion of that element, fusion, evidence of burning, cut marks, rodent gnawing, carnivore chewing, and root etching was noted and encoded. Additional information regarding the general size of the creature from which the bone was derived was also recorded, but must be regarded as tentative. This is particularly true where no definite statement could be made about the element from which the specimen was derived (i.e. unidentifiable cortical bone, cancellous bone, etc.).

This uncertainty has two dimensions: the class of organism and its absolute size. Much of the material has been classified as mammal bone. For the larger fragments, such a classification is strongly warranted. Smaller mammals such as lalagooepe or larger rodents, however, are notoriously difficult to distinguish from comparably sized birds. On the other hand, only one of the 2050 fragments of bone in this sample could be clearly identified as bird, compared to the 180 or so specimens which could be identified to the class Mammalia. This suggests that most of the unidentified fragments are probably mammal.

Following Shaffer and Baker (1992) material that could be classified only as vertebrate, mammalian or avian bone was categorized by animal size (Ugan 1995, personal communication).

Small bird = small perching bird or smaller.
Large bird = vulture or turkey sized bird.
Micro mammal = species <100g.
Medium mammal = Canid-Caprine sized mammal.
Very large mammal = Elk to bison sized or larger.

The second issue is that of size. All of the large bone fragments clearly come from large animals. The potential for confusion arises from the fact that the small..., fragmentary material need not necessarily come from smaller animals. Small ani-

mals cannot contribute large pieces of bone, but the converse is not true. Although assignment of material to a certain size class is generally reliable, conservative estimates should regard such assignments as basal in cases where no clear statement can be made about the osteological element (unidentifiable cortical bone, cancellous bone, etc.).

Figure 3.1. Average form of eastern Uinta Mountains projectile point styles (from Wilson 1997).
Floral Analysis

Use of scientific names and designations for plant taxa conveys more (and more exact) information than use of common names. For example, the taxonomic designation *Juniperus osteosperma* refers to any of the cone and needle bearing trees and shrubs including juniper, space, fit, and pine, and conveys the additional information that a more exact determination to genus and species was not, or could not be made. The term *Pinus* refers to any member of the genus *Pinus*, which includes five different species in the eastern US: *P. contorta* (Lodgepole pine), *P. edulis* (Pinyon pine), *P. flexilis* (Limber pine), *P. longaeva* (Intermountain bristlecone pine), and *P. ponderosa* (Ponderosa pine). Whereas *Pinus edulis* refers only to one species of pinyon pine, in some cases, only one member of a family or genus may occur; in these cases, the generic name also identifies the species. An example is the genus *Pinus*, which term herein always identifies Douglas fir.

Terms with the suffix "-aceae" are not italicized, and denote floral families: Asteraeae denotes the Compositae family, a large family that includes thistles, sunflowers, daisies, dandelions, ragweed, cockleburs, and others. The High-spine Asteraceae are a subgroup of Asteraceae characterized by pollen spine morphology, and include ragweed, cocklebur, and others. The High-spine Asteraceae, sharing a different pollen spine morphology, include asters, rabbitbrush, sneezeweed, sunflowers, and others. The subgroup Ligiulinaceae includes dandelions and chicory.

Appendices One and Two include tables by Holloway and Cummings indexing scientific to common names. An excellent resource for detailed information on species, habitats, and season for plant taxa of our area is available to the interested reader in *Unna Basin Flora* (Goodrich and Neese 1985).

In this report, common names (where applicable and not misleading) are included in parentheses after the initial use of a taxonomic term in each chapter and site report. Thereafter, the scientific term is used for the sake of precision and accuracy. In lengthy discussions, especially where a general scientific term can be robustly inferred to indicate a more specific plant taxon also unambiguously identified by a common name, the scientific term and common name may be used interchangeably.

Macrosilica. Richard Holloway at Quaternary Services conducted the analysis (Appendix One) of macrosilica remain from the excavations, samples submitted for analysis were treated using water separation. The initial volume of material was measured and recorded and then screened to remove the larger particles. The screened material was examined separately but was not subject to water separation. The material passing through this screen was placed in a bucket for physical flotation. The light fraction was collected in fine mesh screens and air-dried. After drying completely, the material was placed in labelled ziplock bags prior to analysis. The heavy fraction was examined for larger botanical pieces and artifacts and was then discarded as none of the samples contained additional materials or artifacts.

The content of the light fraction were measured by volume and then examined using a Jeni stereoscopic zoom microscope (7x-45x magnification). Wood charcoal specimens were examined using a modification of the snap method to expose fresh transverse surfaces. These are necessary since often soil particles fill the vessel elements which may be completely filled by charcoal, obscuring the needle bearing trees.

Pollen Analysis. Richard Holloway did the pollen analysis (Appendix One) and recognized "low, moderate, and high" numbers of pollen relative to each taxon and how it is transferred. For example, because Evening primrose is insect pollinated, it will not be as numerous as pine pollen which is wind pollinated. Given this variable, a little Evening primrose pollen would receive a "high" designation whereas considerable pine pollen would need to be present to rank "high." Grass also produces less pollen, so its count can be lower than pine to be considered high.

Four additional samples were submitted to Linda Scott Cummings at Paleo Research Labs for pollen and starch analysis in late summer of 1999 (Appendix Two). This analysis provided a considerably broader range of taxa, and more species level identifications than presented in those analyzed by Quaternary Services. The reason for this discrepancy is unknown.

The methodology and equipment for quantifying and reporting pollen differs between labs, so care must be exercised in comparing results of the analyses. The full pollen and macrofossil reports from Quaternary Research (Appendix One) and Paleo Research Laboratories (Appendix Two) may be found at the back of this volume, and are discussed in applicable chapters.
Isolated Artifacts From The Project Area.

Selected isolated artifacts collected from the surface of the project area are illustrated on the following two pages.

Map 4.1. Excavated sites at Dutch John.

Illustration 4.1. Isolated artifacts from the project area.
Overview

42Da115 is at an elevation of 1970 meters (6460 feet) on the far northeast edge of Dutch John Bench. The site area is currently covered in Colorado pinyon and Utah juniper, with a few small sagebrush openings and scattered grasses. The soil is a red-brown loam with several small outcrops of Uinta quartzite.

42Da115 was originally identified in 1977 by Forest Service personnel, who reported collecting the entire surface assemblage. The present location or nature of this assemblage cannot be ascertained. The site was revisited by a Forest Service crew in April of 1995 during the Dutch John Privatization Survey. The site was identified as a dispersed lithic scatter and quarry site for Uinta quartzite. The lithic scatter in 1995 included Tiger chert, Uinta quartzite, Sheep Creek quartzite, moss agate, and obsidian. Bedrock outcrops on the site include a grade of Uinta quartzite that is darker in color and more suitable for lithic reduction than is typical of this material. Surface finds included a number of tested pieces and primary cores of this material.

A suspected slab-lined basin and an area of possibly cultural dark soil stain were also noted within the site boundaries. The suspected basin was probed with an Oakfield soil probe, revealing a dark layer at 7 cm below surface. The site was measured at 40 by 100 meters in size, and was determined to be eligible for the National Register due to the presence of diagnostic artifacts and subsurface deposits.

A July 1996 reexamination of this site failed to relocate the suspected slab-lined basin after considerable effort. Additional probing revealed no buried cultural features.
In September of 1996, a test pit was placed in the area of stained soil identified in April of 1995. The test pit revealed the soil did not extend below the surface. The test pit yielded only 6 pieces of bone and 1 Uinta quartzite core before reaching bedrock.

Based on the sparse evidence available, this site was a quarry and campsite, probably during the late Archaic or Fremont Period.

Excavation Strategy

In July 1996, several surface stone arrangements similar in appearance to unexcavated slab-lined basin features were probed to a depth of 15-20 cm in an unsuccessful attempt to relocate the suspected basin noted in 1995.

A 6 by 10 meter grid was placed over the area of soil staining identified in 1995 and probed at 2 meter intervals. The probes averaged 14 cm in depth, but no cultural deposits were detected. The soil encountered was a sterile orange-brown color. A few flakes were noted on the surface within this grid.

On September 3, 1996 a test pit was placed in the center of the stained soil area. The pit was excavated to 10 cm below the surface, where bedrock was reached. Only limited cultural remains were encountered. A shovel-skim test was performed adjacent to the test pit to the southwest and northeast, but no cultural materials were identified.

Cultural Materials

The excavations yielded 6 bone fragments and 1 core. The surface assemblage was comprised of 1 projectile point, 1 biface and approximately 100 flakes of Tiger chert, Uinta quartzite, Sheep Creek quartzite, moss agate, and obsidian.

Chipped Stone Debitage

A single core of Sheep Creek quartzite comprises the excavated lithic assemblage from this site. It was recovered from the test pit.

Chipped Stone Tools

The chipped stone tool assemblage recovered at 42Da115 is comprised of 1 projectile point, 1 preform and 1 biface. All tools were recovered from the surface.

Projectile Points. The single projectile point from this site (FS-3) was classified as an Elko Side-notch spear point of Sheep Creek quartzite, missing the tip. It had a long blade with a straight base and low side notches. It was percussion flaked with a lenticular cross-section. The point measured 1.6 cm in width and 0.4 cm in thickness.

Other Stone Tools. The preform was of Tiger chert, oval in shape, and exhibited no thinning or finish flaking pattern. Only the base of the biface was recovered. It was of black mottled Tiger chert and had a possible notch for hafting, but the blade shape cannot be determined. It had been pressure-flaked with a lenticular cross-section that measured 0.5 cm in thickness.

Fossil Materials

Bone excavated from the test pit was small and highly fragmented, consisting of only 6 pieces. All of the bone was mammal: 3 small vertebrate and 3 medium/large mammal.

Summary

Testing determined this was a surface site. There is a Uinta quartzite outcrop on the site with evidence of material acquisition and reduction, indicating quarrying activity. The variety of lithic types comprising the surface assemblage, and the recovery of small vertebrate and medium/large mammal bone from the test pit suggest the site was used over a period of time by groups who made short visits and left sparse subsurface traces. The presence of an Elko Side-notch point indicated that some site use probably dates to the Archaic or Fremont periods.
The site was systematically probed with an Oakfield soil probe at 3 meter intervals in areas with soil depth. Possible soil stains attributable to cultural activity were identified in sixteen areas. Each of these areas was tested by first shovel-skimming the surface to identify stain boundaries. When features were delimited, they were excavated in halves or quarters. When the feature extent could not be identified by shovel-skimming, one meter square test pits were placed over stained areas. These efforts identified features in three main areas of the site. A majority of the cultural deposits identified at this site have been removed as a result of the excavations.

The deposits at 42Da364 result from a series of short term occupations primarily dating to the Late Archaic through Fremont Periods. Roasting pits and hearths are the most common feature, but some activity areas, and three probable dwellings were also excavated.

Excavation Strategy
Testing of the site began in August of 1997, and excavation continued through October of 1997.

Due to the extent of this site, primary datums were placed near each of 16 tested areas, 11 of which yielded cultural deposits upon excavation.

Excavations yielded 26 identifiable features including 8 hearths, 11 pits, 4 activity areas, and 3 structures containing hearths and pits. Materials recovered include 1378 pieces of debitage, 2 cores, 15 projectile points, 17 bifaces, 1 drill fragment, 1 punch, 1 chopper, 11 hammerstones, 18 manos or mano fragments, 13 metates or metate fragments, and 135 bone fragments.

Feature Descriptions

Area A
Area A is the northwestern portion of the site, and is separated from the northeastern portion (Area C) by a road. Excavations in Area A yielded a modern burned feature, two temporary structures with associated activity areas, and an isolated activity area with features including pits and hearths.

Structure 1
Structure 1 was identified through probing. An area was skimmed to define its outline and was then excavated to reveal a large depression with a use surface containing several hearths and pits. Several pieces of groundstone were recovered from this structure, as well as a Rose Spring Corner-notch projectile point, stone tools, bone fragments (including some with mineralization), a considerable amount of fire-cracked rock, and flakes. The debitage was primarily sizable flakes of large grained purple quartzite.

The center of the structure was a shallow depression that measured 392 cm e-w by 422 cm n-s. The first excavation level was a light brown duff approximately 5 cm in depth. This was followed by a gray cultural layer with some charcoal content, only a few centimeters in depth. This level may represent roof fall. No other evidence of superstructure was noted. Below this was a 12-15 cm thick level of darker soil containing numerous artifacts: bone, flakes, groundstone, chipped stone tools. Interior features of the structure containing cultural fill extended below the surface into orange sterile soil to a depth of approximately 32 cm below the surface.

The structure dates to AD 250, the Terminal Archaic or Early Agricultural period. Two radiocarbon dates (Table 4.1) were obtained from features (Hearth 1 and Pit 3) within this structure. The following features were excavated within this structure.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Ad 650</th>
<th>Ad 590-695</th>
<th>1400+50 BP</th>
<th>Beta-121196</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hearth 1</td>
<td>AC 260</td>
<td>AD 130-420</td>
<td>1760+60 BP</td>
<td>Beta-121195</td>
</tr>
<tr>
<td>Pit 3</td>
<td>AD 860</td>
<td>AD 830-855</td>
<td>1330+60 BP</td>
<td>Beta-121198</td>
</tr>
<tr>
<td>Structure 3</td>
<td>AD 370</td>
<td>AD 220-450</td>
<td>1710+60 BP</td>
<td>Beta-121197</td>
</tr>
</tbody>
</table>

Table 4.1. Radiocarbon dates from 42Da364.
Hearth 1 was a roughly circular pit in the center of Structure 1. It began approximately 20 cm below surface, and measured 62 cm n-s and 60 cm e-w, and 12 cm in depth. Fill was black ashy soil containing a metate fragment and 7 pieces of debitage. Charcoal from this hearth dated to 1760 BP.

Pit 1 was an irregular oblong feature in the northwest quadrant of Structure 1. It measured 80 cm by 60 cm and 10 cm in depth. A scraper and 2 pieces of debitage were found in this feature.

Pit 2 was a small circular ashy pit in the northwest quadrant of Structure 1. It measured 20 cm in diameter and 25 cm in depth.

Pit 3 was a circular roasting pit in the northeastern quadrant of Structure 1. It was full of fire-cracked rock, but no other artifacts. It was 60 cm in diameter and 17.5 cm in depth. A macrofloral sample from this pit contained cedrel, pine, and juniper charcoal. Charcoal from this feature dated to 1775 BP.

Pit 4 was a circular roasting pit in the southeast quadrant of Structure 1, very similar to Pit 3. A few flakes were recovered from this feature. It measured 50 cm n-s by 55 cm e-w and 28 cm in depth.

Pit 5 was a small, oval pit in the south central portion of Structure 1. It measured 30 cm n-s by 20 cm e-w and was 9 cm deep.

Pit 6 was a small circular pit 25 cm in diameter in the south central portion of Structure 1, just south of Pit 6. Pit depth was not recorded.
E-W profile of structure

N-S profile of NE quad of structure
**Structure 2.** Structure 2 was north of Structure 1 and adjacent to Activity Area 4. It was identified by dark subsurface indications during probing. Shovel-skimming revealed a small circular stain. Excavation revealed a large circular area of stained soil, identified as a possible structure containing burned logs and artifacts. The entire feature was removed. Artifacts recovered include 1 Rose Spring Corner-notch point that may have been reworked, 1 Pinto point (FS-212.2), 4 bifaces, 1 single-handed mano, and bone fragments. The feature measured 240 cm N-S and 275 cm E-W. It contained two large burned log fragments measuring 20 and 25 cm in diameter by 50 and 80 cm long. Both logs were in the northwest portion of the structure. A circular pile of fire cracked rocks was found just outside the northeastern edge of the structure.

Although this structure was not dated it is believed to date to the Fremont period, making the Pinto point anachronistic. This point may have been collected and curated by Fremont inhabitants of Structure 2.

**Activity Area 1.** A gray charcoal stain was identified in the cutbank of a small drainage. Half of this stain was excavated, revealing dark soil, charcoal flecks, 15 pieces of debitage, and 2 small pieces of faunal bone. This area may have been a prehistoric activity area, but was eroded to the extent that a perimeter could not be defined.

**Activity Area 2.** A probe in a small drainage on the western-most portion of the site yielded dark soil and was labeled Activity Area 2. A dark stained area with nebulous boundaries was revealed by shovel-skimming. A one meter square test pit was placed on the west edge of the stain. A substantial amount of charcoal was observed in the test pit, turning white further below the surface. Below the charcoal level was a level of modified soil blending into sterile soil. The stained soil started about 4.5 cm below the surface and continued to 10 cm below ground level. Ten pieces of debitage were recovered from the test pit. This was a highly eroded feature with no clearly definable shape. Because no intact cultural deposits could be identified this area was backfilled. Approximately 5 meters east of this pit, excavations on another stain, or a continuation of the same stain, resulted in identification of an activity area comprised of 4 hearths (Hearths 2, 3, 5, and 6) and 1 pit (Pit 10).

Hearth 2 was a hearth or roasting pit that was identified by a dark stain in Activity Area 2. Skimming revealed an extensive feature, so a one meter square test pit was placed over it. Excavations identified four layers. The top fill layer was reddish-brown in color and about 4 cm thick. This was followed by a dark brown layer 4-8 cm thick. The next level was 20-23 cm thick, black with very large chunks of charcoal. The lowest level was a dark gray silty soil with smaller charcoal chunks containing moist pink and orange nodules, and was 23-30 cm thick. The hearth was 77 cm in diameter and roughly circular, with the west side more irregular than the east. The hearth yielded a considerable amount of charcoal, 2 small pieces of faunal bone, 16 pieces of debitage, 2 bifaces, and 1 Pinto point. Charcoal from the hearth produced a date of 1400±50 BP (Table 4.1), making the Pinto point anachronistic. This point, like the Pinto point recovered from Structure 2, may have been curated.

Initial pollen and flotation samples yielded sparse results. A second sample, sent to Palco Research Labs, provided a pollen record of an environment much like that of today, indicative of a site at the sagebrush - pinyon/juniper transition. Chenopods (goosefoot, pigweed) and Opuntia (prickly pear cactus) pollen were found, suggesting both resources may have been processed in the hearth. In addition, some nondiagnostic starch granules were found in the fill. The starch may be from grasses that were processed, used to line the hearth, or that grew in the hearth after it was abandoned. These starches could also have been from an Apiaceae (biscuitroot) tuber.

Hearth 3 consisted of two superimposed hearths 25 cm north-northeast of Hearth 2. The feature was identified as dark soil in the probe, then skimmed to reveal a cultural stain. An upper hearth was removed, exposing a lower hearth, after which the feature was backfilled. The upper hearth was 75 cm in diameter and 22 cm in depth, with ashy fill. It was roughly oval in shape, with the wide; end on the west. There was a lighter compact soil layer below this hearth, followed by the lower hearth. The lower hearth was "C" shaped and 18 cm in depth. This hearth also contained quantities of ash, and chunks of charcoal.

Hearth 4 was a small hearth eroding out of a bank approximately 25 m south of Hearth 5. Fill in this feature consisted of considerable charcoal and oxidized soil. An Elko Corner-notch point, 1 utilized flake, and 10 pieces of debitage were recovered from this hearth.
Hearth 5 was located approximately 1 m south of Hearth 2. It was identified by probe, then skimmed to reveal a circular dark stain, which was subsequently excavated in halves. The entire hearth was excavated. The feature was roughly circular in shape and 90 cm in diameter. The top 10 cm of fill consisted of light brown soil, the next 12 cm of soil with sparse charcoal, and the lowest 6-13 cm was dense charcoal. Below this hearth was orange colored sterile soil. The hearth was 19 cm in depth. No artifacts were noted in this feature.

Hearth 6 was identified as a dark stain in a soil probe beginning 1 m northeast of Pit 10. It was skimmed to reveal a discrete circular area with fill consisting of charcoal stained soil, which was entirely excavated and backfilled. Hearth 6 measured 42 by 44 cm in diameter and 13 cm in depth. The surface soil was light brown and 3-10 cm in depth. A t'ashy hearth fill contained large chunks of charcoal. No artifacts were recovered from this hearth.

Pit 10 was an oven or roasting pit beginning 1.5 m north-northeast of Hearth 3. A stain was identified and shovel-skimmed to reveal its extent, then excavated in quarters. This feature was removed entirely and backfilled. This feature was roughly circular, beginning 40 cm below surface and 62 cm in diameter by 27 cm in depth. A meter lay on the cultural fill in the eastern side of the pit. The deepest portion of the pit was a barrel-shaped area measuring 25 cm by 5 (12) cm. Pit 10 yielded 10 pieces of debitage, 1 biface and 1 basin metate.

Activity Area 3. An area of dark soil was defined by probe east of and adjacent to Structure 1. Shovel-skimming failed to establish boundaries for the stain. A one meter test pit was placed over the area. Two additional one meter squares were added creating an "L" shaped excavation. Two features were identified in this area, a roasting pit and ring of fire-cracked rock. The fill of both features was entirely removed. Lithics recovered from the use surface of Activity Area 3 surrounding Pit 7 include 1 point fragment, 1 Rose Spring projectile point, 2 mano fragments, 1 metate fragment, and 18 pieces of debitage.

Pit 7 appears to have been a roasting pit. Beginning approximately 15 cm below the surface, it was 40 by 45 cm in diameter and 20 cm in depth. Adjacent to this pit was a pile of fire cracked rock, which may have been removed from the pit, or may be a second roasting area overlapping the first. The rock pile measured 30 cm by 13 cm, and contained a metate fragment.

Activity Area 4. Activity Area 4 was adjacent to Structure 2 on the north. Skimming revealed two circular features. These were excavated completely, and identified as Pits 8 and 9. This activity area contained 1 biface, 2 hammerstones, 2 single handed manos, and 23 pieces of debitage.

Pit 8 contained a few flakes and some groundstone. Beginning approximately 12 cm below surface, it measured 97 cm n-s by 90 cm e-w and 35 cm in depth. The surface layer was a light brown sandy soil. Fill was consistent ashy dark gray with high charcoal content.

Pit 9 was just south of Pit 8. It measured 72 cm n-s by 70 e-w. This feature was significantly deeper than Pit 8 and appeared to be 2 superimposed roasting pits. At the bottom was a large pile of fire cracked rock. Pit 9 was identified at about 10 cm below surface and was 53 cm in depth. A few flakes occurred in the upper level of fill, and one quartz fragment was found in the fill.

Hearth 7. Hearth 7, an isolated feature approximately 50 m south of Structure 1, was identified as dark soil in the probe and skimmed to reveal the feature, which was then removed and backfilled. The hearth measured 60 cm n-s by 65 cm e-w and 13 cm in depth. This feature contained fire cracked rock, but no artifacts.

Modern Burn. A suspected prehistoric structure was identified by an area of gray surface stain. Probes of the area revealed a thick subsurface charcoal layer. Shovel-skimming revealed a circular stain approximately three meters in diameter.

The sandy overburden (upper fill) yielded an unquantified, but considerable, amount of debitage, 2 Desert Side-notch projectile points, 1 Elko Corner-notch spear point, 1 biface, 1 punch, and 3 ceramic sherds (2 Shoshonean and 1 Fremont). One of the Desert Side-notch projectile points was of obsidian, sourced to Malad, Idaho (Hughes 1997).

The stain was divided into quarters and the northwest quarter excavated. This revealed an extensive charcoal heap including partially burned axe-cut logs, and two can dums containing bottles and panzurized soda cans dated to 1958. Approximately 5 cm of sandy fill containing Shoshonean and Fremont artifacts covered the burnt and axe-cut logs. Directly below the charcoal heap, the soil was a light colored sandy sterile, with no evidence of cultural occupation. The feature was attributed to modern activity, and backfilled with no further data collection.

The inverted stratigraphy of this site had a relatively simple explanation. The modern occupation was at the base of a sandy slope. The confluence of two small, recently eroded ephemeral drainage channels occurred at the feature. Scattered (probably surface) artifacts and debitage from the slope above had been carried in the loose, sandy soil eroding down these drainages, resulting in approximately 5 cm of sandy fill and an artifact concentration covering the modern burn.
Plate 4.6. 42Da364: Modern burn and cem dumps.

Plate 4.7. 42Da364 Area C. Burned structural elements and Structure 3, view N.

Area B

Three soil stains were tested near the modern horse corrals in the southeast portion of the site; one (Pit 11) was cultural.

Pit 11. Pit 11 was a roasting pit or oven located by probe. The area was then skimmed to reveal a poorly defined stain. A one meter square test pit was placed over the stain to expose the boundaries. The test pit was extended to follow the feature boundaries. The entire pit fill was excavated, and a basin meter fragment was found in the fill, at 36 cm below the surface.

Pit 11 was 64 cm o-e by 48 cm n-s and 25 cm in depth. The pit began 31 cm below surface, and the bottom was 56 cm below surface. Fill was dark charcoal stained soil. Considerable fire-cracked rock, a drill and some debitage were found in this feature. A radiocarbon date (see Table 4.1) of AD 680 was obtained from charcoal from this feature.

Area C

Area C is the northeast side of the site, and contains two cultural features.

Hearth 2. Hearth 8 was first identified by probe as an area of dark soil. Shovel-skimming revealed a discrete circular stain. The feature was completely excavated. The hearth was roughly circular, measuring 42 cm n-s by 34 cm e-w. The feature appeared at 8 cm below surface and was 13 cm in depth. The soil above the hearth was a light brown color. Hearth fill yielded 1 metal fragment, 1 piece of debitage and 1 bone fragment.

Structure 3. Structure 3 was located north of and adjacent to Hearth 8. A one meter square was placed over a stain identified by probe. This cultural stain extended beyond it a test pit. Excavation followed the feature. Three parallel burned branches, probably part of the structure's framework, were noted in the initial test pit. As the excavation proceeded a large circular feature was identified, and the east half entirely removed. The excavated half of this feature yielded 2 bifaces, 77 pieces of debitage, and faunal bone. A date of AD 370 (see Table 4.1) was obtained from charcoal in this feature. No hearths or other features were noted in the exposed portion of the floor, which was 60 cm below ground surface. The depression in which the structure was constructed was approximately 20 cm in depth. Due to time constraints, only the east half of Structure 3 was excavated.

Cultural Materials

Chipped Stone Debitage

The most common artifact type in the assemblage from 42Da364 is debitage. The excavation yielded 1378 pieces of debitage and 2 cores of materials including Tiger chert, Uinta quartzite, Sheep Creek quartzite, and a few unknown material types. Table 4.2 lists the quantity and percentage of flakes recovered by flaking stage and material type.

<table>
<thead>
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<th>Material Type</th>
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<th>Intermediate</th>
<th>Secondary</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flint</td>
<td>14 (12%)</td>
<td>20 (16%)</td>
<td>8 (8%)</td>
<td>32 (23%)</td>
</tr>
<tr>
<td>Chipped</td>
<td>1 (12%)</td>
<td>4 (3%)</td>
<td>0 (0%)</td>
<td>5 (3%)</td>
</tr>
<tr>
<td>Blanks</td>
<td>29 (66%)</td>
<td>26 (66%)</td>
<td>1 (2%)</td>
<td>56 (54%)</td>
</tr>
<tr>
<td>Core fragments</td>
<td>1 (12%)</td>
<td>4 (3%)</td>
<td>0 (0%)</td>
<td>5 (3%)</td>
</tr>
<tr>
<td>Flakes</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>3 (100%)</td>
<td>3 (0.2%)</td>
</tr>
<tr>
<td>Total</td>
<td>37 (82%)</td>
<td>50 (86%)</td>
<td>22 (14%)</td>
<td>109 (100%)</td>
</tr>
</tbody>
</table>

Table 4.2. Debitage from 42Da364: final column lists material quantity and ( ) percentage of site total.

There was a large amount of Umta quartzite at this site. This is somewhat unexpected since no known quarry site is located nearby. The amount of Umta quartzite is similar to the 40% recovered at 42De698, but 696 is adjacent to 624, a quarry site. The high percentage of Umta quartzite suggests another quarry may exist near 42Da364, perhaps to the north or east, outside the project area boundary.

The majority of the debitage was associated with suspected structural remains. Over 40% (44.3%) of the debitage is from Structure 1, and 17% from Structure 2. Fourteen percent of the debitage was recovered from fill over the Modern Burn, as a concentration resulting from recent erosion.
<table>
<thead>
<tr>
<th>Material Type</th>
<th>Location</th>
<th>Level</th>
<th>Material</th>
<th>Length</th>
<th>Width</th>
<th>Notes</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Silicate fragment</td>
<td>212.1</td>
<td>Unknown</td>
<td>Dutch John chert</td>
<td>1.0</td>
<td>0.6</td>
<td>may be stem of tool</td>
<td></td>
</tr>
<tr>
<td>McKeen point</td>
<td>1.1</td>
<td>Surface</td>
<td>Tiger chert</td>
<td>1.5</td>
<td>0.4</td>
<td>concave basal fragment</td>
<td>Site Surface</td>
</tr>
<tr>
<td>Desert Side-notch</td>
<td>1.2</td>
<td>Surface</td>
<td>Tiger chert</td>
<td>1.4</td>
<td>0.3</td>
<td>lip reworked into drill</td>
<td></td>
</tr>
<tr>
<td>Desert Side-notch</td>
<td>2</td>
<td>Surface</td>
<td>Obsidian</td>
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<td>basal fragment</td>
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<td>1.3</td>
<td>Surface</td>
<td>Tiger chert</td>
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<td></td>
<td></td>
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<td>Lancelolate point</td>
<td>1.4</td>
<td>Surface</td>
<td>Sheep Creek qtz</td>
<td>1.7</td>
<td>0.4</td>
<td>midsection, parallel pressure flakes</td>
<td></td>
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<td>Point tip</td>
<td>5</td>
<td>Surface</td>
<td>Sheep Creek qtz</td>
<td>0.4</td>
<td></td>
<td>parallel pressure flaking</td>
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<td>Elko Corner-notch</td>
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<td>Surface</td>
<td>Tiger chert</td>
<td>2.6</td>
<td>0.4</td>
<td>basal fragment</td>
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<tr>
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<td>Surface</td>
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<td>2.6</td>
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<td>leaf shaped</td>
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<td>rounded end piece</td>
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<td>side piece, one notch</td>
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<td>Modern Burn</td>
<td>Upper Fill</td>
<td>Obsidian</td>
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<td>0.3</td>
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<td>Tiger chert</td>
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Table 4.3. Chipped stone tools recovered from 42Da364 (continued on following page).
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<th>1.3</th>
<th>midsection, large percussion flakes</th>
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<td>Fill</td>
<td>Jinta qtz-chal</td>
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<td>0.8</td>
<td>tip, percussion flaked</td>
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<td>3.1</td>
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<td>4.3</td>
<td>2.1</td>
<td>point preform, flake</td>
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<td>0.4</td>
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</tr>
</tbody>
</table>

Table 4.3. Chipped stone tools recovered from 42Da364 (continued from previous page).
Chipped Stone Tools

Stone tools recovered from 42Da364 include bifaces, scrapers, drills, and a range of projectile point types. These artifacts are tabulated in Table 4.4, with information on provenience, material, and dimensional data. Areal distribution of the surface tool assemblage did not seem directly correlated with identified subsurface sites.

Chipped stone tools and biface reduction stages are tabulated by area, structure or activity area and feature in Table 4.4.

Non-Chipped Stone Tools

Non-chipped stone tools recovered from 42Da364 include hammerstones, choppers, manos and metates. These artifacts are tabulated below (Table 4.5) with information on provenience, material and dimensional data.

Most of the groundstone was fragmentary and many fragments were heat damaged. It was not clear if fragmentation resulted from unintentional heating, or if broken groundstone was being used for heating. The metamorphic fragment found in the rock pile near Pit 7 in Activity Area 3 suggests some broken groundstone was used as cooking rocks.

Ute metates are not reported in the Uinta Basin (Shields 1970:2; Marwit 1986:169), so the one found on this site is unexpected.

Quartz river cobbles were used for 7 of the hammerstones (64%), and the chopper. The remaining hammerstones and 94% of the groundstone was Uinta quartzite. Essentially all of the non-chipped stone material was obtained locally. The high percentage of Uinta quartzite debitage and hammerstones in Structure 1, coupled with the absence of Uinta quartzite chipped stone tools in the lithic assemblage from that structure suggests the possibility of a focus on groundstone preparation.

Ceramics

Three ceramic sherd were recovered from Level 1 of the Modern Burn. This feature dates to modern times, but prehistoric artifacts were recovered in the first level. The feature is located in a small drainage and artifacts may have washed in from upslope. The Desert Side-notch projectile points recovered from Level 1 of this feature correspond in age to 2 of the ceramics, which appear to represent 2 different Shoshonean vessels.

Both probable Shoshonean sherd were fired in an uncontrolled atmosphere, resulting in partial oxidation. The paste color of both varies from brown (7.5 YR 3/3) to black (7.5 YR 2/0). The sherd are a base and rim sherd.

The rim sherd is small, only 4.9 mm wide and 7.6 mm thick. This sherd has fingernail incisions in a parallel pattern, perpendicular to the rim. The impressions are placed directly below the apex of the rim, on an angled facet that is the length of the incisions. The incisions are evenly spaced at about 0.5 mm apart. This sherd (FS-123) was subjected to petrographic analysis (Hill, Appendix Three). The paste is opaque black in color, with about 25% quartzite grains and fragments, ranging from very fine to very coarse, as inclusions, probably as a result of being constituents of the clay used for paste. Inclusions are quartzite, brown biotite (mostly weathered to hematite), and three grains of green hornblende. This sherd does not have a formal temper. The constituents of the paste inclusions occur locally in the Red Creek formation approx. 1 mile east of Dutch John in the Red Creek drainage and along the north side of Brownsville (Bibby 1999, personal communication). The composition of this sherd is consistent with local ceramic production, probably using clays retrieved from the north side of the Green River canyon adjacent to the project area. The coarse nature and high level of inclusions in the paste, the color, and the thickness, appearance and decoration of this sherd suggest it is a One or Shoshone brown ware.

The base sherd is the rounded apex of a conical base. This apex is 19 mm thick, while the thickness of the sherd at the higher part of the vessel is 7.4 mm. The width of this sherd is 35 mm. One side of the sherd, just above the apex, displays two rows of fingernail incisions. These are irregularly spaced and diagonal. This sherd (FS-130) was subjected to petrographic analysis (Hill, Appendix Three). The paste is dark brown in color, with about 35% mineral grains and rock fragments as inclusions, probably as a result of being constituents of the clay used for paste. Inclusions are quartz, feldspar, granite, and brown biotite (mostly weathered to hematite). These paste inclusions occur locally in the Red Creek formation just north of the project area (Bibby 1999, personal communication), and in the Red Creek drainage and along the north side of Brownsville, beginning approximately 12 km east of Dutch John.

Illustration 4.4. Selected chipped stone tools from 42Da364.
| Hammerstone   | Surface | Quartzite | 8.6 | 7.4 | 4.0 | flakes removed both ends, crushing wear 3/4 of edge |
| Hammerstone   | Surface | Uinta qtz | 5.0 | 5.6 | 4.5 | entire edge crushing wear, 1 point extensive use |
| Hammerstone   | Surface | Quartzite | 8.7 | 5.8 | 4.4 | light crushing wear, except 5 points |
| Mono fragment | Surface | Quartzite | 8.1 | 3.8 | 3.8 | heavy abrasion & lateral striations 1 face |
| Ute metate    | 23.1-2  | Surface   | 16.8| 11.4| 2.2 | 2 pieces, shelf and part of trough |
| Chopper       | Area A  | Surface   | 9.6 | 7.0 | 3.3 | Large primary flake, crushing wear on 4 corners |
| Single hand mano | Area A | Surface | 11.9| 10.1| 5.2 | heavy abrasion and lateral striations both faces |
| Structure 1   |         |           |     |     |     |                                           |
| Hammerstone   | 57.1    | Structure 1| Fill | Quartzite | 7.1 | 8.7 | 2.8 | Heavy use 1 end, some other |
| Hammerstone   | 85      | Structure 1| Fill | Uinta qtz | 8.1 | 5.8 | 2.9 | entire edge crushing wear |
| Hammerstone   | 154.1   | Structure 1| Upper Fill | Uinta qtz | 7.3 | 8.0 | 4.7 | heavy crushing wear ends, some on edges |
| Hammerstone   | 154.2   | Structure 1| Upper Fill | Uinta qtz | 8.7 | 5.5 | 3.0 | some crushing wear ends |
| Hammerstone   | 154.3   | Structure 1| Upper Fill | Quartzite | 8.5 | 8.3 | 4.4 | heavy crushing wear all sides |
| Hammerstone   | 154.4   | Structure 1| Upper Fill | Quartzite | 8.4 | 6.4 | 2.9 | crushing wear 1 end and edge |
| Mano fragment | 57.2    | Structure 1| Fill | Uinta qtz | 8.7 | 4.7 | 2.2 | heavy abrasion and lateral striations both faces, fire cr |
| Mano fragment | 87.3    | Structure 1| Fill | Uinta qtz | 9.4 | 5.2 | 1 face heavy abrasion, other lighter |
| Single hand mano | 138.1 | Structure 1| Fill | Uinta qtz | 8.9 | 7.1 | 5.3 | 1 face some abrasion, 1 end extensive crushing wear |
| Mano fragment | 138.2   | Structure 1| Fill | Uinta qtz | 8.3 | 6.3 | 2.6 | heavy abrasion faces & edge, crushing wear ends |
| Single hand mano | 154.5 | Structure 1| Upper Fill | Uinta qtz | 7.8 | 9.2 | 4.1 | 1 face light abrasion |
| Mano fragment | 154.7   | Structure 1| Upper Fill | Uinta qtz | 8.1 | 4.2 | 2.1 | 1 face abrasion, edges shaped |
| Mano fragment | 154.8   | Structure 1| Upper Fill | Uinta qtz | 8.2 | 3.8 | 2.8 | heavy abrasion 2 faces, longitudinal striations, dimpling |
| Mano fragment | 154.9   | Structure 1| Upper Fill | Uinta qtz | 8.5 | 2.5 | 4.5 | polishing wear 1 face & edge, fire cracked |
| Mano fragment | 154.10  | Structure 1| Upper Fill | Uinta qtz | 7.2 | 8.2 | 4.2 | heavy abrasion both faces, fire cracked |
| Mano fragment | 154.11  | Structure 1| Upper Fill | Sandstone | 3.7 | 1.7 | 1 face abrasion, worn dimpling, fire cracked |
| Mano fragment | 154.12  | Structure 1| Upper Fill | Uinta qtz | 8.1 | 4.1 | 2.7 | small heavily abraded, fire cracked |
| Metate fragment | 50    | Structure 1| Fill | Uinta qtz | 8.1 | 4.1 | 2.7 | heavily abraded small piece |
| Groundstone frag | 85  | Structure 1| Fill | Uinta qtz | 8.1 | 3.6 | 2.4 | abrasion 2 sides, edge shaped, probably metase |
| Metate fragment | 102    | Structure 1| Upper Fill | Uinta qtz | 8.1 | 3.6 | 2.4 | both faces abraded, one more heavily |
| Groundstone frag | 154.6 | Structure 1| Upper Fill | Uinta qtz | 8.1 | 3.6 | 2.4 | 1 face abraded |
| Metate fragment | 154.13 | Structure 1| Upper Fill | Sandstone | 3.7 | 2.0 | 2.1 | fire cracked, some dimpling but mineral covered |
| Metate fragment | 154.14 | Structure 1| Upper Fill | Uinta qtz | 8.1 | 4.1 | 2.7 | small, fire cracked |
| Slab metate    | 143     | Structure 1| Fill | Uinta qtz | 38.0| 33.5| 5.1 | oval abraded and dimpled area in center |
| Metate fragment | 53     | Structure 1| Fill | Uinta qtz | 8.1 | 4.1 | 2.7 | fire cracked |
| Structure 2   |         |           |     |     |     |                                           |
| Mano fragment | 95      | Activity Area 3 | Fill | Quartzite | 7.7 | 8.8 | 2.8 | 1 edge & end heavily abraded, badly exfoliated |
| Mano fragment | 109     | Activity Area 3 | Fill | Uinta qtz | 8.4 | 5.2 | 3.8 | heavy abrasion, fire cracked |
| Metate fragment | 59     | Activity Area 3 | Fill | Uinta qtz | 8.4 | 5.2 | 3.8 | some abrasion & dimpling 1 face, fire cracked |
| Metate fragment | 137    | Pit 7       | Fill | Uinta qtz | 8.4 | 5.2 | 3.8 | heavy abrasion & dimpling 1 face, possible basin |
| Single hand mano | 198   | Structure 2 | Fill | Uinta qtz | 8.4 | 7.4 | 2.2 | 1 face moderate abrasion-dimpling, other light use |
| Metate fragment | 191    | Structure 2 | Fill | Uinta qtz | 8.4 | 7.4 | 2.2 | 1 faced dimpled, edges shaped |

Table 4.5. Non-chipped stone tools recovered from 42Da364 (continues on following page).
<table>
<thead>
<tr>
<th>Activity Area 4</th>
<th>Hammerstone</th>
<th>151.1</th>
<th>Fill</th>
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<td>Fill</td>
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<td>6.7</td>
<td>3.0</td>
<td>1 face abrasion &amp; lateral striations</td>
</tr>
<tr>
<td>Single hand mano</td>
<td>151.4</td>
<td>Activity Area 4</td>
<td>Fill</td>
<td>Junita qtz</td>
<td>10.5</td>
<td>9.2</td>
<td>2.6</td>
<td>unusual shape, some abrasion 1 face</td>
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<tr>
<td>Basin metate</td>
<td>84</td>
<td>Pit 10</td>
<td>Fill</td>
<td>Junita qtz</td>
<td>27.3</td>
<td>3.2</td>
<td>3.2</td>
<td>abraded in middle, dimpled elsewhere, edges shaped</td>
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<tr>
<td>Basin metate</td>
<td>182</td>
<td>Pit 11</td>
<td>Fill</td>
<td>Junita qtz</td>
<td>22.3</td>
<td>15.7</td>
<td>11.1</td>
<td>dimpled &amp; heavily abraded oval basin</td>
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<tr>
<td>Basin metate</td>
<td>160</td>
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<tr>
<td>Metate fragment</td>
<td>189</td>
<td>Hearth 8</td>
<td>Fill</td>
<td>Junita qtz</td>
<td>22.5</td>
<td>8.9</td>
<td>3.9</td>
<td>heavy dimpling, abraded entire face</td>
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Table 4.5. Non-chipped stone tools recovered from 42Da364 (continued from previous page).

Non-chipped stone tools are tabulated by type and area, structure or activity area and feature in Table 4.6 below.

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Table 4.6. Non-chipped stone tools from 42Da364 by type.
The composition of this sherd is consistent with local ceramic production. The coarse nature and high level of inclusions in the paste, as well as the thickness, conical base, appearance and decoration of this sherd indicate it is Ute or Shoshone Brown ware.

This pottery is similar to those described in the literature as Shoshone or Ute ceramics. The Shoshone ceramics are described (D.B. Madsen 1986) as Paute-Shoshone pottery in the Great Basin and by Eighty (1995) as Intermountain Pottery in Colorado. Madsen's and Eighty's descriptions are similar, flower pot shaped vessels that have flat bottoms and straight sides. The pottery is thick with coarse inclusions and fired in an uncontrolled atmosphere, resulting in colors varying from dark gray to dark brown. Although uncommon, a jar form of Paute-Shoshone pottery with a thick pointed base does occur (D.B. Madsen 1986:211). Additionally, fingerprint impressions can be found on conical-based Paute-Shoshone pottery (D.B. Madsen 1986:209). Although Eighty (1995:65) reports the flat base to be a diagnostic trait of Intermountain Pottery, some of it does display fingerprint impressions.

Shoshone-Paute pottery descriptions of pointed base jar forms, fingerprint incisions, brown to dark gray paste color, poorly controlled firing atmosphere, and large temper match the Dutch John sherds. However, this description is also very similar to a description for a type of Ute ceramics called Uncompahgre Brown ware (Reed 1975). Like Shoshone-Paute pottery, the Uncompahgre Brown ware is fired in a poorly controlled atmosphere. The temper is often quartz, quartzite, or sand, and the color ranges from dark gray or brown to black. The bases of this variety are conical or pointed and the vessels are often fingerprint impressed. The Dutch John sherds match this description exactly for the last characteristic: the Dutch John sherds are not fingerprint impressed, but are fingerprint incised. According to Eighty (1995:166), however, "fingerprint incised pots of Uncompahgre Brown ware tend to have pointed bases", which implies that fingerprint idenitication does occur on these vessels, as it does on the Dutch John sherds.

The distribution of Uncompahgre Brown ware is that of Ute territory, which includes northeastern Utah and the Dutch John area. There is also a record of Shoshone presence in the Uinta mountains and in Brown Park southeast of Dutch John. These ceramics can clearly be attributed to one of these two Numic-speaking groups, and may be either Uncompahgre Brown ware or Paute-Shoshone ware.

One piece of Uinta Gray ware was recovered from the surface of the Modern Burn area fill. This is a small body sherd, measuring 1.9 by 1.0 cm by 0.69 cm thick. The paste color ranges from pink (5YR 7/4) to gray (2.5 YR 6/0) and the core color ranges from very dark gray (7.5 YR 3/0) to pink (5 YR 7/4). It has abundant large white angular pieces of temper. A sample (FS-15) was sent for petrographic analysis (Hall, Appendix Three). The paste contains about 7% rounded fine to very fine quartz and feldspar grains, probably as normal constituents of the clay selected as a paste. The temper (about 15% of the matrix) is limestone with oolitic and some shell fragments. Possible sources include the Morrison and Stump formations, both available within 3 km of the project area. The composition of this sherd is consistent with Uinta Gray ware and local ceramic production.

Glass
A glass vial was recovered from the surface of the site near the old Guard Station. The vial of clear glass has a polygonal (hexagonal) base profile. It measures 0.9 cm along each of the six sides, with a diameter of 1.9 cm. The bottle is broken off 4 cm above the base. The bottom has a symbol comprised of a crown and the number 6.

Faunal Materials

The faunal material from the site consists of 135 small, fragmented bone specimens. Several could be classified to genus including: Centoceras sp. (sage grouse, Ovis canadensis (big horn sheep), Neotoma cinerea (busby tail wood rat), Sylilagus sp. (cottontail), and Sylilagus audoboni (desert cottontail). Very few of the remaining mammal bones were identifiable beyond the general class level. Of the 99 mammal bone fragments in the collection, 51 fragments (51%) are classified as medium/large mammal and 48 fragments (48%) are classified as small mammal. Additionally, 2 Sylilagus teeth and 1 mandible fragment were discovered.

The majority of the bone was recovered from Structure 3, which contained 71 percent (87 bones) of the bone collected. An almost equal amount of large and small mammal bone was noted. Approximately 29% of the faunal assemblage from Structures 3 and 2 (Syringmex recovered from Structure 2) was rabbit or rabbit sized mammal. This is the highest percentage for rabbit recovered from sites in the project area. Most of this material was cottontail bone.

Analysis (Holloway, Appendix One) of macrofossils from five features yielded materials identified as conifer, Pinus (pine), and Juniperus (juniper). FS-54 from Activity Area 2 Hearth 2 dating 1400 BP contained Pinus (pine) and conifer charcoal, charred Pinus wood, and one charred Juniperus (juniper) seed. FS-80 from Structure 1 Pit 3 fill dating 1770 BP yielded Pinus and Juniperus charcoal and charred conifer wood. FS-133 from Activity Area 4 Pit 8 (undated) contained Pinus, Juniperus, and conifer charcoal. FS-202 from Area B Pit 11 dating 1330 BP contained charred Pinus wood and charcoal, and 1 charred Juniperus seed. FS-203 from Area C Structure 3 dating 1710 BP yielded conifer, Pinus, and Juniperus charcoal and charred Pinus wood.

Holloway processed two pollen samples from this site. FS-79 from Structure 1 Pit 3 (1770 BP) yielded one grain each of Poaceae (grass) and Lam-posite Aristaeaceae (ragweed cocklebur) pollen. FS-194 from Area B Pit 11 (1330 BP) yielded low values for Pinus, Cheno-ams, and Low-spine Aristaeaceae.

An additional pollen sample was sent to Paleo Research Labs, primarily for starch analysis (Cummings, Appendix Two). FS-52, from Activity Area 2 Hearth 2 dating 1400 BP, indicated an environment "typical of the transition between a pinyon-juniper woodland and a sagebrush zone or an area with sparse pinyon-juniper woodland and sagebrush in the understory." Small amounts of Salix pollen indicating riparian conditions may be attributable to the proximity of Dutch John Spring to the southeast. A Quercus (oak) pollen aggregate was noted, along with pollen from Rosaceae (Rose family), Ephedra, (Mormon tea), Shepherdia canadensis (Buffaloberry), Cheno-ams (goosefoot), pigweed, saltbush, Ericognum (backweed), and Sphaeralcea (globemallow).

Rosaceae, Shepherdia, and Salix are typically associated with riparian habitat, and probably reflect the presence of perennial water from Dutch John Spring. Economic activities were most strongly suggested by the Cheno-ams and Opuntia pollen, and by the presence of some nonindicative plant sterciches.

Summary
This is one of several sites at Dutch John for which more than one sample from a structure or feature was submitted for datimg. Dating of multiple samples from a structure or feature allowed the testing of inferences regarding definition of structures, or associations between structures or features, and an additional check on the date returned. In the case of the hearth and Pit 3 in structure 1 at 42Da364, the conventional 14C midpoints agree to within 10 years.

This multi-component site was probably occupied from the mid-Archaic through the Late Prehistoric period, but dated components clustered in the Fremont period. The limited cultural remains and paucity of compacted use surfaces suggest that
although this site may have been visited regularly, visits were brief. Plant processing appears to have been a major activity, but processing of faunal remains and stone tool manufacturing were also important activities. This site has limited evidence of reuse of features (Hearth 3 and Pit 7), which is uncommon at Dutch John. It is not surprising to find a number of features near Dutch John Spring. This is today the best source of water in the project area. Most features were located more than 75 meters from the spring. However, modern spring development and building of the Dutch John Guard Station may have destroyed features closer to the spring.

Heavy use during the Terminal Archaic and early Fremont Period sets this site apart from others on the project area. Tucker (1986) and Talbot and Richins (1996; 1999) have argued for an aceramic Fremont phase in the Uinta Basin. The material culture from Structures 1 and 3 supports this notion. These features have dates of AD 250 to 370, and Rose Spring projectile points, showing a fundamental change in technology, but with no evidence of domesticates nor pottery. This sequence is discussed in depth in Chapter Nine.

Plate 4.8. Structure 1 NE quad profile.

Illustration 4.5. 42Da364: Utah metate fragment, FS-23.1.
Illustration 4.8. 42Da364: Unusual basin metate, FS-162.

Illustration 4.9. 42Da364: Manoa, FS-138.1 (top) and FS-138.2 (bottom).
Overview

42Da599 is located as an elevation of 1878 m (6160 feet), on dissected terraces above a riparian area in Dutch John Draw. The site is covered with sagebrush and some pinon-juniper. The soil is reddish-brown and sandy, and incorporates rock debris weathering from bedrock outcrops above the site.

42Da599 was identified by a Forest Service crew in October of 1993 during the Dutch John Privatization Survey. The site was determined to be eligible for the National Register due to the presence of diagnostic artifacts, features, and subsurface deposits. The initial site was measured at 70 by 250 meters. A double ring of medium to small sized rocks suggesting a possible structure was noted on a terrace on the north edge of the site above a road cut. Several dark stains indicating possible fire hearths were noted on the site. The site was recorded as an Archaic habitation site.

The surface assemblage at the site included several lithic concentrations, the densest of which were located on the south side of the site. Over 500 flakes of Sheep Creek quartzite, Uinta quartzite, and Tiger chert were noted. The surface artifact assemblage includes 2 projectile points, 1 projectile point fragment, 1 biface, 3 metates, and 2 manos.

All areas with soil depth or soil stains were tested with an Oakfield soil probe. Because possible cultural stains were noted in several locations over a considerable area of bench, slope and drainage bottom, the initial site boundaries were expanded and the site was divided into three main areas in addition to the isolated rock ring. Area A contained a slab-lined basin. Area B and Area C were activity area and campsite palimpsests.
Excavation Strategy

Work at this site began in May of 1994, and excavation continued intermittently until October of 1997. The rock ring and the slab-lined basin were excavated as features. A number of test pits were placed across Area A and Area C in an effort to locate features or use surfaces. Several contiguous squares were excavated around a possible hearth and use surface near the south end of Area C. A grid was established and excavated in Area B, and a majority of the cultural deposits were removed.

Excavations indicate that this was a short-term, occasional occupation site used by groups from the Early Archaic to the Late Prehistoric period. The site was likely popular due to its proximity to a small water source, and the availability of plant resources. While a group of superimposed activity area floors is apparent, these appear to have been open-air spaces.

Feature Descriptions

Unfortunately, of the excavated sites at Dutch John, 42Da599 shows the highest degree a palimpsest effect that makes the individual occupations inseparable. This term from the world of art is very applicable to archaeology. An art palimpsest is created when an artist repeatedly paints a canvas, cuts the paint with a paint knife and paints again. The end result displays remnants of each discrete painting event, but they have been combined into one inseparable image. One kind of archaeologica
cal palimpsest is created when deposition is slow and evidence from occupations is mixed rather than superimposed. While elements of each event are preserved, those elements are not stratigraphically separated.

Extensive investigation revealed the entire site area contained cultural deposits of varying density. The site was occupied numerous times prehistorically, probably for relatively short periods, to take advantage of the local water source and other natural resources in the area. In spite of extensive excavations, relatively few features were identified. These were clumped in three general areas of the site, and included 1 possible structure, 2 hearths, and 1 slab-lined basin. Dates and diagnostic artifacts indicated that the site was inhabited periodically from the Early Archaic period (ca. 7120 BP) through the Fremont period (1060 BP), and experienced at least some transitory use postdating the Fremont period.

Three excavation areas were designated. Area A is the western end of the site, on a dissected terrace. This area is the highest elevation on site and was excavated first. Area B is the eastern edge of the site, east of the drainage and spring. Area C is in the center of the site, on the west side of the drainage. Area C is on a terrace below a 7 meter (20 feet) south facing cliff.

Isolated Feature

Possible structure. A large ring of rocks with a smaller rock ring in its center was noted on a terrace in the west portion of the area. The outer ring measured approximately 2 meters in diameter, the inner ring about 50 cm in diameter. A possible tightly packed floor was encountered at 7 cm below ground surface in the outer ring, and a moderate assemblage of artifacts, including 1 metate, 3 seeds, small bone fragments, 32 flakes and 2 bifaces was recovered from the fill. Although the inner ring was first thought to represent a hearth, no charcoal, fire-cracked rock or stained soil was noted within it. The only artifact recovered from within the inner ring was 1 seed. Lack of superstructural evidence and condition of the floor temper the interpretation this (undated) feature is a structure. However, with such slowly soil deposition, no superstructure remains would be expected unless a structure had burned. No determination could be made as to whether this isolated feature represented a structure or utilization of a natural rock arrangement.

Area A

Cultural stains and artifacts occur throughout this area. Area A was a sparsely used for several activities. However, activity frequency was not as intense here as in other site areas, judging from the paucity of compacted floor and significant cultural deposits. Area A was the first area tested for the project. However, because the area was so complex, excavation of this area was not completed until late in the project.

Slab-lined basin. A slab-lined basin was found in Area A. This undated basin was approximately 20 cm in diameter and 19 cm in depth. This type of feature is generally associated with mobile Archaic groups, and thought to be used in roasting tubers or other plant products (Chapter 7). This basin deviated from the typical slab-lined basin, in that it had a small diameter, and contained considerable bone, with a few flakes and almost no charcoal in basin fill. The fill of the basin was also well stratified. The stratigraphy may have resulted from several occupations or reuse events, as occurred over the rest of the site. This basin may have served several purposes over time.
Testing in the west portion of the site revealed a dense, compact charcoal concentration interpreted as a hearth. This roughly circular feature was approximately 50 cm in diameter and 25 cm in depth. No artifacts were present. Some larger pieces of charcoal retained enough structural integrity for excavators to note that the wood was generally seen vertically, suggesting a portion of a log had been placed upright in the hearth. Probe testing in the immediate area failed to locate even a thin use floor or structural remains. The charcoal within this feature was abundant. Two samples from a large quantity of charcoal collected were submitted for dating, resulting in returned dates of 600±40 BP and 690±60 BP (Table 4.8). This represents Late Prehistoric occupation of the site.

**Table 4.8: Radiocarbon dates for 42DAS99.**

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<td>AD 330</td>
<td>AD 270-390</td>
<td>1620±60 BP</td>
<td>121199</td>
</tr>
</tbody>
</table>

**Activity Area 2:**

A series of test squares and trenches were placed in this area. Although a considerable quantity of cultural material was encountered, the only feature identified was a hearth. The deepest deposits at the site were found on this sedgebrush-covered terrace. Artifacts were recovered from more than 70 cm below the surface in some test pits. Area C was the last area excavated at the site and for the exchange.

**Activity Area 1:** Test units in Area A revealed a stratigraphic sequence representing an area of intensive prehistoric use. A thin diff layer contained light cultural deposits. This level was approximately 10-15 cm in depth and contained 2 metates, 1 piece of bone, 1 stone tool and several pieces of debris. Beneath this was a second level comprised of darker, more dense, cultural fill approximately 15-20 cm thick. This level produced 3 pieces of groundstone, charcoal, some bone fragments, fire-cracked rock, considerable debitage, and 5 projectile points including 1 Desert Side-notched point, indicating a relatively late occupation. The cultural fill terminated at a red, reddish gray layer, possibly a floor. This may represent the floor of a structure, but given the absence of features, the inclusion of somewhat sporadic nature of an identifiable perimeter, and the numerous artifacts (specifically debitage) in the fill, it seems likely this surface was created solely through frequent use.

Similar stratigraphy was noted in test units located on the southwest edge of Area C approximately 3 meters west of Activity Area 1. These test units produced a similar artifact assemblage, suggesting a continuation of the same use surface. However, 3 points indicative of Early Archaic occupation (2 Northern Side-notched points and 1 McKean point made of Tiger chert) were identified in this assemblage. If the compacted layer exposed in this area is a prehistoric ground surface, it is unlikely to have resulted from a single occupation. This layer was either two (or more) temporally discrete surfaces, a single surface that underwent high levels of mixing, or resulted from curtilage of Archaic points during a Late Prehistoric occupation. The compacted area was approximately 25-30 cm below ground level. A sample from the bottom of the cultural fill indicates an occupation at 7120±90 BP. This corroborates the Early Archaic occupation represented by the projectile points. A focal point may have been Hearth 2, discussed below. Beneath this use surface is sterile soil.

**Hearth 2:** A dark, charcoal filled soil was noted near the center of Activity Area 1 at a depth of approximately 35 cm. Excavation revealed a shallow, basin shaped pit approximately 50 cm in diameter by 12 cm in depth. In addition to charcoal and fire-cracked rock a few flakes (including 1 obsidian flake), hearth fill included some bone fragments.

**Area A:**

Area A was apparently the focus of many activities during several occupations, as it is now a confused melange of floors, artifacts and cultural materials. One meter test units eventually numbering 46 were excavated in an irregularly shaped area that reached a maximum width of 16 meters e-w and 10 meters n-s. More intensive excavations focused on a 24 unit rectangle in the western half. Excavations removed most of the cultural fill from this area.

**Activity Area 2:** The general stratigraphy in Area A began with cultural material on the surface and within the diff layer. Beneath the diff, a moderately thick level of darker soil with more cultural debris was encountered. At least one complete surface existed throughout the area, beneath this second level. In some areas there appeared to be two or more floors or use surfaces. Unfortunately, these were not always apparent or noted during excavation, such much of the cultural material retrieved from this area was probably mixed in the artifact catagories. Where two surfaces were observed, a thin layer, usually about 3 cm in depth, of gray ash soil separated them. The surfaces consisted of hard, light gray mottled soil. The upper surface tended to be less extensive, and may have been centered over the lower surface, which covered the entire excavation area. A sample from contact between fill and the upper surface produced a radiocarbon date of 1620±60 BP, indicating a Formative age occupation (Table 4.8).

Both use surfaces were uneven, with numerous shallow depressions. The depressions tended to be small, apparently randomly spaced, and devoid of artifact concentrations. They were interpreted as a product of the natural uneven ground surface. It is interesting that with artifacts so numerous, and the appearance that considerable use had compacted these surfaces, that no features except the surfaces themselves were noted. Many artifacts came from this area, including bone, debitage (including an area of tiny pressure flakes), tools and groundstone. This was a multiple occupation area with evidence of grinding activities, tool retouch and perhaps tool making. However, construction of permanent features and activities requiring intentional landscape modification do not seem to have occurred here.

**Cultural Materials**

**Chipped Stone Debitage**

The most common artifact type in the assemblage from 42DAS99 is debitage. Excavations yielded 19,012 pieces. Table 4.9 lists the quantity and percentage of flakes recovered by flaking stage and material. Tiger chert flakes and Sheep Creek quartzite are far more common than the other categories. The "Other" category includes a variety of quartzites, several burned pieces, an orange material that could either be Dutch John chert or Pumpkin chert from northwestern Colorado, and white chalcedony, most of which was probably quarried from Uinta quartzite outcrops.

Although much of the "other" material was probably collected locally, flake sizes suggest the Tiger chert and Sheep Creek quartzite at the 85% of the debitage) were obtained at some dist. ec. Lithic material obtained through exchange or at some distance generally is smaller, reflecting reduction before the material reaches a site. Material collected locally typically shows less reduction, resulting in larger flakes and more cortex. "Other" primary flakes averaged 0.3 grams (g) while the primary flakes of Tiger chert averaged 0.9 g and Sheep Creek quartzite 1.03 g. Overall the Tiger chert debitage averaged 0.33 g, the Sheep Creek quartzite 0.65 g. "Other" 0.99 g, and Uinta quartzite 1.46 g. The average weight appears to be correlated to the distance transported. For instance, the 13 obsidian flakes, which probably represent the most distant material source, average 0.26 g.

Eighty percent (80%) of the shatter was Tiger chert. At this site only Tiger chert shows significant signs of heat treatment. Sharrack (1966:38-39) suggests that Tiger chert was heated to remove it from its limestone matrix. The high degree of polishing fractures and shatter for Tiger chert at this site is not attributed to quarrying of the material, but suggests that post-acquision heat treatment was also an important part of Tiger chert tool technology.

**Chipped Stone Tools**

Provenience points recovered from 42DAS99 are tabulated below (Table 4.10). Other chipped stone tools are tabulated in Table 4.11 below.

**Non-Chipped Stone Tools**

Choppers, pecking stones, manos and metates, and groundstone fragments from 42DAS99 are tabulated in Table 4.12 below.
<table>
<thead>
<tr>
<th>Artifact Type</th>
<th>#</th>
<th>Area</th>
<th>Level</th>
<th>E/W Grid</th>
<th>N/S Grid</th>
<th>Material</th>
<th>Length</th>
<th>Width</th>
<th>Thick</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spear point</td>
<td>1</td>
<td>Surface</td>
<td></td>
<td>Tiger chert</td>
<td>2.0</td>
<td>0.4</td>
<td>stemmed indented base, tip reworked into punch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elko Corner-notch</td>
<td>2</td>
<td>Surface</td>
<td></td>
<td>Tiger chert</td>
<td>2.3</td>
<td>0.3</td>
<td>large ears</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Point fragment</td>
<td>14</td>
<td>Surface</td>
<td></td>
<td>Tiger chert</td>
<td>0.5</td>
<td></td>
<td>large Corner-notch or stemmed point</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rose Springs</td>
<td>30</td>
<td>A</td>
<td>Level 1</td>
<td>Test Tr. 1</td>
<td>Tiger chert</td>
<td>0.2</td>
<td></td>
<td>heat damaged, Corner-notch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Point base</td>
<td>55.1</td>
<td>A</td>
<td>Level 1</td>
<td>Test Tr. 1</td>
<td>Chalcedony</td>
<td>0.3</td>
<td></td>
<td>small side notch - probably Uinta</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Point fragment</td>
<td>55.2</td>
<td>A</td>
<td>Level 1</td>
<td>Test Tr. 1</td>
<td>Tiger chert</td>
<td>0.4</td>
<td></td>
<td>tip, heat damaged</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Point fragment</td>
<td>55.3</td>
<td>A</td>
<td>Level 1</td>
<td>Test Tr. 1</td>
<td>Tiger chert</td>
<td>0.2</td>
<td></td>
<td>tip, fine oblique pressure flaking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Point fragment</td>
<td>36.1</td>
<td>A</td>
<td>Level 1</td>
<td>Test Tr. 2</td>
<td>Tiger chert</td>
<td>0.8</td>
<td>0.2</td>
<td>arrow midsection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Point preform</td>
<td>36.2</td>
<td>A</td>
<td>Level 1</td>
<td>Test Tr. 2</td>
<td>Uinta qtz</td>
<td>2.1</td>
<td>0.8</td>
<td>leaf shaped, partially Side-notch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Desert Side-notch</td>
<td>54</td>
<td>B</td>
<td>Level 1</td>
<td>1W</td>
<td>6-7 N</td>
<td>Sheep Creek qtz</td>
<td>1.2</td>
<td>0.3</td>
<td>small</td>
<td></td>
</tr>
<tr>
<td>McKean</td>
<td>71.1</td>
<td>B</td>
<td>Level 1</td>
<td>1W</td>
<td>6-7 N</td>
<td>Sheep Creek qtz</td>
<td>6.5</td>
<td>2.5</td>
<td>long triangular blade</td>
<td></td>
</tr>
<tr>
<td>Lanceola; point</td>
<td>71.2</td>
<td>B</td>
<td>Level 1</td>
<td>1W</td>
<td>6-7 N</td>
<td>Variegated chert</td>
<td>8.5</td>
<td>2.5</td>
<td>found in two pieces, different squares</td>
<td></td>
</tr>
<tr>
<td>Point fragment</td>
<td>64</td>
<td>B</td>
<td>23 cm</td>
<td>1 W</td>
<td>10 N</td>
<td>Tiger chert</td>
<td>0.4</td>
<td>0.3</td>
<td>stem or midsection, heat damage, one edge serrated</td>
<td></td>
</tr>
<tr>
<td>McKean</td>
<td>73.1</td>
<td>B</td>
<td>Level 1</td>
<td>2 W</td>
<td>8 N</td>
<td>Tiger chert</td>
<td>3.0</td>
<td>0.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Point fragment</td>
<td>73.2</td>
<td>B</td>
<td>Level 1</td>
<td>2 W</td>
<td>8 N</td>
<td>Tiger chert</td>
<td>1.7</td>
<td>0.5</td>
<td>tip, parallel sided, heat damaged</td>
<td></td>
</tr>
<tr>
<td>Elko Side-notch</td>
<td>239.1</td>
<td>B</td>
<td>Level 1</td>
<td>2 W</td>
<td>7 N</td>
<td>Tiger chert</td>
<td>0.3</td>
<td></td>
<td>convex base, polisli fracture</td>
<td></td>
</tr>
<tr>
<td>Point fragment</td>
<td>239.2</td>
<td>B</td>
<td>Level 1</td>
<td>2 W</td>
<td>7 N</td>
<td>Tiger chert</td>
<td>1.7</td>
<td>0.3</td>
<td>concave basal portion of Corner-notch</td>
<td></td>
</tr>
<tr>
<td>Point fragment</td>
<td>255</td>
<td>B</td>
<td>Level 1</td>
<td>2 W</td>
<td>6 N</td>
<td>Tiger chert</td>
<td>0.3</td>
<td></td>
<td>arrow midsection</td>
<td></td>
</tr>
<tr>
<td>Large Side-notch</td>
<td>259</td>
<td>B</td>
<td>Level 1</td>
<td>2 W</td>
<td>5 N</td>
<td>Chalcedony</td>
<td>1.8</td>
<td>0.3</td>
<td>midsection</td>
<td></td>
</tr>
<tr>
<td>Large Side-notch</td>
<td>240</td>
<td>B</td>
<td>Level 1</td>
<td>3 W</td>
<td>7 N</td>
<td>Obsidian</td>
<td>0.4</td>
<td></td>
<td>tip, at least 1.6 cm wide, perhaps wider</td>
<td></td>
</tr>
<tr>
<td>Large Corner-notch</td>
<td>241</td>
<td>B</td>
<td>Level 1</td>
<td>3 W</td>
<td>7 N</td>
<td>Obsidian</td>
<td>0.3</td>
<td></td>
<td>slightly concave base, Corner-notch</td>
<td></td>
</tr>
<tr>
<td>McKean</td>
<td>224</td>
<td>B</td>
<td>Level 1</td>
<td>3 W</td>
<td>8 N</td>
<td>Tiger chert</td>
<td>0.4</td>
<td></td>
<td>Corner-notch arrow midsection, heat damaged, Tiger chert?</td>
<td></td>
</tr>
<tr>
<td>Point fragment</td>
<td>136</td>
<td>B</td>
<td>Level 2</td>
<td>3 W</td>
<td>8 N</td>
<td>Gray chert</td>
<td>0.4</td>
<td></td>
<td>Corner-notch arrow midsection, heat damaged, Tiger chert?</td>
<td></td>
</tr>
<tr>
<td>Point fragment</td>
<td>229</td>
<td>B</td>
<td>Level 1</td>
<td>4 W</td>
<td>8 N</td>
<td>Tiger chert</td>
<td>0.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Point fragment</td>
<td>196</td>
<td>B</td>
<td>Level 2</td>
<td>4 W</td>
<td>8 N</td>
<td>Tiger chert</td>
<td>0.2</td>
<td></td>
<td>tip</td>
<td></td>
</tr>
<tr>
<td>Point fragment</td>
<td>244</td>
<td>B</td>
<td>Level 1</td>
<td>4 W</td>
<td>5 N</td>
<td>Sheep Creek qtz</td>
<td>1.3</td>
<td>0.3</td>
<td>base slightly expanding-convex</td>
<td></td>
</tr>
<tr>
<td>Point fragment</td>
<td>182</td>
<td>B</td>
<td>Level 1</td>
<td>5 W</td>
<td>3 N</td>
<td>Sheep Creek qtz</td>
<td>0.2</td>
<td></td>
<td>tip</td>
<td></td>
</tr>
<tr>
<td>Point fragment</td>
<td>145</td>
<td>B</td>
<td>Level 2</td>
<td>5 W</td>
<td>3 N</td>
<td>Tiger chert</td>
<td>0.3</td>
<td></td>
<td>midsection, sinuous edges</td>
<td></td>
</tr>
<tr>
<td>Besant point</td>
<td>242</td>
<td>B</td>
<td>Level 1</td>
<td>6 W</td>
<td>8 N</td>
<td>Uinta qtz</td>
<td>5.9</td>
<td>2.3</td>
<td>broken prehistorically, both halves found same level</td>
<td></td>
</tr>
<tr>
<td>Point fragment</td>
<td>235</td>
<td>F</td>
<td>Level 1</td>
<td>7 W</td>
<td>8 N</td>
<td>Tiger chert</td>
<td>1.5</td>
<td>0.4</td>
<td>heated midsection, serrated edge</td>
<td></td>
</tr>
<tr>
<td>McKean</td>
<td>29</td>
<td>B</td>
<td>Level 2</td>
<td>5-2 E</td>
<td>8 N</td>
<td>Uinta qtz</td>
<td>2.3</td>
<td>0.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Point fragment</td>
<td>374</td>
<td>C</td>
<td>14-30 cm</td>
<td>1 E</td>
<td>4 N</td>
<td>Tiger chert</td>
<td>0.2</td>
<td></td>
<td>most of blade, heat damage, at least 1.4 cm wide</td>
<td></td>
</tr>
<tr>
<td>Point fragment</td>
<td>372</td>
<td>C</td>
<td>15-30 cm</td>
<td>1 E</td>
<td>4 N</td>
<td>Tiger chert</td>
<td>1.8</td>
<td>0.4</td>
<td>tip, some cortex, large point</td>
<td></td>
</tr>
<tr>
<td>Point fragment</td>
<td>324.1</td>
<td>C</td>
<td>30-43 cm</td>
<td>12 E</td>
<td>4 N</td>
<td>Tiger chert</td>
<td>0.4</td>
<td></td>
<td>arrow tip</td>
<td></td>
</tr>
<tr>
<td>Point fragment</td>
<td>324.2</td>
<td>C</td>
<td>30-43 cm</td>
<td>12 E</td>
<td>4 N</td>
<td>Gray chert</td>
<td>0.2</td>
<td></td>
<td>tip, heated Tiger chert?</td>
<td></td>
</tr>
<tr>
<td>Prairie Side-notch</td>
<td>354</td>
<td>C</td>
<td>30-43 cm</td>
<td>13 E</td>
<td>4 N</td>
<td>Tiger chert</td>
<td>1.6</td>
<td>0.4</td>
<td>pot lid fracture, square base, shallow notching</td>
<td></td>
</tr>
<tr>
<td>Pinto Shouldered</td>
<td>247</td>
<td>C</td>
<td>15-30 cm</td>
<td>1</td>
<td>7 N</td>
<td>Tiger chert</td>
<td>1.2</td>
<td>0.3</td>
<td>base, shallow notch, rounded shoulders</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.10. Projectile points recovered from 42Da599 (continues on following page).
<table>
<thead>
<tr>
<th>Point fragment</th>
<th>313</th>
<th>C</th>
<th>15-30 cm</th>
<th>6 E</th>
<th>8 N</th>
<th>Tiger chert</th>
<th>0.2</th>
<th>arrow point tip, slightly serrated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Point preform</td>
<td>339</td>
<td>C</td>
<td>30-45</td>
<td>6E</td>
<td>4N</td>
<td>Tiger chert</td>
<td>3.7</td>
<td>concave base, probably McKean</td>
</tr>
<tr>
<td>Point fragment</td>
<td>348</td>
<td>C</td>
<td>30-45 cm</td>
<td>6 E</td>
<td>4 N</td>
<td>Moss agate</td>
<td>0.3</td>
<td>tip</td>
</tr>
<tr>
<td>Point fragment</td>
<td>318</td>
<td>C</td>
<td>45-60 cm</td>
<td>6 E</td>
<td>6 N</td>
<td>Gray chert</td>
<td>1.6</td>
<td>midsection, use wear one edge</td>
</tr>
<tr>
<td>Elko Side-notch</td>
<td>389.1</td>
<td>C</td>
<td>18-30 cm</td>
<td>9 E</td>
<td>4 N</td>
<td>Tiger chert</td>
<td>0.4</td>
<td>hinge fracture across blade</td>
</tr>
<tr>
<td>Northern Side-notch</td>
<td>389.2</td>
<td>C</td>
<td>18-30 cm</td>
<td>9 E</td>
<td>4 N</td>
<td>Tiger chert</td>
<td>2.4</td>
<td>sinuous basal fragment</td>
</tr>
<tr>
<td>Elko Eared</td>
<td>323.1</td>
<td>C</td>
<td>30-45 cm</td>
<td>9 E</td>
<td>4 N</td>
<td>Uinta qtz</td>
<td>3.2</td>
<td>asymmetrical notching, tip retouched into graver</td>
</tr>
<tr>
<td>Northern Side-notch</td>
<td>323.2</td>
<td>C</td>
<td>30-45 cm</td>
<td>9 E</td>
<td>4 N</td>
<td>Tiger chert</td>
<td>4.1</td>
<td>asymmetrical notching, tip retouched into graver</td>
</tr>
<tr>
<td>Northern Side-notch</td>
<td>106.1</td>
<td>C</td>
<td>30-45 cm</td>
<td>Square</td>
<td>1</td>
<td>Tiger chert</td>
<td>2.0</td>
<td>straight sides, slightly concave base</td>
</tr>
<tr>
<td>McKean</td>
<td>106.2</td>
<td>C</td>
<td>30-45 cm</td>
<td>Square</td>
<td>1</td>
<td>Uinta qtz</td>
<td>1.8</td>
<td>concave base, reworked into graver</td>
</tr>
<tr>
<td>Elko Side-notch</td>
<td>154.1</td>
<td>C</td>
<td>Level 1</td>
<td>Square</td>
<td>2</td>
<td>Purple chert</td>
<td>1.2</td>
<td>probably arrow, serrated edge</td>
</tr>
<tr>
<td>Point fragment</td>
<td>154.2</td>
<td>C</td>
<td>Level 1</td>
<td>Square</td>
<td>2</td>
<td>Tiger chert</td>
<td>1.3</td>
<td>grey color - banded, heavily burned base</td>
</tr>
<tr>
<td>Elko Corner-notch</td>
<td>86</td>
<td>C</td>
<td>Level 2</td>
<td>Square</td>
<td>3</td>
<td>Tiger chert</td>
<td>1.6</td>
<td>slightly serrated, concave base</td>
</tr>
<tr>
<td>Large Corner-notch</td>
<td>122</td>
<td>C</td>
<td>Level 2</td>
<td>Square</td>
<td>3</td>
<td>Tiger chert</td>
<td>2.0</td>
<td>point blade, heat damaged</td>
</tr>
<tr>
<td>Point fragment</td>
<td>103</td>
<td>C</td>
<td>Level 2</td>
<td>Square</td>
<td>4</td>
<td>Tiger chert</td>
<td>2.7</td>
<td>large basal notch, Side-notch, unusual</td>
</tr>
<tr>
<td>Point fragment</td>
<td>104</td>
<td>C</td>
<td>Level 2</td>
<td>Square</td>
<td>4</td>
<td>Tiger chert</td>
<td>1.7</td>
<td>concave base, blade edges nearly parallel</td>
</tr>
<tr>
<td>Elko Side-notch</td>
<td>110.1</td>
<td>C</td>
<td>Level 2</td>
<td>Square</td>
<td>5</td>
<td>Tiger chert</td>
<td>1.5</td>
<td>base and lower portion of blade</td>
</tr>
<tr>
<td>Northern Side-notch</td>
<td>110.2</td>
<td>C</td>
<td>Level 2</td>
<td>Square</td>
<td>5</td>
<td>Tiger chert</td>
<td>7.9</td>
<td>base and lower portion of blade</td>
</tr>
<tr>
<td>Northern Side-notch</td>
<td>110.3</td>
<td>C</td>
<td>Level 2</td>
<td>Square</td>
<td>5</td>
<td>Tiger chert</td>
<td>0.4</td>
<td>base and lower portion of blade</td>
</tr>
<tr>
<td>Point fragment</td>
<td>110.4</td>
<td>C</td>
<td>Level 2</td>
<td>Square</td>
<td>5</td>
<td>Tiger chert</td>
<td>1.5</td>
<td>midsection, may have part of notch</td>
</tr>
<tr>
<td>Elko Side-notch</td>
<td>99</td>
<td>C</td>
<td>Level 2</td>
<td>Square</td>
<td>6</td>
<td>Chalcedony</td>
<td>2.0</td>
<td>base and lower portion of blade</td>
</tr>
<tr>
<td>Point fragment</td>
<td>278</td>
<td>C</td>
<td>Level 2</td>
<td>Square</td>
<td>7</td>
<td>Tiger chert</td>
<td>0.2</td>
<td>straight base, Side-notch, heat damage</td>
</tr>
<tr>
<td>Point fragment</td>
<td>282</td>
<td>C</td>
<td>Level 2</td>
<td>Square</td>
<td>7</td>
<td>Tiger chert</td>
<td>1.6</td>
<td>point blade 2.9 cm long, one ear, possible Corner-notch</td>
</tr>
<tr>
<td>Northern Side-notch</td>
<td>291</td>
<td>C</td>
<td>0-15 cm</td>
<td>Square</td>
<td>12</td>
<td>Mottled white chert</td>
<td>0.5</td>
<td>remnants of notch and ear, serrated edge, Tiger chert?</td>
</tr>
<tr>
<td>Point fragment</td>
<td>297</td>
<td>C</td>
<td>Test P. 10</td>
<td>Gray chert</td>
<td></td>
<td></td>
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Table 4.10. Projectile points recovered from 42Da599 (continued from previous page).
Illustration 4.10. Selected chipped stone tools from 42DA699.

Illustration 4.11. More selected chipped stone tools from 42DA699.
<table>
<thead>
<tr>
<th>Type</th>
<th>Code</th>
<th>Layer</th>
<th>Material</th>
<th>Length</th>
<th>Width</th>
<th>Thick</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biface</td>
<td>7</td>
<td>A</td>
<td>0-10 cm</td>
<td>TP 1</td>
<td>10.4</td>
<td>6.0</td>
<td>1.5 two retouched pieces, joined edge utilized, after break one end reduced</td>
</tr>
<tr>
<td>Biface fragment</td>
<td>13</td>
<td>A</td>
<td>surface</td>
<td>TP 2</td>
<td></td>
<td>0.4</td>
<td>S4, edge of base</td>
</tr>
<tr>
<td>Biface fragment</td>
<td>43</td>
<td>A</td>
<td>Level 1</td>
<td>TT 2</td>
<td>3.5</td>
<td>0.9</td>
<td>S3, tip, heat damage</td>
</tr>
<tr>
<td>Biface</td>
<td>44</td>
<td>A</td>
<td>Level 1</td>
<td>TT 2</td>
<td></td>
<td>0.7</td>
<td>S3, base</td>
</tr>
<tr>
<td>Biface fragment</td>
<td>55</td>
<td>A</td>
<td>Level 1</td>
<td>TT 1</td>
<td>0.6</td>
<td></td>
<td>S4, small piece</td>
</tr>
<tr>
<td>Biface</td>
<td>56</td>
<td>A</td>
<td>0-10 cm</td>
<td>TP 3</td>
<td>5.1</td>
<td>3.6</td>
<td>1.3 S1, leaf shaped, some cortex</td>
</tr>
<tr>
<td>End scraper</td>
<td>20</td>
<td>A</td>
<td>0-10 cm</td>
<td>TP 4</td>
<td></td>
<td>0.3</td>
<td>unifacial edge retouch &amp; use, severely heat damaged</td>
</tr>
<tr>
<td>Scraper</td>
<td>292</td>
<td>A</td>
<td>Road</td>
<td></td>
<td></td>
<td>5.3</td>
<td>4.6 1.4 steep edge retouch, some use wear</td>
</tr>
<tr>
<td>Drill</td>
<td>36.3</td>
<td>A</td>
<td>Level 1</td>
<td>TT 2</td>
<td></td>
<td>0.9</td>
<td>0.5 juncture of bit &amp; base, small drill</td>
</tr>
<tr>
<td>Biface fragment</td>
<td>32</td>
<td>B</td>
<td>Level 1</td>
<td>TT</td>
<td></td>
<td>0.9</td>
<td>S3, rounded base</td>
</tr>
<tr>
<td>Biface fragment</td>
<td>66</td>
<td>B</td>
<td>Level 1</td>
<td>1 W</td>
<td>3.2</td>
<td>0.6</td>
<td>S3, base</td>
</tr>
<tr>
<td>Biface fragment</td>
<td>68</td>
<td>B</td>
<td>Level 1</td>
<td>1 W</td>
<td>4 - 5 N</td>
<td>0.9</td>
<td>S2, some use on broken edge</td>
</tr>
<tr>
<td>Biface fragment</td>
<td>69</td>
<td>B</td>
<td>Level 1</td>
<td>1 W</td>
<td>11 N</td>
<td>5.1</td>
<td>1.5 S2, base</td>
</tr>
<tr>
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<td>73.3</td>
<td>B</td>
<td>Level 1</td>
<td>TT 1</td>
<td></td>
<td>1.4</td>
<td>S2, heat damage</td>
</tr>
<tr>
<td>Biface fragment</td>
<td>168</td>
<td>B</td>
<td>Level 1</td>
<td>5 W</td>
<td>3 N</td>
<td>1.8</td>
<td>0.4 S3, probably point proform</td>
</tr>
<tr>
<td>Biface fragment</td>
<td>213.1</td>
<td>B</td>
<td>Level 1</td>
<td>3 W</td>
<td>4 N</td>
<td>0.4</td>
<td>S4, very small piece of biface edge, heat damage</td>
</tr>
<tr>
<td>Biface fragment</td>
<td>213.2</td>
<td>B</td>
<td>Level 1</td>
<td>3 W</td>
<td>9 N</td>
<td>0.3</td>
<td>S4, very small piece</td>
</tr>
<tr>
<td>Biface fragment</td>
<td>214</td>
<td>B</td>
<td>Level 1</td>
<td>3 W</td>
<td>6 N</td>
<td>0.3</td>
<td>S4, very small piece</td>
</tr>
<tr>
<td>Biface fragment</td>
<td>222</td>
<td>B</td>
<td>Level 1</td>
<td>5 W</td>
<td>8 N</td>
<td>3.6</td>
<td>0.7 S3, tip, use wear apparent</td>
</tr>
<tr>
<td>Biface fragment</td>
<td>225</td>
<td>B</td>
<td>Level 1</td>
<td>3 W</td>
<td>6 N</td>
<td>0.3</td>
<td>S4, tip, at least 1.8 cm wide</td>
</tr>
<tr>
<td>Biface fragment</td>
<td>228.1</td>
<td>B</td>
<td>Level 1</td>
<td>4 W</td>
<td>8 N</td>
<td>0.5</td>
<td>S2, thin, but mostly cortex, some bifacially retouch, small piece</td>
</tr>
<tr>
<td>Biface fragment</td>
<td>228.2</td>
<td>B</td>
<td>Level 1</td>
<td>4 W</td>
<td>8 N</td>
<td></td>
<td>S4, leaf shaped, one lateral edge retouch and use</td>
</tr>
<tr>
<td>Biface fragment</td>
<td>249</td>
<td>B</td>
<td>Level 1</td>
<td>3 W</td>
<td>8 N</td>
<td>0.7</td>
<td>S3, 5 x 1.5 piece of an edge</td>
</tr>
<tr>
<td>Biface fragment</td>
<td>250</td>
<td>B</td>
<td>Level 1</td>
<td>3 W</td>
<td>8 N</td>
<td>0.8</td>
<td>S3, base, at least 4 cm wide</td>
</tr>
<tr>
<td>Biface fragment</td>
<td>33</td>
<td>B</td>
<td>Level 2</td>
<td>TT</td>
<td></td>
<td>1.0</td>
<td>S1, mostly cortex, very limited bifacially retouch</td>
</tr>
<tr>
<td>Biface</td>
<td>92</td>
<td>B</td>
<td>Level 2</td>
<td>5 W</td>
<td>4 N</td>
<td>5.4</td>
<td>3.4 S1, small amount of cortex</td>
</tr>
<tr>
<td>Scraper</td>
<td>238</td>
<td>B</td>
<td>Level 1</td>
<td>3 W</td>
<td>7 N</td>
<td>0.7</td>
<td>unifacially flaked, some use wear</td>
</tr>
<tr>
<td>Scraper</td>
<td>269</td>
<td>B</td>
<td>Level 1</td>
<td>5 W</td>
<td>5 N</td>
<td>5.9</td>
<td>1.1 limited edge retouch, mostly cortex covered</td>
</tr>
<tr>
<td>Scraper</td>
<td>270</td>
<td>B</td>
<td>Level 1</td>
<td>5 W</td>
<td>5 N</td>
<td>0.5</td>
<td>fine retouch, moderately steep angle, some use wear</td>
</tr>
<tr>
<td>Scraper</td>
<td>135</td>
<td>B</td>
<td>Level 2</td>
<td>5 W</td>
<td>8 N</td>
<td>7.1</td>
<td>4.5 2.1 bifacially edge retouch on a large flake, some use wear on side</td>
</tr>
<tr>
<td>Drill</td>
<td>71</td>
<td>B</td>
<td>Level 1</td>
<td>1 W</td>
<td>6 - 7 N</td>
<td>1.0</td>
<td>0.4 base only as wide as bit, missing tip</td>
</tr>
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</table>

Table 4.11. Other chipped stone tools recovered from 42Da599 (continues on following page).
<table>
<thead>
<tr>
<th>Billet fragment</th>
<th>C</th>
<th>Level</th>
<th>Square</th>
<th>Chipped stone tool type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Billet fragment</td>
<td>105</td>
<td>Level 1</td>
<td>Square 2</td>
<td>Tiger chert</td>
<td>Side of edge damaged, some use</td>
</tr>
<tr>
<td>Billet fragment</td>
<td>150.1</td>
<td>Level 1</td>
<td>Square 2</td>
<td>Sheep Creek qtz</td>
<td>3.7</td>
</tr>
<tr>
<td>Billet fragment</td>
<td>150.2</td>
<td>Level 1</td>
<td>Square 2</td>
<td>Sheep Creek qtz</td>
<td>0.4</td>
</tr>
<tr>
<td>Billet fragment</td>
<td>150.3</td>
<td>Level 1</td>
<td>Square 2</td>
<td>Tiger chert</td>
<td>3.3</td>
</tr>
<tr>
<td>Billet fragment</td>
<td>150.4</td>
<td>Level 1</td>
<td>Square 2</td>
<td>Tiger chert</td>
<td>0.4</td>
</tr>
<tr>
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<td>285</td>
<td>Level 1</td>
<td>TP 8</td>
<td>Tiger chert</td>
<td>0.4</td>
</tr>
<tr>
<td>Billet fragment</td>
<td>313</td>
<td>Level 1</td>
<td>Square 2</td>
<td>Uinta qtz</td>
<td>4.8</td>
</tr>
<tr>
<td>Billet fragment</td>
<td>322</td>
<td>Level 1</td>
<td>Square 2</td>
<td>Tiger chert</td>
<td>6.6</td>
</tr>
<tr>
<td>Billet fragment</td>
<td>319.2</td>
<td>Level 1</td>
<td>Square 2</td>
<td>Chalcedony</td>
<td>0.5</td>
</tr>
<tr>
<td>Billet fragment</td>
<td>384</td>
<td>Level 1</td>
<td>Square 2</td>
<td>Tiger chert</td>
<td>6.1</td>
</tr>
<tr>
<td>Billet fragment</td>
<td>334</td>
<td>Level 1</td>
<td>Square 2</td>
<td>Tiger chert</td>
<td>3.7</td>
</tr>
<tr>
<td>Billet fragment</td>
<td>114</td>
<td>Level 2</td>
<td>Square 3</td>
<td>Tiger chert</td>
<td>3.8</td>
</tr>
<tr>
<td>Billet fragment</td>
<td>115</td>
<td>Level 3</td>
<td>Square 3</td>
<td>White-brown chert</td>
<td>2.4</td>
</tr>
<tr>
<td>End scraper</td>
<td>84</td>
<td>Level 1</td>
<td>Square 3</td>
<td>White-brown chert</td>
<td>3.8</td>
</tr>
<tr>
<td>Scraper</td>
<td>286.1</td>
<td>Level 1</td>
<td>TP 9</td>
<td>Sheep Creek qtz</td>
<td>5.0</td>
</tr>
<tr>
<td>Scraper</td>
<td>286.2</td>
<td>Level 1</td>
<td>TP 9</td>
<td>Sheep Creek qtz</td>
<td>3.1</td>
</tr>
<tr>
<td>Scraper</td>
<td>286.3</td>
<td>Level 1</td>
<td>TP 9</td>
<td>Tiger chert</td>
<td>3.5</td>
</tr>
<tr>
<td>Scraper</td>
<td>286.4</td>
<td>Level 1</td>
<td>TP 9</td>
<td>Tiger chert</td>
<td>1.2</td>
</tr>
<tr>
<td>Scraper</td>
<td>286.5</td>
<td>Level 1</td>
<td>TP 9</td>
<td>Tiger chert</td>
<td>2.1</td>
</tr>
<tr>
<td>Scraper</td>
<td>319.1</td>
<td>Level 1</td>
<td>Square 2</td>
<td>Tiger chert</td>
<td>2.1</td>
</tr>
<tr>
<td>Scraper</td>
<td>349</td>
<td>Level 1</td>
<td>Square 2</td>
<td>Tiger chert</td>
<td>6.7</td>
</tr>
<tr>
<td>Core</td>
<td>330</td>
<td>Level 1</td>
<td>Square 2</td>
<td>Tiger chert</td>
<td>7.5</td>
</tr>
<tr>
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<td>395</td>
<td>Level 1</td>
<td>Square 2</td>
<td>Uinta qtz</td>
<td>7.2</td>
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Table 4.11. Other chipped stone tools recovered from 42Da599 (continued from previous page).
<table>
<thead>
<tr>
<th>Artifact Type</th>
<th>PE #</th>
<th>Area</th>
<th>Level</th>
<th>E/W Grid</th>
<th>N/S Grid</th>
<th>Material</th>
<th>Length</th>
<th>Width</th>
<th>Thick.</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single handed mano</td>
<td>2</td>
<td>A</td>
<td>Level 1</td>
<td>TT 2</td>
<td>Uinta qtz</td>
<td>11.9</td>
<td>10.5</td>
<td>6.5</td>
<td></td>
<td>both faces lateral striations, extensive wear on edges</td>
</tr>
<tr>
<td>Single handed mano</td>
<td>3</td>
<td>A</td>
<td>Surface</td>
<td></td>
<td>Uinta qtz</td>
<td>12.3</td>
<td>10.1</td>
<td>5.7</td>
<td></td>
<td>1 face abrasion wear, 1 end crushing wear</td>
</tr>
<tr>
<td>Pecking stone</td>
<td>36</td>
<td>A</td>
<td>Level 1</td>
<td>TT 2</td>
<td>Uinta qtz</td>
<td>5.8</td>
<td>5.4</td>
<td>3.6</td>
<td></td>
<td>very light crushing wear couple spots</td>
</tr>
<tr>
<td>Chopper</td>
<td>56</td>
<td>A</td>
<td>Level 1</td>
<td>Pit 3</td>
<td>Quartzite</td>
<td>2.1</td>
<td></td>
<td></td>
<td></td>
<td>fire cracked, unifacially flaked, some crushing wear</td>
</tr>
<tr>
<td>Single handed mano</td>
<td>41.1</td>
<td>A</td>
<td>Level 1</td>
<td>TT 1</td>
<td>Uinta qtz</td>
<td>10.6</td>
<td>8.9</td>
<td>5.8</td>
<td></td>
<td>abrasion on small area of 1 face, poor condition</td>
</tr>
<tr>
<td>Mano fragment</td>
<td>41.2</td>
<td>A</td>
<td>Level 1</td>
<td>TT 1</td>
<td>Uinta qtz</td>
<td>6.6</td>
<td>5.4</td>
<td></td>
<td></td>
<td>1 face heavy abrasion, fire cracked, 1 end some pecking</td>
</tr>
<tr>
<td>Mano fragment</td>
<td>43</td>
<td>A</td>
<td>Level 1</td>
<td>TT 2</td>
<td>Uinta qtz</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>very small piece, fire cracked, small area abraded</td>
</tr>
<tr>
<td>Loaf shaped mano</td>
<td>48</td>
<td>A</td>
<td>Level 1</td>
<td>TT 2</td>
<td>Uinta qtz</td>
<td>6.5</td>
<td>6.7</td>
<td></td>
<td></td>
<td>double faceted, rounded, shaped, smoothed top, lateral striations on both facets</td>
</tr>
<tr>
<td>Single handed mano</td>
<td>49.1</td>
<td>A</td>
<td>Level 1</td>
<td>TT 1</td>
<td>Uinta qtz</td>
<td>9.4</td>
<td>7.1</td>
<td>5.2</td>
<td></td>
<td>heavy abrasion lateral striations one face, crushing wear ends</td>
</tr>
<tr>
<td>Mano fragment</td>
<td>49.2</td>
<td>A</td>
<td>Level 1</td>
<td>TT 1</td>
<td>Uinta qtz</td>
<td></td>
<td></td>
<td>4.6</td>
<td></td>
<td>small piece, fire cracked, heavy abrasion 1 face</td>
</tr>
<tr>
<td>Single handed mano</td>
<td>52.1</td>
<td>A</td>
<td>Level 1</td>
<td>Pit 3</td>
<td>Sandstone</td>
<td>9.1</td>
<td>4.7</td>
<td></td>
<td></td>
<td>heavy abrasion on flat face, heavy crushing wear end</td>
</tr>
<tr>
<td>Metate fragment</td>
<td>52.2</td>
<td>A</td>
<td>Level 1</td>
<td>Pit 3</td>
<td>Uinta qtz</td>
<td>2.2</td>
<td></td>
<td></td>
<td></td>
<td>limited abrasion 1 face</td>
</tr>
<tr>
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<td>26</td>
<td>A</td>
<td>Level 3</td>
<td>Pit 4</td>
<td>Uinta qtz</td>
<td>2.5</td>
<td></td>
<td></td>
<td></td>
<td>small piece, some abrasion</td>
</tr>
</tbody>
</table>

| Pecking stone      | 66   | B    | Level 1 | 1 W  | 9 N  | Quartzite | 8.7    | 4.1   | 2.5   | very light pecking one end                                              |
| Chopper            | 54   | B    | Level 1 | 1 E  | 6 1/2| Quartzite | 7.2    | 5.3   | 4.3   | crushing wear just over half of edge                                     |
| Loaf shaped mano   | 42   | B    | Level 1 | 1 E  | 8 N  | Uinta qtz | 9.5    | 6.8   |       | some abrasion flat surface, some dimpling, may be shaped                 |
| Single handed mano | 67   | B    | Level 1 | 1 W  | 9 N  | Uinta qtz | 11.1   | 8.8   | 5.6   | both faces heavy abrasion, lateral striations, edge dimpling             |
| Single handed mano | 70   | B    | Level 1 | 1 W  | 9 N  | Uinta qtz | 12.9   | 9.9   | 4.9   | 2 faces heavily abraded & onto edge, lateral striations                 |
| Mano fragment      | 151  | B    | Level 1 | 3 W  | 9 N  | Quartzite | 10.2   | 5.5   |        | abrasion & lateral striations both faces, polish 1 edge                  |
| Mano fragment      | 165  | B    | Level 1 | 5 W  | 7 N  | Uinta qtz | 11.1   |       | 5.3   | 1 side & edge heavily abraded, other slightly, crushing wear ends        |
| Mano fragment      | 192  | B    | Level 2 | 4 W  | 8 N  | Sandstone | 9.1    | 6.0   |        | 1 face heavy abradation, extensive dimpling most of mano                 |
| Single handed mano | 302  | B    | Level 1 | 6 W  | 8 N  | Uinta qtz | 11.9   | 8.5   | 6.5   | 1 face heavy use, lateral striations, ends heavy crushing wear          |
| Mano fragment      | 305  | B    | Level 1 | 4 W  | 8 N  | Uinta qtz |        |       |        | very small piece                                                         |
| Slab metate fragment| 72   | B    | unknown |       |       | Uinta qtz | 25.8   | 4.4   | 1 face heavily abraded toward middle, lighter toward edge                |
| Metate fragment    | 195.1| B    | Level 1 | 5 W  | 6 N  | Uinta qtz | 3.4    |       | 1 small piece, edge shaped, but no use apparent                          |
| Metate fragment    | 195.2| B    | Level 1 | 5 W  | 6 N  | Uinta qtz | 2.9    |       | 2 small pieces, heavy abrasion, some dimpling                           |
| Basin metate fragment| 195.3| B   | Level 1 | 5 W  | 6 N  | Uinta qtz | 23.2   | 4.3   | 2.3   | edge shaped by flaking, basin 11.3 by 2.3 cm deep                         |
| Basin metate fragment| 202 | B   | Level 1 | 5 W  | 2 N  | Uinta qtz | 5.1    |       | 2.7   | 2.7 | basin both sides, heavily abraded - even beyond basin both sides         |
| Metate fragment    | 242  | B    | Level 1 | 3 W  | 9 N  | Uinta qtz | 2.7    |       | 2.7   | heavily abraded, some dimpling                                           |
| Basin metate fragment| 258 | B    | Level 1 | 2 W  | 5 N  | Uinta qtz | 2.7    |       | 2.7   | high points abraded, small piece, some dimple marks                     |
| Metate fragment    | 301  | B    | Level 1 | 2 W  | 6 N  | Uinta qtz | 4.8    |       | 4.8   | heavy abrasion toward basin, bi-directional striations                   |
| Metate fragment    | 303  | B    | Level 1 | 4 W  | 8 N  | Uinta qtz | 1.7    |       | 1.7   | 1 side abraded and dimpled, small                                       |
| Metate fragment    | 304  | B    | Level 1 | 4 W  | 8 N  | Uinta qtz | 3.5    |       | 3.5   | 1 side heavily abraded, other side maybe                                 |
| Slab metate fragment| 306  | B    | Level 1 | 4 W  | 8 N  | Sandstone | 2.5    |       | 2.5   | heavily abraded                                                          |
| Groundstone fragment| 309  | B    | Level 1 | 6 W  | 8 N  | Uinta qtz |        |       |        | light abrasion one face, very small                                      |

Table 4.12. Non-chipped stone tools recovered from 42Da599 (continues on following page).
<table>
<thead>
<tr>
<th>Metate fragment</th>
<th>94</th>
<th>B</th>
<th>Level 2</th>
<th>5 W</th>
<th>3 N</th>
<th>Sandstone</th>
<th>2.4</th>
<th>some abrasion one face, looks like crushing wear shaped edge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metate fragment</td>
<td>134</td>
<td>B</td>
<td>Level 2</td>
<td>5 W</td>
<td>5 N</td>
<td>Uinta qtz</td>
<td>5.0</td>
<td>heavy abrasion both sides, 1 side extensive dimpling</td>
</tr>
<tr>
<td>Metate fragment</td>
<td>150</td>
<td>B</td>
<td>Level 2</td>
<td>9 W</td>
<td>8 N</td>
<td>Uinta qtz</td>
<td>2.1</td>
<td>1 side heavily abraded, small piece</td>
</tr>
<tr>
<td>Metate fragment</td>
<td>157</td>
<td>B</td>
<td>Level 2</td>
<td>5 W</td>
<td>8 N</td>
<td>Uinta qtz</td>
<td>2.1</td>
<td>extensive abrasion face, dimpling</td>
</tr>
<tr>
<td>Basin metate fragment</td>
<td>197</td>
<td>B</td>
<td>Level 2</td>
<td>5 W</td>
<td>4 N</td>
<td>Uinta qtz</td>
<td>20.4</td>
<td>5.5 heavily abraded, even beyond basin, 9.5 cm x .5 cm deep</td>
</tr>
<tr>
<td>Basin metate fragment</td>
<td>204</td>
<td>B</td>
<td>Level 2</td>
<td>5 W</td>
<td>3 N</td>
<td>Uinta qtz</td>
<td>5.0</td>
<td>heavy abrasion in depressions either side, slight abrasion beyond</td>
</tr>
<tr>
<td>Single handed mano</td>
<td>200</td>
<td>Unknown</td>
<td>Quartzite</td>
<td>7.5</td>
<td>4.6</td>
<td>both side heavy abrasion, lateral striations, ends worn</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single handed mano</td>
<td>140</td>
<td>C</td>
<td>Level 3</td>
<td>Square 5</td>
<td>Uinta qtz</td>
<td>11.4</td>
<td>8.6</td>
<td>4.1 one side heavily abraded, ends crushing wear</td>
</tr>
<tr>
<td>Single handed mano</td>
<td>274.1</td>
<td>C</td>
<td>Level 2</td>
<td>Square 7</td>
<td>Uinta qtz</td>
<td>10.5</td>
<td>9.9</td>
<td>5.5 1 face abrasion, all edges dimpled</td>
</tr>
<tr>
<td>Metate fragment</td>
<td>274.2</td>
<td>C</td>
<td>Level 2</td>
<td>Square 7</td>
<td>Uinta qtz</td>
<td>2.1</td>
<td></td>
<td>small piece, both sides abraded and dimpled</td>
</tr>
<tr>
<td>Metate fragment</td>
<td>147</td>
<td>C</td>
<td>Level 1</td>
<td>Square 2</td>
<td>Sandstone</td>
<td>1.0</td>
<td></td>
<td>two pieces, small slab?</td>
</tr>
<tr>
<td>Metate fragment</td>
<td>156</td>
<td>C</td>
<td>Level 1</td>
<td>Square 2</td>
<td>Uinta qtz</td>
<td>3.5</td>
<td></td>
<td>heavily abraded, dimples, dimples heavily worn</td>
</tr>
<tr>
<td>Metate fragment</td>
<td>300</td>
<td>C</td>
<td>Level 1</td>
<td>Square 10</td>
<td>Uinta qtz</td>
<td>15.5</td>
<td>27.5</td>
<td>3.6 1 side abrasion, other side part of slight depression</td>
</tr>
<tr>
<td>Slab metate fragment</td>
<td>332.1</td>
<td>C</td>
<td>15-30</td>
<td>6 E</td>
<td>4 N</td>
<td>Uinta qtz</td>
<td>3.5</td>
<td>extensive abrasion, edge extensive pecking</td>
</tr>
<tr>
<td>Slab metate fragment</td>
<td>332.2</td>
<td>C</td>
<td>15-30</td>
<td>6 E</td>
<td>4 N</td>
<td>Sandstone</td>
<td>3.5</td>
<td>both faces extensive abrasion, striations, pecking, fire reddened</td>
</tr>
<tr>
<td>Metate fragment</td>
<td>332.3</td>
<td>C</td>
<td>15-30</td>
<td>6 E</td>
<td>4 N</td>
<td>Sandstone</td>
<td>1.9</td>
<td>fire cracked, probably part of 332.1, extensive striations</td>
</tr>
<tr>
<td>Basin metate fragment</td>
<td>335.1</td>
<td>C</td>
<td>15-30</td>
<td>13 E</td>
<td>4 N</td>
<td>Sandstone</td>
<td>1.9</td>
<td>both faces heavily abraded &amp; have basins visible</td>
</tr>
<tr>
<td>Metate fragment</td>
<td>335.2</td>
<td>C</td>
<td>15-30</td>
<td>13 E</td>
<td>4 N</td>
<td>Sandstone</td>
<td>3.7</td>
<td>it appears abraded, small piece</td>
</tr>
<tr>
<td>Single handed mano</td>
<td>335.3</td>
<td>C</td>
<td>15-30</td>
<td>13 E</td>
<td>4 N</td>
<td>Uinta qtz</td>
<td>8.8</td>
<td>7.8 1 face moderate abrasion, other light - only high points</td>
</tr>
<tr>
<td>Metate fragment</td>
<td>315</td>
<td>C</td>
<td>30-45</td>
<td>6 E</td>
<td>5 N</td>
<td>Uinta qtz</td>
<td>3.4</td>
<td>river cobbles, one face slightly flattened - little use</td>
</tr>
<tr>
<td>Metate fragment</td>
<td>338</td>
<td>C</td>
<td>30-45</td>
<td>11 E</td>
<td>4 N</td>
<td>Uinta qtz</td>
<td>3.1</td>
<td>1 side moderate abrasion, other light - only high points</td>
</tr>
<tr>
<td>Metate fragment</td>
<td>381</td>
<td>C</td>
<td>30-45</td>
<td>6 E</td>
<td>6 N</td>
<td>Uinta qtz</td>
<td>3.6</td>
<td>heavily abraded 1 side</td>
</tr>
<tr>
<td>Basin metate fragment</td>
<td>314</td>
<td>C</td>
<td>60-75</td>
<td>6 E</td>
<td>5 N</td>
<td>Uinta qtz</td>
<td>2.9</td>
<td>small piece with abrasion</td>
</tr>
<tr>
<td>Metate fragment</td>
<td>201.1</td>
<td>C</td>
<td>Level 2</td>
<td>Square 2</td>
<td>Uinta qtz</td>
<td>20.8</td>
<td>4.8</td>
<td>2 pieces, heavily abraded in basin, some outside</td>
</tr>
<tr>
<td>Metate fragment</td>
<td>201.2</td>
<td>C</td>
<td>Level 2</td>
<td>Square 2</td>
<td>Uinta qtz</td>
<td>28.7</td>
<td></td>
<td>2.6 heavy abrasion, long striations near center of one side</td>
</tr>
<tr>
<td>Groundstone fragment</td>
<td>60</td>
<td>C</td>
<td>Level 2</td>
<td>Square 3</td>
<td>Uinta qtz</td>
<td>2.4</td>
<td></td>
<td>small piece, extensive abrasion either side</td>
</tr>
<tr>
<td>Basin metate fragment</td>
<td>89</td>
<td>C</td>
<td>Level 2</td>
<td>Square 4</td>
<td>Uinta qtz</td>
<td>1.3</td>
<td></td>
<td>extensive abrasion on small piece</td>
</tr>
<tr>
<td>Metate fragment</td>
<td>342</td>
<td>C</td>
<td>backfill</td>
<td>Square 8</td>
<td>Uinta qtz</td>
<td>4.1</td>
<td></td>
<td>deep striations, few deep peck marks, extensive abrasion</td>
</tr>
<tr>
<td>Metate fragment</td>
<td>394</td>
<td>C</td>
<td>Level 2</td>
<td>Square 7</td>
<td>Uinta qtz</td>
<td>1.1</td>
<td></td>
<td>caliche covered, little use, may belong to FS-89</td>
</tr>
<tr>
<td>Metate fragment</td>
<td>79</td>
<td>Unknown</td>
<td>Uinta qtz</td>
<td>2.1</td>
<td></td>
<td>heavy abrasion on high points 1 face, very light other face</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.12. Non-chipped stone tools recovered from 42Da599 (continued from previous page).
Ceramics

Three ceramic sherds were found in Level 1 of Test Pit 8 in the north end of Area A. All pieces are small body sherds ranging from 1.1-2.6 cm wide. The thickness is uneven, ranging from 6.8-7.9 mm. The paste and core color are brown (7.5 YR 5/3), with some black (7.5 YR 2.0), indicating uneven firing control. The sherds are undersized gray ware similar to Fremont or Wyoming Late Prehistoric manufacture. A sample (FS-288) was sent for petrographic analysis (Hill, Appendix Three). The paste contains about 3% angular fragments of hornblende "andesite" porphyry, with "andesite" fragments ranging from fine to coarse, and probably present as a result of being a natural constituent of the clay used to make the vessel. The reported andesite is probably anthophylic. These mineral constituents occur within a few kilometers of Dutch John as a component of the Red Creek formation (Bilbey 1999, personal communication). This sherd represents a vessel that was probably Shoshonean Brown ware of local manufacture.

Faunal Materials

The faunal remains from the site consist of 888 pieces, mostly very small fragments. These include rabbit (Lepus sp.), cottontail (Sylvilagus sp.), bushy tailed woodrat (Neotoma cinerea), fish (Osteichthyes and Cypriniformes), squirrel (Sciuridae), gopher ( Thomomys)odont (Tamias minimus), big horn sheep (Ovis canadensis), and pronghorn (Antilocapra americana). Although mammal bones make up the vast majority of the assemblage, few are identifiable beyond the class level. Medium to very large mammal bone comprised 52% of the total collection, and 73% of the elements identified to the class level. Modified bone includes 4 bones with cutmarks and 1 shaped bone. Burnt elements (158 pieces or 18% show no apparent preference for any species or class in this category.

Plant Remains

Flotation analysis found few botanical remains. Organics were limited to wood fragments and charcoal. A sample taken from Activity Area 2 contained charcoal fragments and an uncharred hardwood fragment. The lower floor of this area yielded conifer and other charcoal fragments. The floor of Activity Area 1 also yielded conifer and other charcoal fragments.

Summary

The recovery of several dart points from the Early Archaic period as well as smaller Late Prehistoric arrow points, and radiocarbon dates from various locations within the site indicate that the site was inhabited many times prehistorically. These occupations began in the Early Archaic (7,120 BP). The site may have been preferred over time due to its proximity to a small water course and spring. Periodic occupation continued at least until around 600 BP.

This is one of several sites at Dutch John for which multiple 14C samples from a feature or structure were dated. This allowed a check on dates obtained, and contributed to understanding the relationships between structures or features. In the case of the inferred hearth 42Da599, the 14C midpoint dates of two charcoal samples from the hearth agree to within 90 years. This is a considerably wider midpoint range than obtained from other sample multiples. Excavators noted the presence of at least one large piece of wood in the charcoal from this hearth (see Area A Hearth 1 above). The discrepancy may

Illustration 4.18. 42Da599: Manos, FS-48 (Top) and FS-70 (Bottom).
be attributable to use of at least one piece of large, old wood in addition to smaller materials as fuel in this hearth. There was no indication of hearth reuse or associated features, and it is unlikely the discrepancy is due to multiple use episodes.

Unfortunately, the site is a palimpsest due to a low rate of deposition and frequent reoccupation. Cultural deposits from each occupation were not covered before advent of new occupations, resulting in mixing of the assemblages from each. An example above is Activity Area 2, where at least two living floors are present, but neither can be clearly discerned from the other. It is possible that one or more of the surfaces represents a structure of some sort, but given the elusive nature of boundaries for these features, nothing can be said with confidence. Conversely, features such as Structure 1 can be discerned with some confidence, but the cultural fill is very thin.

The slab-lined basin is an interesting feature, as it is a constructed feature most commonly linked to Archaic plant processing. However, unlike most other slab-lined basins, this one is quite small in diameter, and contained large quantities of animal bone (which may have been post-use refuse).

With the exception of two small hearths, no other significant and intentional landscape modifications were noted. Overall, it appeared that 42Da599 was frequently visited for relatively short periods of time by prehistoric people from the Early Archaic period through the Late Prehistoric. Given the apparent short duration of the typical stay, it is likely this site was occupied as an overnight camp or during the exploitation of a specific resource.

Plate 4.12. Test trench at 42Da599.

42Da600

Kelda Wilson

Overview

42Da600 is at an elevation of 1909 m (6260 feet), on a small rise along a side drainage in Dutch John Draw. The site area is currently covered in Colorado pinyon and Utah juniper, with sagebrush occurring in open areas. The soil on the site is a tan sand that differs from the surrounding reddish brown soil.

42Da600 was identified by a Forest Service crew in October of 1993, during the Dutch John Privatization Survey. The site was determined to be eligible for the National Register due to the presence of three surface circular stone features suspected to be slab-lined basins and indications of subsurface cultural deposits. A possible hearth was identified in the northeast portion of the site. The site was measured at 40 by 100 meters. The north end of the site has been damaged by a road that cuts through it and few artifacts were noted in that area.

The surface artifact assemblage at 42Da600 included a lithic scatter of more than 50 flakes of Tiger chert, Sheep Creek quartzite, and moss agate. In addition, 2 manos, 1 metate fragment, 1 metate, and 1 drill were noted on the surface.

All areas with soil depth or possible cultural soil stains were tested with an Oakfield soil probe. Possible stains were identified in three areas, and 2 slab-lined basins exposed upon excavation.

This site dates to around 1740-1425 BC and is believed to have been used during the Archaic period for plant, root or tuber preparation and roasting.

Plate 4.13. View SW to 42Da600.
Excavation Strategy

In May of 1995 a crew tested the site and began excavation. Two features and a one meter square test pit were excavated. The test pit was placed over a semicircle of rocks suspected of being culturally arranged. This test pit produced some flecks of charcoal, as well as pieces of aluminum foil, but no indication of depth, and excavation was discontinued. The other 2 rock arrangements were identified as slab-lined basins, and the contents removed.

Feature Descriptions

The excavations yielded 2 slab-lined basins, 28 pieces of debitage, 1 biface, 1 drill, and 3 groundstone fragments. Surface sediments at this site were a tan sandy soil approximately 10 cm in depth. Two slab-lined basin features had a darker subsurface matrix, which comprised the only cultural stratigraphy at this site.

Slab-lined basin 1

A suspected slab-lined basin on the western slope of a small knoll next to the two-track road was excavated as a meter square until the perimeter of the basin was exposed, then excavation continued only within the feature. The entire basin contents were removed. Surface soil within the basin was dark brown, followed by a charcoal mottled stain (3 YR 2.5/1). At 9 cm below surface the soil became darker (7.5 YR 2.0/) and quite sandy with a small amount of clay. The basin was oval shaped, 53 cm by 46 cm in diameter, and tapered to 29 cm in diameter at the bottom. Depth was 39 cm. Uinta quartzite slabs lined the sides and bottom of the basin. Two mica fragments and a few small flakes were recovered from the fill.

Slab-lined basin 2

Basin 2, approximately 7 m east of Basin 1, was identified as a possible slab-lined basin during survey due to the presence of a ring of rocks above the surface with additional rocks in the center of the ring. This feature was exposed by shovel-

skimming and excavated. The dark staining was more extensive in the south half of the basin, and a small pile of rocks in the basin may indicate reuse. At 15 cm below surface, some roughly horizontal flat stone slabs were found in the dark cultural fill. A layer of smaller flat rocks at 32 cm below surface comprised the stone lined floor.


Plate 4.15. Slab-lined basin 2.

Cultural Materials

Chipped Stone Debitage

The excavation yielded only 28 flakes, including moss agate, Sheep Creek quartzite, Uinta quartzite, and Tiger chert. Tiger chert dominated the assemblage. All of these flakes are tertiary. Table 4.15 lists materials quantity and (%) percentage of total site debitage.

Chipped Stone Tools

The chipped stone tool assemblage recovered at 42Da600 was comprised of 1 drill and 1 biface. Both were recovered from the surface of the site.

The drill was of Sheep Creek quartzite, and missing the tip. It was recovered from the surface of Slab-lined basin 1. The base was triangular in shape and pressure-flaked with a lenticular cross-section. It measured 2.2 cm in width and 0.7 cm in thickness.

The biface was of percussion flaked Sheep Creek quartzite and was D-shaped with a lenticular cross-section. The piece was complete. It measured 3.1 cm in length, 2.1 cm in width, and 0.7 cm in thickness.

<table>
<thead>
<tr>
<th>Material</th>
<th>Total # (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tiger chert</td>
<td>22 (79%)</td>
</tr>
<tr>
<td>Uinta quartzite</td>
<td>1 (0.7%)</td>
</tr>
<tr>
<td>Moss agate</td>
<td>1 (0.7%)</td>
</tr>
<tr>
<td>Sheep Creek quartzite</td>
<td>4 (14%)</td>
</tr>
</tbody>
</table>

Table 4.14. Debitage from 42Da600.
Non-Chipped Stone Tools
One metate fragment was recovered from the fill of Basin 2. It was a small triangular fragment of Uinta quartzite 1.5 cm thick. One side had been ground flat. Two metate fragments were found in Basin 1. One was part of a basin metate with heavy abrasion inside the basin and some abrasion outside extending toward the metate edge. It was 2.8 cm in thickness. The other fragment was a small piece heavily abraded on both sides and only 1.3 cm in thickness.

Several pieces of groundstone were recorded on the surface of the site, including 2 single handed manos and 2 metates. One metate had an off center linear worn area. It was 48 cm in length by 42.5 cm in width and 1.0 cm in thickness and made from Uinta quartzite. The other was a small metate that had been ground linearly on one face, while the opposite face had a circular grinding area. It was also made of Uinta quartzite and measured 23 cm by 24 cm by 4 cm.

Summary
Plate 4.16. 42Da600 view S.

To test an inference that slab-lined basins at Dutch John share tight temporal associations with dates clustering in the Archaic period, a soil sample from Basin 2 was submitted for dating. Results received in September, 1999 indicated a date of 3300 BP, firmly in the Archaic period. Additionally, this 14C midpoint date falls centrally within the range of Archaic dates obtained from 42Da17, another slab-lined basin site at Dutch John.

The site was probably an Archaic period plant processing and cooking site like many of the other sites in the area. A paucity of bone and limited array and quantity of chipped stone tools and debitage is typical at these Archaic slab-lined basin sites. These basins were probably used to roast roots, tubers, and/or cactus pads.
42Da602

Kelda Wilson

Overview

42Da602 is at an elevation of 1909 m (6260 feet), on a terraced ridge north of Dutch John Bench. The site area is currently covered in a rather open woodland of Colorado pinyon and Utah juniper, but a sagebrush clearing is located approximately 20 m to the southwest. Low rock outcrops, terraces and cliffs occur across the site. The ground surface has light soil deposits and is covered in pine duff. The area is highly erosional. The ridge features shallow soils on colluvial mantled steep slopes, with abundant bedrock.

42Da602 was identified by a Forest Service crew in April of 1994, during the Dutch John Privatization Survey. The site was determined to be eligible for the National Register due to the presence of diagnostic artifacts, features, and subsurface deposits. The site was measured at 90 by 45 meters. Both historic and prehistoric components were noted at the site, which contains three rockshelters. A stone storage cist was identified in one rockshelter, a dark stain with burnt bone fragments was noted in another, and tin cans and glass in another.

The surface artifact assemblage included 5 projectile points, 2 end scrapers, 1 side scraper, 2 knives, 2 bifaces, 1 chopper, and 1 slab mosaic. Several lithic concentrations of chert, quartzite, and agate with a range of flaking stages were also noted, but not collected.

All areas with soil depth or stains of possible cultural origin were tested with an OAKfield soil probe. The historic component was focused on and adjacent to Rockshelter 2 and consisted of a surface scatter of several tin cans, including some lead soldered bottle-in-the-top cans, and 20 pieces of aqua colored glass, dating the component to between 1880 and 1920. No subsurface deposits were noted and this feature was not investigated further. Evidence of subsurface deposits was noted in the storage cist in Rockshelter 1 and in the stained area in Rockshelter 3. The fill of the storage cist in Rockshelter 1 was removed, and soil and pollen samples were collected. A test pit in Rockshelter 3 revealed remains of at least 2 hearths. All prehistoric cultural deposits identified at this site were removed as a result of these excavations.

The main occupations are Archaic temporary hunting camps dating between 820 BC and AD 95, and a Fremont storage cist. A thin surface Historic component is also present.

Excavation Strategy

In July of 1996 crews conducted excavations at the site. The fill of the storage cist in Rockshelter 1 was excavated, and soil and pollen samples were collected. Probing in other parts of this rockshelter yielded no subsurface artifacts or evidence of depth. A test pit in Rockshelter 3 yielded evidence of 2 fire hearths or roasting pits. A thin cultural layer was also encountered, but the thin soil and areas of exposed bedrock indicate that the majority of cultural material in this rockshelter was removed during excavation.

Feature Descriptions

Excavations yielded 3 features: 2 hearths and 1 storage cist. Materials recovered include 55 pieces of debitage, 5 projectile points, 1 preform, 4 bifaces, 1 scraper, 2 utilized flakes, 1 metate fragment, and 90 bone fragments.

Storage Cist

Fill from the slab storage cist in Rockshelter 1 was removed by halves. Profiles, maps and soil samples were done when the east half of the cist fill was removed. The fill of this feature was not cultural, suggesting the feature was emptied after use. The first level of the feature fill was a thick layer of pine needle duff about 1 cm in thickness. Below that was a 2.1 cm thick level of soft class grayish brown sand (moist 7.5 YR 4/3 dark brown), possibly an eolian deposit. A few charcoal flecks were noted in the fill, but no artifacts. The bottom of the cist was a gray sterile clay and Uina quartzite bedrock.

The cist consisted of three stone slabs placed against the back of the rockshelter to form a stone box. The east slab that extended out from the back wall was 3 cm thick and 52 cm in length. The west slab was 5 cm thick and 54 cm in length. The front slab was 6 cm thick and 61 cm in length. Depth of this cist was 26 cm. Another slab lay in the center of the cist on an incline. It is not clear if this slab was used as a cover or a partition for the cist.

42Da602 Site Map

The cist consisted of three stone slabs placed against the back of the rockshelter to form a stone box. The east slab that extended out from the back wall was 3 cm thick and 52 cm in length. The west slab was 5 cm thick and 54 cm in length. The front slab was 6 cm thick and 61 cm in length. Depth of this cist was 26 cm. Another slab lay in the center of the cist on an incline. It is not clear if this slab was used as a cover or a partition for the cist.
Hearth 1
A one meter test pit was opened in front of Rockshelter 3 where a dark stain was noted. A roughly oval shaped charcoal stain (Hearth 1) was encountered just below the surface. A second one meter square pit was added to the south of the first square to allow complete excavation of this feature. The level containing this feature ended at 10-13 cm below the surface. Most of the feature bottomed on bedrock in the southwest quadrant of the test pit, and the feature in general seemed to have been considerably eroded. Hearth 1 measured 90 cm by 70 cm and was only 2 cm in depth.

One sample from the east half of Hearth 1 was dated by radiocarbon analysis. The results (listed in Table 4.16 below) date this hearth 820-770 BC and the Late Archaic.

<table>
<thead>
<tr>
<th>#</th>
<th>Location</th>
<th>Age BC</th>
<th>Radiocarbon Age</th>
<th>Beta #</th>
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<td>2600±40 BP</td>
<td>Beta-107702</td>
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<tr>
<td>2</td>
<td>Hearth 2</td>
<td>AD 35</td>
<td>1980±40 BP</td>
<td>Beta-132189</td>
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Table 4.16. Radiocarbon dates from 42Da602.

Hearth 2
Hearth 2 was northeast of and adjoining Hearth 1 in the test pit, first noted as an area of stained soil approximately 8 cm below the surface. Hearth 2 became a defined feature at 13 cm below the surface. A large concentration of fire-cracked rock occupied the center of the hearth. The rocks were arranged in a roughly circular shape. A thin, compact, lighter gray material was noted near the center of the hearth. Charcoal and burnt bone were recovered in and adjacent to this feature. Hearth 2 was approximately 55 cm in diameter and 10 cm in depth. This hearth dates to 55 BC - AD 95 (Table 4.16).

The remains of 2 fire hearths were encountered, but the presence of ash, fire cracked rocks and animal bone throughout the test pit suggested the area was continually reused prehistorically. A very thick layer of reddish brown sand covered the site, but was mostly absent in this area, exposing the underlying dark cultural material. A single strata was noted in the profile between the one meter squares. Dark grey ashy soil extended from 5 to 30 cm deep, ending in bedrock. The bedrock bottom was very uneven across the profile and test pits, and the northwest corner of the test pit started on bedrock. There was abundant unmodified rock in this pit, making excavation difficult.

Cultural Materials

Chipped Stone Debitage
The excavation of the test pit yielded 55 pieces of debitage, primarily Tiger chert and Sheep Creek quartzite, with a few unknown materials. Table 4.17 shows the quantity and percentage of flakes recovered by flaking stage and material type.

<table>
<thead>
<tr>
<th>Primary</th>
<th>Secondary</th>
<th>Tertiary</th>
<th>Total</th>
<th># (%)</th>
</tr>
</thead>
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<td>2%</td>
<td>16%</td>
<td>17/17</td>
<td>26/65</td>
</tr>
<tr>
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<tr>
<td>0%</td>
<td>0%</td>
<td>5%</td>
<td>2/26</td>
<td>7/13</td>
</tr>
</tbody>
</table>

Table 4.17. Debitage from 42Da602: final column lists material quantity and (%) percentage of site total.

Sheep Creek quartzite and Tiger chert are the most frequently utilized materials on the north slope of the Utes, so their frequency in this assemblage is not unusual. The small amount of debitage in flaking stages 1 and 2 suggests the material had been reduced before being transported to the site. The high rate of shatter for Tiger chert is probably a result of heat treatment, which was very common for this material.

Chipped Stone Tools
The chipped stone tool assemblage recovered at 42Da602 is comprised of 5 projectile points, 1 preform, 4 bifaces, 1 scraper, and 2 utilized flakes. All of these tools, except for 1 point (FS-53), were recovered from the surface of the site.

Illustration 4.19. (1:1) Tools from 42Da602: FS-5 (L), FS-6 (C), and FS-7 (R).

Projectile Points. Rose Spring and Elko Corner-notch points were recovered from this site.

FS-3 was a fragment with a single corner notch. It appeared to be a Rose Spring Corner-notch missing part of the base and one notch. It was made from a mottled pink chalcedony and coated with calcite deposits. The cross-section was plano-convex. The point measured 1.9 cm in width and 0.4 cm in thickness.

FS-5 was an Elko Corner-notch of Sheep Creek quartzite with the tip missing and shoulder damage. It appeared to have been resharpened for use as a concave scraper, perhaps for smoothing wooden shafts. The base was straight, with a plano-convex cross-section. It measured 2.7 cm in width and 0.4 cm in thickness.

FS-6 was made of grey chert. This small point had parallel sides, a convex base, a lenticular cross-section, and was missing the tip. The artifact measured 1.1 cm in width and 0.2 cm in thickness.

FS-7 was made of a fine pink chert. It was a small corner-notch with an indented base and lenticular cross-section, missing the tip and one shoulder. It displayed parallel oblique pressure flaking on one side. The point measured 1.9 cm in width and 0.4 cm in thickness.
FS-33 was recovered from the cultural fill of Hearth 1. It was an Elko Corner-notch of Sheep Creek quartzite, missing much of the base and the tip. It was triangular in a concave-convex section. The blade was asymmetrical, mostly percussion flaked with some pressure flaking. It measured 2.0 cm in width and 0.5 cm in thickness.

Other Stone Tools. One preform of Sheep Creek quartzite was recovered, missing the tip and base. It was triangular in shape, and parallel pressure-flaked with a concave-convex section. It measured 1.5 cm in width and 0.5 cm in thickness.

One end-scrap was recovered at this site. It was made of Tiger chert and rounded in shape. The artifact had been severely heat damaged, and the modified edges were cracked and stepped. It had a plano-convex cross-section and measured 3.1 cm in length, 2.8 cm in width, and 0.7 cm in thickness.

FS-8 was one of 4 bifacial fragments recovered from the surface. It was a blade midsection of Sheep Creek quartzite, with pressure-flaked edges and a lenticular cross-section. It measured 2.6 cm in width, and 0.9 cm in thickness.

FS-9 appeared to be a bifacial edge fragment, made of Sheep Creek quartzite. It was percussion flaked and measured 0.3 cm in thickness.

FS-10 was a bifacial fragment, probably a scraper, of Tiger chert. It had been broken and the broken edge had been utilized, but not modified. It was percussion flaked with a rounded tip, and measured 0.9 cm in thickness.

FS-11 was a bifacial fragment of Tiger chert. It was badly heat fractured. This fragment measured 0.7 cm in thickness.

FS-12 (1 of 2 utilized flakes recovered) was of Tiger chert. It was a smooth flake that had almost continuous bifacial usewear on all edges except the base. It measured 3.0 cm in length, 2.7 cm in width, and 1.6 cm in thickness.

FS-13 was a very large triangular flake of Sheep Creek quartzite. One corner had been rounded and ground smooth. One edge had continuous usewear in one direction. The cross-section was concave-convex. It measured 11.9 cm in length, 7.8 cm in width, and 1.8 cm in thickness.

Faunal Materials
The faunal material from the site consists of 90 small bone fragments (Table 4.18). Several of the remains could be identified to the genus level, including Cyprinidae (probably squawfish or Humpback chub), Sylviagrus sp. (cottontail), and Ovis Canadensis (mountain sheep). Of the remaining material, few mammal bones were identifiable beyond the class level. Of the 62 mammal bone fragments in the collection, 25 fragments (40%) are classified as medium/large mammal and 36 fragments (59%) are classified as small mammals. At least 70% of the bone was burnt.

<table>
<thead>
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<td>10.5%</td>
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<tr>
<td>Reptile</td>
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<td>1.0%</td>
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<td>0.5%</td>
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<table>
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<th>Bone Type</th>
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<tbody>
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<td>Reptile</td>
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<tr>
<td>Bird</td>
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<td>0.0%</td>
</tr>
<tr>
<td>Plant</td>
<td>3</td>
<td>1.5%</td>
</tr>
</tbody>
</table>

Table 4.18. Faunal remains distribution at 42Da602.

Plant Remains
A pollen sample from the undated slab cist yielded (Hallaway, Appendix One) high values for Low-spike Asteraceae (ragweed, cocklebur), moderate amounts of Pinus (pine), low amounts of Poaceae (grass), High-spike Asteraceae (rabbitbrush, sunflower), Cheno-ams (goosefoot, pigweed), Liguliflereae (dandelion, chicory), Artemisia (sagebrush), and Ephedru

(Mormon tea), and traces of Juniperus (juniper) and Quercus (oak) pollen. A flotation sample from the cist yielded two uncharred Juniperus seeds and a few small charcoal fragments.

A pollen sample from the lighter fill in the center of Hearth 2 (FS-16) yielded very high values for Artemisia, high values for Poaceae, relatively high values for Juniperus and a pollen aggregate from Quercus, and low values for Pinus, Ericaceae (buckwheat), and Cylindropuntia (Cholla cactus). The Cylindropuntia identification is questionable (Cummings 1999, personal communication), and this material is probably Opuntia.

While the pollen samples from this site suggest a similar environment to that of today, the presence of Quercus pollen in both of the samples is a point of interest. At present, the closest Quercus to the site is 60 miles away on the west end of the Uinta Mountains, and in the Book Cliffs to the south (Goodrich 1997, personal communication). Quercus is not common in other pollen samples from the Dutch John area, and the pollen aggregate recovered from Hearth 2 is less likely than individual pollen grains to have reached the rock shelter through pollen rain. Conditions circa 2000-1400 BP may have allowed Quercus to grow in this area (Chapter Five). The large amount of indeterminate pollen in these samples indicates a degraded assemblage, probably through weathering.

Summary
The site has multiple occupations during the Archaic, Fremont, and Historic periods. Radiocarbon dates of 520 to 770 BC and 53 BC to AD 95 place occupations in the Archaic era, while the slab storage bin is of the typical Fremont construction. Rose Spring projectile points support a Fremont use of the site, while the 2 Elko Corner-notch points may represent either the Archaic or Fremont occupations. The shelters were probably used as a short-term camp site by Archaic hunter-gatherers, and later adapted for storage by Fremont peoples. The protection provided by the shelters was again sought by Euro-Americans, who camped here in the late 19th to early 20th century, leaving behind their glass and cans.

The importance of small game reflected in the faunal assemblage is typical for Archaic hunting camps in this area. The tool assemblage, which lacks groundstone, also supports the use of this site as a limited activity hunting camp. The Fremont points found on the surface may indicate the site was used by hunting parties during this period, but no intact cultural deposits remain from this use. The stone storage cist in Rockshelter 1 appears to have been emptied after it was last used.
Excavation Strategy

No excavation was indicated (or possible, within the feature). The feature was photographed and sketched in 1996. Additional photographs were taken when the site was revisited in 1999.

Feature Descriptions

This site was comprised of broken and cut juniper trunks and branches arranged to form a rectangular enclosure against a south facing bedrock ledge shelf and wall approximately 2 m in height. The enclosure was measured at approximately 1.5 m e-w by 0.9 m n-s. Original height of the construction could not be established, but appeared to have been in excess of 1 meter. Lengths of juniper limbs or branches as small as 5 cm in diameter and branches or trunks as large as 26 cm in diameter had been roughly interwoven and stacked on some rocks on the bedrock ledge. There was no evidence of a roof.

The juniper material appeared in some cases to have been broken from the parent tree, and in some cases to have been cut. The morphology of the cuts suggested use of a light weight steel cutting tool such as a large knife or a small axe, rather than a large, efficient axe. Cut morphology also was consistent in some cases with cutting of live trees or branches.

The location of this feature high on the ridge overlooking the open country of Dutch John Flat and Dutch John Draw is consistent with either a lookout post, or a hunting blind used by a rifleman. While most shots at game would probably be at distances exceeding 100 m (110 yards), it would be difficult to select a more salubrious spot from which to observe the approach of human visitors from the east, south, and west. This feature today overlooks the intersection of U.S. Highway 191 and the Dutch John access road and gas station. As a hunting blind, it would not have made much sense after activity associated with construction of Flaming Gorge Dam began in the 1950s. A pinyon tree approximately 3 m (10 feet) in height growing at the south (down-slope) wall of the blind blocks much of the view from within the blind today. Consideration of construction technique and technology, pinyon growth, area history and location of modern roads and buildings argue for an estimated date of 50-100 BP.

Cultural Materials

Chipped Stone Debitage

A Tiger chert flake noted on the floor of the structure in 1994 could not be relocated on subsequent visits.

Summary

The site was probably a lookout post or hunting blind constructed and used during the Historic period.

Overview

42Da604 is at an elevation of 1920 m (6300 feet), on a bedrock ledge near the end of a ridge west of Dutch John Flat and north of Dutch John Draw. The site area is currently covered in a rather open woodland of Colorado pinyon and Utah juniper, but extensive open sagebrush areas of Dutch John Flat and Dutch John Draw are within 100 m to the east and to the south. Low rock outcrops, slopes and cliffs occur across the site. The ground is covered in pine dust, and where it is not bedrock, has light soil deposits.

42Da604 was identified by a Forest Service crew in 1993, during the Dutch John Privatization Survey. The site appeared to be a hunting blind. It was determined to be eligible for the National Register due relative rarity of hunting blind sites on Ashley National Forest. The blind area was measured at 5 by 3 meters. Surface artifacts at 42Da604 consisted of one Tiger chert flake on the floor within the blind and two other flakes on the surface near the blind, noted in 1994.

An intensive surface examination, including scraping of pine dust from the floor of the blind and from the area surrounding the blind was performed in 1996. This effort yielded a 1957 nickel, a piece of tin foil, a bottle opener and a piece from an unidentified child's toy within approximately a 20 m radius of the blind. Examination of the blind floor failed to relocate the Tiger chert flake noted in 1994, and revealed the floor of the blind to be bedrock under than pine dust.

The presence of logs cut with a steel saw indicates this feature dates to the Historic period. The shape, size, appearance of hasty construction and location of the feature within the terrain suggest it was used as a hunting blind or lookout position.
Overview

42Da609 is at an elevation of 1939 m (6360 feet), in a draw at the west end of Dutch John Flat. Part of this site is in a drainage in pinyon-juniper trees with some areas of sagebrush, while most is in the mature pinyon-juniper woodlands. The soil is a reddish-brown sand with crushed shale on top.

42Da609 was identified by a Forest Service crew in April of 1994, during the Dutch John Privatization Survey. The site was determined to be eligible for the National Register due to the presence of diagnostic artifacts, features, and subsurface deposits. The site was measured at 60 by 320 meters. A bedrock depression, a dark stain, and lithic concentrations were noted. The site was identified as a lithic scatter.

The surface artifact assemblage included 2 projectile points, 2 metates, a knife and a biface. Over 100 flakes of quartzite, chert, and obsidian were noted. The bedrock depression was round in shape and measured 6 by 4 meters. It appeared to be the result of recent quarrying of bedrock with mechanized equipment. A charcoal stain was noted in the east road cut of Highway 191. The stain was identified as a possible hearth. Highway 191 bisects the site, and a dirt road and frequent camping activity had impacted the site.

The main occupation was a Fremont temporary camp, dating to AD 450-615.

Excavation Strategy

In July of 1996 the site was tested by soil probing and shovel-skimming. An Oakfield soil probe was used to systematically test both along the dirt road and in all small clearings over the entire site. The probing revealed very thin soil in many places on the site. Only two probes yielded possible culturally stained soil; both were near the stain in the road cut. Shovel-skimming of the two areas identified by probe revealed a duff layer stratigraphically below the dark soil layer, indicating recent disturbance. The two stains located by probe were attributed to modern causes.

The hearth in the road cut was excavated using trowels. This hearth measured approximately 50 cm in diameter and approximately 29 cm in depth, and contained charcoal and charcoal stained soil. All cultural deposits identified at this site have been removed.

Feature Descriptions

Hearth

The only feature at this site was a hearth located in the road cut three meters north of Highway 191. It began 10 cm to 27 cm below the surface datum on a 15 degree slope (due to disturbance by the road cut that goes through the site). The hearth measured 30-40 cm in diameter and approximately 27 cm in depth. It contained charcoal and charcoal stained soil, and heat had baked the clay earth of the hearth bottom. There were three levels of hearth fill. The top layer was a 10 cm thick level of dark brown soil, which graded into a purely black layer that was truncated by the road cut. Below this black charcoal stained soil was a light reddish brown (5 YR 6/4) baked clay. The north half of the hearth was excavated first, exposing a dense charcoal at the east end of the hearth. The south side of the feature was then collected as a soil sample. This feature has been removed and no additional subsurface deposits were identified.

One sample from the east end of the north half of the hearth was dated by radiocarbon analysis (Table 4.19 below). The date of AD 450-615 indicates use in the Fremont period.
The second projectile point (FS-609.3) was a large Elko Corner-notch spear point of Sheep Creek quartzite, missing the tip. The base was long and convex, and the cross-section concave-convex. It measured 2.4 cm in width and 0.5 cm in thickness.

**Other Stone Tools.** A large knife (FS-609.1) was recovered at this site. It was made of Uinta quartzite, missing half the blade and the tip. The artifact had very large corner notches and a convex base. It had been percussion flaked with a lenticular cross-section. It measured 4.7 cm in width and 0.8 cm in thickness.

A biface fragment of Tiger chert was recovered. It had been percussion flaked with a lenticular cross-section with a thickness of 0.4 cm.

Two recovered fragments of Tiger chert were later refitted to form a single biface fragment. The pieces formed part of the base of a biface with a rounded end. One side of the tool had been severely heat damaged. The edges of the tool were pressure flaked and it had a lenticular cross-section measuring 0.7 cm in thickness.

**Plant Remains.** A sample from the south half of the hearth at this site was dominated by conifer charcoal, and also contained some pieces of hardwood charcoal that belonged to either *Populus* (cottonwood and aspen) or *Salix* (willow), members of the same plant family (Holloway, Appendix One). A single charred fragment of juniper seed was also present.

It is not clear from the small amount of juniper seeds found at Dutch John sites whether they were used as a food resource. Because juniper does not appear to have been used as a fuel source generally, the presence of charred juniper seeds may result from human collection for consumption. However, during the excavations we noted that juniper seeds tend to accumulate in any depression. Additionally, juniper seeds could have been introduced to a feature with fuel materials, or in the case of a structure, as debris from structural materials.

A single pollen sample from the south half of the hearth was analyzed. The total pollen concentration was very small (only 153 grains/g). Trace amounts of *Pinus* (pine) were present, as well as small amounts of *Poaceae* (grass) and Chenopodiaceae (goosefoot, pigweed).

**Summary.**

The limited remains recovered from this site do not permit a great deal of interpretation. The recovery of two styles of Fremont projectile points and a radiocarbon date of 1530±30 BP indicates that this site was occupied during the Fremont period. The lack of substantial subsurface deposits suggests that this site was not occupied on a long term basis, but perhaps supported short-term campsites.

<table>
<thead>
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<tr>
<td>42Da609 Hearth</td>
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</tbody>
</table>

**Cultural Materials.**

No artifacts were recovered from the excavation. The surface artifacts collected include 2 projectile points, 1 knife, and 3 biface fragments. No lithic debitage was collected from the surface of the site.

**Chipped Stone Tools.**

All artifacts from this site were recovered from the surface. The chipped stone tool assemblage recovered at 42Da609 is comprised of 2 projectile points, 1 knife, and 3 biface fragments.

**Projectile Points.** One projectile point (FS-609.2) was a Rose Spring Corner-notch of obsidian, missing the tip. It was finely pressure flaked with a serrated edge and a lenticular cross-section. It measured 1.2 cm in width and 0.3 cm in thickness. The obsidian was sourced to the Teton Pass area (Hughes 1997).
Overview

42Da614 is located at an elevation of 1933 m (6340 feet), in a drainage just northwest of Dutch John Flat, north of Dutch John Draw. The site is surrounded by Colorado pinyon and Utah juniper with occasional Ponderosa pine.

42Da614 was identified by a Forest Service crew in April of 1994, during the Dutch John Privatization Survey. The site was determined to be eligible for the National Register due to the presence of dark stains with artifacts eroding out of them, indicating the presence of subsurface deposits. Diagnostic artifacts were identified as well. The site was measured at 14 by 150 meters. The site has been impacted by recent erosion along the drainage that crosses it.

The surface artifact assemblage was scattered over an area approximately 90 m n-s by 15 m e-w including and north from (up the drainage from) the dark cultural stain observed on the surface. This assemblage included several hundred flakes of Tiger chert, Sheep Creek quartzite, Utah quartzite, and Dutch John chert. In addition, 10 sherds of Utah Gray pottery, burned bone, 7 projectile points and 1 preform, 3 bifaces, 1 hammerstone, 1 mano and 1 metate (in 6 fragments) were noted.

Provenience within the site for the projectile points, preforms, bifaces, mano, and debitage were not recorded.

The hammerstone, metate, bone and ceramic sherds were documented as associated with a dark cultural stain later excavated as a brush structure buried approximately 15 cm below surface, and are discussed below with results of that excavation. The site was recorded as a lithic scatter and habitation site that was occupied during Archaic and Fremont periods.

The main feature was a Fremont brush structure, dating to AD 905 to 1020. It probably represents a single occupation summer camp. The surface assemblage indicated additional use of this area by Fremont and possibly by Archaic groups.

Feature Descriptions

Lithic Scatter.
Surface materials that cannot be directly associated with the brush structure at this site include the surface collection of debitage, 7 projectile points, 1 preform, 3 bifaces fragments, and 1 mano. These materials from the lithic scatter were collected primarily from the eroding drainage across the site, much of which is above (up the drainage from) the brush structure. These tools are discussed with the other cultural materials below.

Brush Structure
The precise edges of the structure were not easily identified, as a drainage cut through the feature on the east side, and the southern side was difficult to define. The burned branches that formed the superstructure framework extended beyond the cultural fill with no discernible post molds on the east side, so excavation there was ended arbitrarily. A hearth was

Excavation Strategy

In October of 1995 a crew tested the site and began excavation. All areas with soil depth or evidence of possible cultural stains were tested at three meter intervals with an Oakfield soil probe. One stained area was identified and a one meter grid system was placed using base lines established by transit. Excavation began over a 4 by 3 meter area by opening 12 one meter square test pits. It was subsequently found necessary to expand the excavation to the south, resulting in excavation of a 4 by 4 meter area. All cultural deposits identified at this site have been removed as a result of these excavations.

42Da614 Site Map.
identified 2 meters from the northern edge of the excavation. Since the hearth appeared to be centrally located, the structure’s diameter was estimated as approximately 4 meters. A series of burned poles found radiating from the center of the feature probably represents the structure’s framework. Numerous pottery sherds were recovered, as well as debitage, bone, a bone gaming piece, and stone tools.

The stratigraphy of the brush structure consisted of three layers. Where recent erosion had not cut into the deposits, the surface layer was a light colored soil that was only about 1 cm deep, containing only a few artifacts. Below this was a layer of dark gray soil 10-15 cm in depth that terminated on a hard, packed floor. The dark layer of fill contained a series of burned timbers as well as a variety of artifacts. The floor (near the hearth) was approximately 15 cm below surface.

A carbon sample from the west leg of the brush framework 10 cm below surface at 3N 1W was dated by radiocarbon analysis. The date lagged to 1070 BP (see Table 4.20 below), the Fremont period. An additional carbon sample was taken from the hearth. The two sigma ranges of the samples overlap, but the date midpoints could indicate the occupants were using older wood in the hearth.

**Cultural Materials**

Distribution of the site surface assemblage approximated the area of active erosion in the drainage, and included both materials eroding out of the brush structure, and a lithic scatter of materials eroding out of (or being washed down from) an area measuring approximately 100 m x 50 m to the northeast of (up drainage from) the structure.

**Lithic Scatter**

Site surface materials that could not be directly associated with the brush structure (primarily materials up drainage from the structure, and/or with exact surface location not recorded) include 7 projectile points, 3 bifaces, 1 preform and 1 mano, described here.

**Projectile Points and Preforms (Survey FS-1)**

1. The stem with concave base of an Archaic point of brown mottled chert measuring 1.6 cm in width, 1.2 cm in length, and 0.4 cm in thickness.
2. Base fragments of 2 corner-notch points of Tiger chert.
3. Middens of 2 projectile points grey chert measuring approximately 1.5 cm in width and 0.4 cm in thickness.
4. Tiger chert and grey chert point misidentification fragments (1 Tiger chert and 1 grey chert). The preform was of tan quartzite, with tenas and a stem connection, and measured 3.4 cm in thickness.
5. Bifaces (Survey FS-2) were as follows: 1. Fragment of unfinished bifacial of yellow to brown mottled measuring 2.8 cm by 2.0 cm by 0.7 cm. 2. Mottled tan chert bifacial fragment measuring 2.1 cm by 0.9 cm.
6. Small bifacial fragment of mottled tan/black chert measuring 3.5 cm by 1.0 cm by 0.4 cm.

**Bone**

The mano (Survey FS-1) was of red quartzite and broken on one edge. This mano measured 9.9 cm by 9.3 cm by 5.0 cm. One side was smooth and showed heavy wear.

**Brush Structure**

Surface materials recovered from the surface within the perimeter of the brush structure include fire cracked rock, 4 projectile points, 4 bifaces, 1 hammerstone, 1 mano, 1 metate, 10 ceramic sherds (1 rim and 9 body sherds) and 96 bone fragments. These artifacts are discussed together with the subsurface assemblage in applicable sections below.

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**Excavation of the 4 by 4 meter grid placed over the brush structure yielded a subsurface assemblage comprised of 54 pieces of lithic debitage, 2 projectile points, 326 bone fragments, 38 ceramic sherds, 1 bone gaming piece, 2 hammerstones, 1 chopper, 1 pecking stone, 1 metate fragment and 1 trough metate.**

**Chipped Stone Debitage**

The most common artifact type in the excavated assemblage from 42Da614 is debitage. Excavation yielded 54 pieces of Dutch John chert, Tiger chert, Umta quartzite, moss agate, and Sheep Creek quartzite. Table 4.21 lists the quantity and percentage of flakes recovered by flaking stage and material type. Tiger chert is the dominant material type in this assemblage.

**Figure 4.15** shows grid provenience of debitage by quantity.

<table>
<thead>
<tr>
<th>Material</th>
<th>Primary</th>
<th>Secondary</th>
<th>Tertiary</th>
<th>Shatter</th>
<th>Total # (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dutch John chert</td>
<td>0 (0%)</td>
<td>2 (33%)</td>
<td>4 (67%)</td>
<td>0 (0%)</td>
<td>6 (11%)</td>
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<tr>
<td>Tiger chert</td>
<td>2 (06%)</td>
<td>3 (08%)</td>
<td>31 (88%)</td>
<td>0 (0%)</td>
<td>36 (67%)</td>
</tr>
<tr>
<td>Moss agate</td>
<td>1 11%</td>
<td>1 11%</td>
<td>5 (16%)</td>
<td>0 (0%)</td>
<td>9 (17%)</td>
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<tr>
<td>Sheep Creek quartz</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>2 (100%)</td>
<td>0 (0%)</td>
<td>2 (04%)</td>
</tr>
</tbody>
</table>

Table 4.21. Debitage from 42Da614; final column lists material quantity and (%) percentage of site total.

**Chipped Stone Tools**

The stone tool assemblage associated with excavation of the brush structure is comprised of 6 projectile point fragments and 4 biface fragments.

**Projectile Points**

The surface within the structure perimeter yielded 4 projectile points (FS-38.1-38.4), and 2 additional points (FS-18 and FS-39) were recovered from below the surface.

FS-38.1 was the base of a spear point made of Tiger chert. It had an indented base with bulbous basal projections, and was classified as a McKen point. It was pressure flaked, 1.6 cm in width with a lenticular cross-section measuring 0.4 cm in thickness.

FS-38.2 was the base of spear of Tiger chert, missing the tip, part of the shoulders, and part of the base. It had an indented base, and was classified as an Elko Corner-notch. This point was pressure flaked, and measured 2 cm in width and 0.4 cm in thickness with a lenticular cross-section.

FS-38.3 was the midsection of a point made of Tiger chert. It was 1.8 cm in width, had been parallel pressure flaked with a plano-convex cross-section, and measured 0.4 cm in thickness.

FS-38.4 was the midsection of a point made of Tiger chert. It was parallel pressure flaked with a lenticular cross-section and measured 0.4 cm in thickness.

FS-18 (recovered from 2N 2W during excavation) was a spear point of Tiger chert. Although only the base was present, it appeared to be a large corner-notch point, and therefore was classified as an Elko Corner-notch. It was pressure flaked with a subconvex base and a lenticular cross-section. It was approximately 2.2 cm in width with a neck width of approximately 1.4 cm and a thickness of 0.3 cm.

FS-39 (recovered from 2N 5W during excavation) was a projectile point fragment that had broken on the vertical axis, so only a side portion was recovered. It was a corner-notch point, but neck width was not measurable from this fragment. It may have been either a spear point or an arrow point, and was likely either a Rose Spring Corner-notch or an Elko Corner-notch. This point was made of moss agate, with a curved blade edge and a lenticular cross-section. It had been pressure flaked, and measured 2.7 cm in length and 0.35 cm in thickness.

**Other Stone Tools**

Four bifaces were recovered from the surface within the structure perimeter during excavation.

FS-38.5 was a leaf-shaped corner-notch piece of Sheep Creek quartzite that was percussion flaked with a plano-convex cross-section and missing the base. It measured 2.8 cm in width and 1.0 cm in thickness.
FS-19.1 was a biface fragment of Tiger chert. The fragment was a piece of one side, with a curved edge. It was pressure-flaked with a lenticular cross-section that measured 0.4 cm in thickness.

FS-19.2 was a biface fragment of Dutch John chert. The fragment was a rounded corner piece with a pressure-flaked edge and lenticular cross-section. It measured 0.7 cm in thickness.

FS-19.3 was a biface fragment of Tiger chert with a rounded end. It was percussion flaked with a lenticular cross-section that measured 0.9 cm in thickness.

Non-Chipped Stone Tools
A total of 10 non-chipped stone tools (3 hammerstones, 2 metates and 1 metate fragment, 2 manos, 1 pecking stone and 1 chopper) were recovered from within the grid placed over the brush structure prior to and during excavation. Non-chipped stone tools associated with the structure are as follows.

Prior to beginning of excavation, 1 hammerstone, 1 mano and 1 metate were found on the surface within the perimeter of the brush structure. These tools were assigned no FS number.

The hammerstone (grid provenience unrecorded) was a roughly triangular quartzite river cobble measuring 10.0 by 8.0 by 4.0 cm, and showing use wear on one end.

The mano (grid provenience unrecorded) was a single handed mano of Uinta quartzite. One face had extensive abrasion, the other face and one edge had moderate abrasion. The ends and one edge exhibited crushing wear. It was 9.1 cm long, 7.5 cm wide, and 4.1 cm thick.

The metate was recovered from the surface in 15.3W. It was of purple Uinta quartzite, broken in 6 adjoining pieces, and measured 53.5 by 37.5 by 2.5 cm as refitted. Exposure to the elements had weathered the use surface, which showed heavy use wear resulting in a shallow trough. This metate had been fire cracked.

During excavation, 2 additional hammerstones, 1 chopper, 1 pecking stone, 1 additional mano, 1 metate fragment and 1 trough metate were recovered.

FS-15, recovered from 2N 5W structure fill, was a triangular Uinta quartzite river cobble hammerstone measuring 6.0 by 8.0 by 4.5 cm with percussion use on one edge.

FS-31.1, recovered from 1N 4W structure fill, was a triangular Uinta quartzite river cobble hammerstone refitted from broken pieces. It measured 6.0 by 6.3 cm with percussion use wear on one edge.

FS-25, recovered from 2N 2W, was a chopper of Uinta quartzite recovered from the structure floor. It measured 7.4 by 7.7 cm, was bifacially flaked on one end, and showed no evidence of use.

FS-31.2, recovered from 1N 4W structure fill, was a pecking stone of Uinta quartzite measuring 9.1 by 6.4 cm, worked on one face, showing some use wear on the opposite face and percussion damage on one corner.

FS-35, (exact grid provenience unrecorded), was a broken mano of Uinta quartzite recovered from the surface. It measured 11.3 by 9.4 cm, and was worked on one face and one end. The side exposed on the surface had lichen growing on it.

FS-34, recovered from 1N 4W structure fill, was a fragment of fire cracked sandstone showing light abrasion on one face.

FS-36, recovered from 1N 4W structure fill, was a fragment of trough metate measuring approximately 7.5 cm in length. Metate width was approximately 11.5 cm, thickness approximately 2 cm.
Figure 4.11. 42Da614 Brush structure artifact distribution.

Plate 4.22. 42Da614 Brush structure floor and hearth.
Ceramics
Figure 4.11 shows grid provenience of artifacts, including ceramic sherds, by quantity.

Forty-eight pieces of Usta Gray ware ceramics were recovered at this site. Of the sherds, 10 were recovered from the surface of the site within the structure perimeter. Most sherds were recovered from the roof fall layer. Several sherds were subsequently refined to form larger pieces, including a side of a vessel with a straight neck and a slightly excavate round rim. This refined vessel is comprised of sherds from 2N 3W, 2N-2, 2N-2W, and a rim sherd from the surface. The sherds have been slightly polished. One sherd contains the basal portion of a handle.

There is great variation in color on these sherds, from light red (2.5 YR 6/6), reddish brown (5 YR 4/3), light brown (7.5 YR 6/4), gray (2.5 YR 6/0), to very dark gray (7.5 YR 3/0). They range from 5.9 to 10.0 mm thick, with an average of 7.4 mm. The sherds have been unevenly fired in a reducing atmosphere and contain abundant large white angular temper. A sample sent for petrographic analysis in 1998 (Hill, Appendix Three, 614 FS-1.1). The paste contains about 15% fine to silt sized metamorphized quartz grains andfeldspar grains, probably as normal constituents of the clay used. Limestone temper (about 15% of the matrix) is mostly micritic fragments, including some with crystalline texture. About 23% of the fragments are rounded grains. These mineral constituents are consistent with the Morrison and Stump formations (Bilby 1999, personal communication) that occur within 3 km north of the project area. The limestone temper contained oolites and sparse shell fragments. The composition of this sherd is consistent with Usta Gray ware and local ceramic production, probably using materials gathered within 3 km of Dutch John. An additional sherd from this site was sent for analysis in 1999 (Hill, Appendix Three, 42De614, 614 FS-1.2). The limestone temper of this sherd contained oolites, bryozoa and foraminifers. These fossils are found in Mississippian and Morgan limestones. Outcrops of these limestones appear to have been available in the Green River canyon within a few kilometers upstream of Dutch John before the dam was built, as "From the Utah-Wyoming border to the damsite the river crosses over or beneath exposed geologic formations dating from the Precambrian to the Recent." (Day and Dibble 1963:4). Additionally, it is possible these limestones were available as river cobbles in the canyon of the Green River adjacent to Dutch John.

The two sherds submitted to analysis, although similar in appearance, and both from a sample collected from the structure floor at 2N 3W, do have some slight compositional differences. Refining of sherds from east of the hearth also suggests two vessels are present. It is possible at least two quite similar vessels were broken in the structure.

Faunal Materials

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<td>Fish</td>
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<tr>
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</table>

Table 4.22. Faunal remains from 42De614.

The faunal material from the site consists of 413 small, fragmented bone specimens, 96 of which were recovered from the surface within the structure perimeter with grid provenience unrecorded. Of the 354 identifiable bone fragments in the collection, 266 (74%) are classified as large mammals and 65 (19%) are classified as small/medium mammal. Some of the bone fragments can be more specifically classified within the genus level including, Sylvilagus sp. (cottontail), Cervus elephas (elk), and Odocoileus sp. (deer). The majority of the bones were located within the lower levels of the site. At least 77 percent of the bone collection had been burnt.

A bone gaming piece, FS-16, was recovered from 2N 5W. This piece is an end portion with a rounded end and straight sides. It measured 1.7 cm wide, 0.3 cm thick, but only 1.9 cm of the length remains. It had five small vertical lines at the tip and three vertical lines running the length of the fragment. It was very smooth and worn.

The bone gaming piece material has been identified as large mammal. Five bone fragments from within the brush structures had cutmarks, and a sixth was anvil-abraded.

Illustration 4.21. Partially reconstructed ceramic vessel from 42De614.
Plant Remains
A flotation sample (FS-53) was taken from just above the floor of the structure. This sample contained conifer charcoal, uncharred Juniperus (juniper) twigs, and a single charred Juniperus seed, as well as a large bone fragment.

Two flotation samples FS-55, FS-56 were taken from the fill of the structure. FS-54 contained conifer charcoal, uncharred Juniperus twigs, and a charred Juniperus seed fragment. FS-56 contained conifer charcoal and Juniperus twigs and seeds. More than 95% of this sample was uncharred.

Summary
The primary occupation at this site is a Fremont brush structure. The radiocarbon dates, trough morten, Rose Spring projectile points, Uinta Grey pottery, and bone gaming piece are typical for this time period. Wilson (1997) has shown that Elko Corner-notch points also occur during the Fremont period. The McKean point and extensive lithic deposits seem to indicate that this site had been utilized over a considerable length of time, but no intact deposits could be located for any other occupation. Like most other sites in Dutch John these were probably temporary camps that left ephemeral remains.

This is one of several sites at Dutch John for which multiple 14C samples from a feature or structure were dated. This allowed a check on dates obtained, and contributed to understanding the relationships between structures or features. In the case of the brush structure at 42De614, the 14C radiocarbon dates from charcoal in the hearth and from a burnt roof structural member differ by 130 years (although the 2-sigma ranges overlap), with the date from hearth charcoal older than the date from the burnt roof structure. This may indicate the use of old wood as fuel in the hearth.

This brush structure is similar to the one at 42De685 in age and contents. However, 585 lacked groundwater and a formally constructed hearth. At 42De614 rocks have been placed over coals to create a flat heating surface. In addition, remains of the actual brush framework were found at this site. A central pole seems to have been longer and larger than the other poles may have resembled a Southern Paiute brush structure (Kelly and Fowler 1986:374, upper left). Unfortunately the southern edge of the structure was missing so it is not clear if the entire end was open like the pictured structure in Kelly and Fowler, or if it had been enclosed. Chapter Eight contains further discussion of Fremont brush structures.

Analysis of ceramic paste and temper suggest the ceramic vessel may have been produced at Dutch John, or within 20 km to the east in the Brown Park area. The possibility of production in the immediate area of the site has implications both for gender and duration of occupational episode.
Overview

42Da617 is located at an elevation of 1921 m (6300 feet) at the northwest edge of Dutch John Flat, on a gentle sandy slope at the base of rock outcrops on a valley edge. The site is covered with sagebrush and grasses and is surrounded by a pinyon-juniper woodland. The soil is a reddish-brown sand with a mixture of gravels and larger rocks.

42Da617 was identified by a Forest Service crew in April of 1994, during the Dutch John Privatization Survey. The site was determined to be eligible for the National Register due to the presence of diagnostic artifacts, features, and subsurface deposits. The site was measured at 40 by 120 meters. Possible rock alignments were noted, as well as multiple dark stain features. One stain in a drainage was initially identified as a mid/loc.

The surface artifact assemblage at the site included 4 manos, 4 projectile points, and 3 bifaces, as well as a lithic scatter of 25-100 flakes of Tiger chert, Sheep Creek quartzite, and Uinta quartzite. The area of cultural stain in the drainage was about 20 meters long with numerous flakes eroding out of it. The lowest stain area contained several small fragments of burnt bone. A stone circle noted was suspected to be a slab-lined basin.

Test pits were placed over suspected stone features. Other areas with soil depth or evidence of possible cultural stains were tested with an Oakfield soil probe and shovel-skimming. The stains and most of the testing occurred along the main drainage at the site. All cultural deposits at this site appear to have been removed as a result of these excavations.

The main occupation at this site was an Archaic plant processing and roasting area, dating to 1975-1645 BC. Possible Paleoindian and Late Prehistoric surface components are also present.
Excavation Strategy
In October of 1994 crews began to test the site, with excavation continuing intermittently through July 1996.

Test pits were placed over possible stone arrangements and cultural stains and excavated until features were defined, at which point excavation continued only within the features. Seven areas along the drainage were tested. Additional areas were shovel-skimmed but only one feature (Hearth 1) was identified through this process.

Feature Descriptions
The excavations yielded 3 slab-lined basins, 1 pit, 2 hearths, an unidentified charcoal stain, 88 pieces of debitage, 5 projectile points, 6 bifaces, 1 uniface, 6 manos, and 64 bone fragments.

Slab-lined Basin 1
A 1 m-e-w by 2 m-s-n-unit was placed over a cluster of stone slabs (Slab-lined basin 1) on the eastern side of the tested area, at a junction of two small drainages. The unit was excavated at arbitrary 10 cm levels until the basin's upper edge was defined, then excavation continued within the basin. During this phase a broken one-handed mano was recovered from below the surface just outside the north wall of the basin. Final depth of the test pit outside of the feature was 10-20 cm below surface, at which point the basin measured 80 by 110 cm outside, and 52 by 56 cm inside the rock slabs lining the basin walls. Excavation continued to the stone lined bottom of the basin at 64 cm below surface.

The basin was 30 cm in diameter at the bottom and measured 50 cm in depth. The cultural fill was dark. Tree roots had penetrated this feature, disturbing the slabs lining the basin. Several flakes, a biface fragment (FS-21), and 2 burnt bone fragments were recovered from basin fill. A mano (FS-5) was adjacent to the basin.

Slab-lined Basin 2
A 1 m-s-n by 2 m-e-w unit was placed over a stone feature on the southeastern edge of the tested area, just south of the drainage. Excavation of the east unit yielded 12 lithic flakes and dark soil discoloration at the west end. Excavation of the meter square unit adjacent on the west revealed a slab-lined basin. This test unit was excavated to 20 cm below surface to expose the slab lining, then excavation continued only within the basin, to a depth of 70 cm below surface. Debitage, bones, and a biface fragment (FS-11) were recovered from the stone lined bottom of this basin. The soil below the basin was sterile. The fill was homogenous and black. The basin measured 31 cm in depth at the sides, 66 cm in depth at the center, and 70 cm in diameter.

<table>
<thead>
<tr>
<th>Pit</th>
<th>Location</th>
<th>Mid-Point</th>
<th>Beta</th>
<th>Radiocarbon age</th>
<th>Beta #</th>
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</thead>
<tbody>
<tr>
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</table>

Plate 4.26. 42Da617: Slab-lined basin 1, view S.

Samples from Slab-lined basins 1 and 2 were dated by radiocarbon analysis (Table 4.23). The samples date to the Archaic period.

Slab-lined Basin 3
A one meter test pit was placed over a vertical rock slab protruding 5 cm above the surface on the south side of the drainage, excavated as Basin 3. The unit was excavated in arbitrary 10 cm levels until the basin edge was defined. The test unit outside the basin was taken down to 20 cm below surface. The basin interior was excavated entirely, to a depth of 63 cm below surface. The fill of the basin was uniform and a dark brown - almost black color, and contained a uniface (FS-4), a point fragment (FS-26), and two bone fragments. The basin was 63 cm in depth, 55 cm in diameter at the top and 35 cm in diameter at the bottom.

The floor of this basin was smaller than in Basins 1 and 2. The bottom was lined with flat rocks of Uinta quartzite arranged around a quartzite mano measuring 14 by 9 cm.

Pit 1
A 1 m-e-w by 2 m-s-n-unit was placed over a dark stain adjacent on the west of Basin 1. It was excavated in arbitrary 10 cm levels to 50 cm below surface. From 15 to 30 cm below surface was a dark stain, identified as Pit 1. The soil below this feature was tan, loose and sterile. A mano fragment and some debitage were present on the surface of this pit. The dark soil contained fire cracked rock. This feature may have been used in conjunction with Slab-lined basin 1, either to heat rocks which were then pushed into the basin, or as a place to put rocks and charcoal when emptying the basin. This was the only evidence from the project area for a slab-lined basin and pit or hearth feature complex. There was no stained soil at the base of this hearth. It measured 120 cm in diameter and 15 cm in depth. The center rose 5 cm above the rest of the bottom.

Hearth 2
A dark stain was identified by shovel tests on the western edge of the drainage. A 25 cm square test unit was placed over the stain. Due to difficulty in defining the extent of the stain, the test unit was expanded to a one meter square. This unit was excavated to 6 to 9 cm below surface, until Heath 2 was defined as a stain in the northeastern quarter of the test unit. Excavations then continued only within the hearth. The pit was excavated to 14 cm below surface, and the excavation went below it to about 18 cm in sterile soil. This feature measured approximately 25 cm in diameter and 5 cm in depth.

Hearth 2 was originally identified as a midden. It was a dark brown sandy deposit with carbon flecks, measuring 12-15 cm in diameter and approximately 8 cm in depth. Adjacent to the pit was some light black sandy soil. Surrounding this feature was the test pit was mantled brown sterile soil. The feature yielded only fire cracked rock.

Hearth 1
A one meter square test pit was placed over a dark soil stain approximately 70 meters southwest of the main area of excavations that was identified after a shovel-skim of the top 2-3 cm of soil. A dark stain noted in the northern portion of the unit was identified as a hearth. This unit was excavated to a depth of 7 cm until the hearth was defined, then excavations continued only within the hearth. The hearth measured 40 by 40 cm in an approximately square shape and was 12 cm in depth. It contained fire cracked rock, burnt bone, and charcoal.

Charcoal stain
A 1 m-e-w by 2 m-s-n-unit was placed over a subsurface stain identified by probe approximately 2 m southeast of Hearth 2. The northern half of the unit was excavated to a depth of 3-5 cm with no evidence of cultural material or stain. In the south half of the test pit a stain was noted at 2-4 cm below surface. The feature was excavated entirely, ending at 9 cm below.
Feature Map 4.12. 42Da617 Slab-lined basin 1.

Feature Map 4.13. 42Da617 Slab-lined basin 2.
surface. This feature was basin shaped, measured 14 cm in diameter, and may have been a post mold, though no wood was recovered. The top 5 cm were a black sandy soil with moderate amounts of carbon. The lower 4 cm were a tanish-brown sand with a smaller amount of carbon. Probes and shovel-skimming of the area surrounding this feature and Hearth 2 failed to yield any evidence of buried cultural deposits.

Cultural Materials

Chipped Stone Debitage

The most common artifact type in the assemblage from 42Da617 wasdebitage. The excavation yielded 88 pieces of Dutch John chert, Tiger chert, moss agate, Sheep Creek quartzite, and a few unknown material types. Sheep Creek quartzite and Tiger chert are the most common material types at this site. Table 4.24 lists quantity and percentage of debitage recovered by flaking stage and material type.

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</tbody>
</table>

Table 4.24. Debitage from 42Da617: final column lists material quantity and (%) percentage of site total.

Chipped Stone Tools

The chipped stone tool assemblage recovered at 42Da617 is comprised of 6 projectile points, 5 bifaces, and 1 uniface.

Proietile Points. Excavations yielded 1 projectile point; 5 points were collected from the surface.

FS-26 was the midsection of a leaf shaped point made of Sheep Creek quartzite recovered during excavation of Slab-lined basin 3. It had been pressure-flaked and measured 1.8 cm wide and 0.5 cm in thickness. The cross-section was lenticular.

FS-39.1 was the basal portion (probably) of a Northern Side-notch of moss agate. It was lenticular in cross-section, measuring 2.3 cm at the base and 0.4 cm in thickness.

FS-39.2 was the midsection of a of a Sheep Creek quartzite point, measuring 1.7 cm wide and 0.5 cm in thickness. The tops of notches were just visible on the bottom portion, but the notching style could not be ascertained. The sides were very straight and parallel, and it had been parallel pressure-flaked. The cross-section was lenticular.

FS-39.3 was a narrow lanceolate point with convex base made of Tiger chert. The piece was missing only the tip. The piece was random pressure-flaked with a lenticular cross-section. It measured 7.0 cm long, 1.9 cm wide, and 1.0 cm in thickness. It was similar to Medicine Lodge Creek points and may be Paleoindian in affiliation.

FS-39.4 was an unnotched triangular projectile point made of Tiger chert. Polished fractures indicated heat damage, the tip and one corner were missing. The point had been finely pressure-flaked with a lenticular cross-section measuring 0.4 cm in thickness. Halfway up the point, it measured 1.4 cm in width.
FS-42 was the base of a Desert Side-notch made of Tiger chert. It had been finely pressure flaked and had a lenticular cross-section. The point was 1.3 cm wide and 0.2 cm in thickness.

Other Stone Tools. Excavations yielded 2 bifaces and 1 surface. 3 bifaces were collected from the surface. FS-4, recovered from cultural fill in Slab-lined basin 3, was a surface made of Tiger chert. This artifact was complete. It was the shape of a rectangle with an off-center stem. It had been percussion flaked and had a plano-convex cross-section. It measured 4.4 cm long, 2.4 cm wide, and 0.7 cm in thickness.

FS-11, recovered from cultural fill surrounding Slab-lined basin 2, was the edge of a curved biface made of Tiger chert. It had polished fractures indicating heat damage. The artifact measured 0.6 cm in thickness.

FS-21, recovered from cultural fill surrounding Slab-lined basin 1, was the tip of a rounded leaf shaped biface made of Sheep Creek quartzite. It had cortex on one side and had been percussion flaked. The cross-section was lenticular and it measured 3.8 cm wide and 0.75 cm in thickness.

FS-10.1 was a biface of Sheep Creek quartzite missing the tip. It was leaf-shaped and percussion flaked. The cross-section was lenticular and it measured 2.8 cm wide and 0.8 cm in thickness.

FS-10.2 was a biface edge fragment of Tiger chert. It had been percussion flaked with a lenticular cross-section, and measured 0.8 cm in thickness.

FS-40 was the midsection of a biface made of Tiger chert. The sides were straight and it had been percussion flaked. The cross-section was lenticular and it measured 3.2 cm wide and 0.9 cm thick.

Non-Chipped Stone Tools

Manos and manos remains were recovered from the surface (both as isolated finds and in association with features) and from excavations.

FS-35 from surface collection measured 8.9 by 4.3 by 3.8 cm; an oval, single handed mano of purple Uinta quartzite with extensive use wear on one side.

FS-36 measured 8.5 by 4.1 cm; an oval, single handed mano of pink-tan quartzite with use wear on both sides and pecking damage on both ends.

FS-37 from surface collection was a small, leaf-shaped mano, unusual for this area, of pink/tan quartzite. It measured 15.2 cm long, by 8.3 cm wide, by 8.3 cm thick. The primary face had heavy abrasion wear, both ends had been extensively worked, and the sides were smoothed or slightly abraded.

A leaf shaped quartzite mano measuring 14 cm in length by 9 cm in width was built into the floor of Slab-lined basin 3.

FS-5 protruded from the surface adjacent to Slab-lined basin 1. It was a broken one handed mano of red quartzite with heavy abrasion on one face and dimpling around the edges and end.

Fossil Materials

The fossil material from the site consists of 64 small, fragmented bone specimens (Table 4.25). Several of the fragments can be classified within the genus level, including: *Sylviscapus* (cottontail), *Odocoileus* (deer) and *Ovis canadensis* (mountain sheep). Few of the remaining mammalian bones were identifiable beyond the general class level. Of the 57 mammal bone fragments in the collection, 45 fragments (79%) are classified as medium/large mammal and 11 fragments (17%) are classified as small/medium mammal. Three fragments of bones displayed visible evidence of cut-marks and at least 13% of the bone had been burnt. The majority of the bone at the site was located in Slab-lined basin 2, Level 2.

Plant Remains

A flotation sample recovered from just above the floor of the Slab-lined basin 1 was analyzed. The sample contained no charred material. A flotation sample from fill of the hearth was analyzed (FS-48). The sample was found to contain conifer charcoal and charred *Pinus* (pine) wood. The charcoal fragments were very small and the sample consisted of more than 90% uncharred material.

A pollen sample (FS-69) from Slab-lined basin 1 was analyzed by Paleo Research Laboratories (Cummins. Appendix Two). Analysis suggests a pinyon/juniper woodland with considerable sedgebrush understory. Traces of *Quercus* (oak) and *Pseudotsuga* (Douglas fir) pollen suggest the presence of these species in the woodlands to the west in the Uintas. *Cheno-ams* (goosefoot, pigweeds) and *Qwama* (prickly pear cactus) pollen were in quantities sufficient to suggest these economic taxa may have been processed in this basin. In addition, starch granules were recovered. Much of the starch may be from grasses, which could have been parched, used to line the pit, or even grew in the pit after its use. An *Apatanaeae* type (Pursley family including biscuitroot) starch granule recovered from this feature is the best evidence for processing of biscuitroot in the project area.

A pollen sample (FS-59 from Hearth 2) analyzed by Holloway (Appendix One) yielded 21% indeterminate pollen, high amounts of *Poaceae* (grass), moderate amounts of high and low spine *Asteraceae* (sunflower family), very low values for *Cheno-ams*, and trace amounts of *Pinos*.

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Small Varied</th>
<th>Large Varied</th>
<th>Middle Varied</th>
<th>Large Mammal</th>
<th>Medium Mammal</th>
<th>Small Mammal</th>
<th>Animal</th>
<th>Flora</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basin 1</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Basin 2</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>12</td>
</tr>
</tbody>
</table>

Table 4.25: Fossil remains from 42Du617.

Summary

This is one of several sites at Dutch John for which multiple 14C dates were obtained. This contributed to understanding the relationships between structures or features. A sample from Slab-lined basin 2 was submitted for dating in 1997, and returned a date of 3500 BP. To test an inference that slab-lined basins at Dutch John date to approximately the same time period, a sample from Slab-lined basin 1 was submitted for dating in 1998, and returned a date of 3130 BP. The 14C midpoints dates from Basins 1 and 2 are separated by 376 years, but both date solstically in the Late Archaic period.

Basin 1 and adjacent Pit 1 may have been used in tandem, with Pit 1 serving to build coals and heat rocks to be used in Basin 1, and/or as a repository for fire cracked rock and coals when emptying Basin 1. This pattern is common in Wyoming (Smith and McNeely 1999) but no associated hearths or middens were noted at most of the Dutch John slab-lined basins.

Basin 2 is atypical for Dutch John in the large number of faunal bones recovered from the fill. The majority of faunal remains from the site were recovered from this basin. This may indicate meat was roasted there, but it is not clear if this was done exclusively, in connection with plant roasting, or if the material was refuse deposited after the pit had been abandoned.

Two manos from this site (FS-37 and the mano built into the bottom of Slab-lined basin 3) were atypical for Dutch John. Both were leaf-shaped, two handed quartzite manos. Whether these two atypical manos result from coincidence, sampling error, variability in resource use, or individual preference remains undetermined.

The majority of activity at this site occurred during the Archaic period and probably consisted primarily of roasting plant materials. This important use in the Dutch John area will be discussed further in Chapter Seven.
Illustration 4.23. 42Da617: Loaf-shaped mano (FS-17) recovered from site surface.

42Da624

Kelda Wilson

Plate 4.28. View N to 42Da624.

Overview

42Da624 is located at an elevation of 1976 m (6480 feet), on the slope of a small knoll above a drainage at the west edge of Dutch John Bench, overlooking Dutch John Draw. The rockshelter is near the base of large rock outcrops on top of the knoll. The quarry is located on the slope of the knoll, below the rock outcrops. The site is currently covered in Colorado pinyon, Utah juniper and sparse grasses. The sparse soil is a reddish-brown sand.

42Da624 was identified by a Forest Service crew in April of 1994, during the Dutch John Privatization Survey, as a rockshelter containing wood and stone slab wall features. A lithic quarry of Uinta quartzite containing a high density scatter of natural and cultural flakes was also noted on the site. The site was determined to be eligible for the National Register due to the unique nature of the site and its potential for containing important cultural information. The site was measured at 70 by 150 meters.

The quarry component has thin soil on bedrock outcrops and no evidence of subsurface deposits. The rockshelter potentially contained subsurface cultural deposits. A single test pit was placed in the rockshelter to test for deposits.

Excavation Strategy

On June 3, 1996, a test pit inside the rockshelter was excavated with trowels and the contents screened with 1/4" wire mesh. The excavation was halted at 20 cm below surface when modern trash was encountered.
The rockshelter has clearly been used in the modern era, when a fire or fires were built and created an ashy layer in the shelter. It is unclear who built the walls at the shelter, but they can probably be attributed to the recent occupants. Considerable effort went into construction of the coursed rock wall. Not far from this site, just below 42DA696, was a rather elaborate roofed structure with cedar bark for the roof and 4 x 4 lumber and plywood for the frame. Abundant graffiti and soft drink bottles there date to the 1970s. Some of the names on the rockshelter wall at 42DA624 were those of individuals raised in Dutch John, including one person who works for the Forest Service and resides in Dutch John today. We suspect the features in the 42DA624 rockshelter, the free standing plywood structure, as well as some rock carvings discussed in the report for 42DA696 were constructed by young energetic folks from families living at Dutch John during the last few decades. Near the town dump a large "kid’s fort" had been constructed. Although it appeared to have been there for several years, one of the paraprofessional archaeologists on our crew recognized her hammer and some cans of nails that had been left there recently by her teenage boys. Young people growing up in Dutch John have apparently constructed a number of elaborate and energy intensive structures around Dutch John.

The presence of the flake inside the rockshelter may be due to surface collection near the rockshelter, or to disturbance of some sparse subsurface cultural material by recent users. The lithic quarry at this site is the largest of several in the area. The high percentage of Uinta quartzite at nearby sites demonstrates that the quarry was used prehistorically.

Although no intact prehistoric subsurface cultural deposits were identified at the site, the quarry component of the site is important to understanding lithic procurement and use in the area.

Summary

The rockshelter has clearly been used in the modern era, when a fire or fires were built and created an ashy layer in the shelter. It is unclear who built the walls at the shelter, but they can probably be attributed to the recent occupants. Considerable effort went into construction of the coursed rock wall. Not far from this site, just below 42DA696, was a rather elaborate roofed structure with cedar bark for the roof and 4 x 4 lumber and plywood for the frame. Abundant graffiti and soft drink bottles there date to the 1970s. Some of the names on the rockshelter wall at 42DA624 were those of individuals raised in Dutch John, including one person who works for the Forest Service and resides in Dutch John today. We suspect the features in the 42DA624 rockshelter, the free standing plywood structure, as well as some rock carvings discussed in the report for 42DA696 were constructed by young energetic folks from families living at Dutch John during the last few decades. Near the town dump a large “kid’s fort” had been constructed. Although it appeared to have been there for several years, one of the paraprofessional archaeologists on our crew recognized her hammer and some cans of nails that had been left there recently by her teenage boys. Young people growing up in Dutch John have apparently constructed a number of elaborate and energy intensive structures around Dutch John.

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Although no intact prehistoric subsurface cultural deposits were identified at the site, the quarry component of the site is important to understanding lithic procurement and use in the area.
Kelda Wilson

Plate 4.29. View N to 42Da679.

Overview

42Da679 is located at an elevation of 1951 m (6400 feet), on a small knoll at the edge of Dutch John Flat. The site area is currently covered in Colorado pinyon and Utah juniper.

42Da679 was identified by a Forest Service crew in October of 1994, during the Dutch John Privatization Survey as a lithic scatter containing diagnostic artifacts. A dark stain containing fire blackened rock and burnt bone was visible in a small ephemeral drainage that cut across the site. Parallel logs or poles were noted protruding from the side of the drainage approximately 5 m south of the stained area. The site was determined to be eligible for the National Register due to the presence of diagnostic artifacts and subsurface depth visible in the cutbank. The site was measured at 50 by 120 meters. A small chert and quartzite lithic concentration was noted; 1 projectile point, 1 knife base fragment, and 2 bifaces were observed on the surface.

Two areas within the drainage were excavated. A five unit block of one meter square test pits was placed over the area where poles were protruding from the side of the drainage. Excavation here yielded a lean-to dating to the Historic period. A 1 m x 1 m by 2 m test pit was placed over the stained area 5 m north (up the drainage). Excavation here revealed a roasting pit feature. The eastern half of the roasting pit was recovered. All cultural materials associated with the lean-to appear to have been removed, while the western half of the roasting pit was left intact.

The main occupations appear to be an Archaic single occupation plant processing site, and a Historic period lean-to.

Excavation Strategy

In July of 1996 a one meter square was placed over the poles protruding into the drainage, then expanded to 5 one meter squares. A 1 by 2 m test pit was placed over the rounded area of stained soil 5 m north of the drainage and the eastern half was excavated. Both units were excavated with trowels and the fill screened through 1/4" wire mesh.

Feature Descriptions

The excavations yielded remains of a roasting pit and lean-to, as well as 9 flakes, 2 projectile points, 2 bifaces, 2 textile fragments, 1 piece of wire, fire cracked rock, and numerous pieces of wood, including 10 poles.

Historic Structure

A single square meter test pit was placed over the area containing the visible logs, and this was expanded into a hock of five test pits following the lowest cultural level encountered. The stratigraphy consisted of a natural level. The upper level (Level 1) ranged from 35 to 67 cm in depth and was a brown soil. This level contained the wood from the lean-to structure, followed by smaller pieces of wood that were presumed to be associated with the structure. The second level (Level 2) was an ashy gray level that was 15-25 cm in depth. This level contained ashy culturally soil as well as the limited amount of debitage and fire cracked rock. Total depth below surface was 60-85 cm. This feature was more deeply burned than other features excavated at Dutch John, yet dated to the Historic period. Depth of overburden is attributed to the floor of the structure having dug into the slope of the hill, and subsequent collapse of the cutbank after the structure was abandoned. Level 2 did not produce enough carbon for dating, and it was unclear whether this undated level was directly associated with the lean-to. The stratigraphy suggests that it may predate the upper occupation. However, the structure overburden above the poles appeared to be sterile, suggesting rapid deposition through bank collapse.

Considerable wood was recovered from Level 1. Two of these pieces were exposed in the west bank of the drainage prior to excavation. All of the wood was decomposing and fragmentary. The wood pieces were arranged in a pattern suggesting a
rectangular structure. Eight poles lay parallel in a row, about 15 to 25 centimeters apart. These poles are referred to as posts in the excavation notes, although "poles" is probably a more accurate term. Pole 4 was identified as Utah Juniper (Goodrich 1997, personal communication). All of the pieces appear to be the same kind of wood, and since the site is in a pinyon-juniper woodland, it seems likely that the structure was constructed from the locally plentiful juniper.

The thickest pieces were nearest the surface, and may have been roof members. Recovered pieces range in diameter from 2.0 to 5.7 cm, and in length from 11 to 60 cm (Table 4.26). Beneath the poles, the soil matrix contained many smaller wood fragments, ranging from 0.7 to 7.0 cm in length and from 0.5 to 1.3 cm (average 0.8 cm) in diameter. These were probably remains of a brush covering for the structure.

<table>
<thead>
<tr>
<th>Pole</th>
<th>Length</th>
<th>Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>60 cm</td>
<td>5.7 cm</td>
</tr>
<tr>
<td>2</td>
<td>33 cm</td>
<td>4.3 cm</td>
</tr>
<tr>
<td>3</td>
<td>11 cm</td>
<td>2.0 cm</td>
</tr>
<tr>
<td>4</td>
<td>41 cm</td>
<td>2.2 cm</td>
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<tr>
<td>7</td>
<td>36 cm</td>
<td>2.2 cm</td>
</tr>
<tr>
<td>6</td>
<td>26 cm</td>
<td>2.2 cm</td>
</tr>
<tr>
<td>9</td>
<td>47 cm</td>
<td>3.0 cm</td>
</tr>
<tr>
<td>10</td>
<td>31 cm</td>
<td>4.0 cm</td>
</tr>
</tbody>
</table>

Table 4.26. 42Da679 Dimensions of large wood pieces.

Pole 4, located in Squares 1 and 2 at about 39 cm below surface, was radiocarbon dated (Table 4.27). Radiocarbon results and area history suggest the structure dates to the nineteenth century.

<table>
<thead>
<tr>
<th>FS #</th>
<th>Location</th>
<th>Mid-Point</th>
<th>2 Signs</th>
<th>Radiocarbon age</th>
<th>Beta #</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Squares 1-2</td>
<td>none</td>
<td>AD 1695-1725</td>
<td>70±30 BP</td>
<td>Beta-102798</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>AD 1815-1820</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.27. Radiocarbon date from 42Da679.

Roasting Pit
An area 5 meters north of the lean-to was tested because of a visible stain associated with a pile of fire cracked rock. Some of the rocks were larger than grapefruit size. Under the rocks the soil was loose, sandy, and brown in color. No artifacts were present. The pit was 20 cm in depth. A large rodent hole intruded the feature. The soil was black, but no charcoal pieces were located. One flake of Sheep Creek quartzite was recovered from the surface of the pit, but no artifacts were recovered from the excavation. Only the eastern half of the pit was removed. The pit measured 150 cm in diameter and approximately 25 cm in depth. Fire cracked rocks were piled on dark cultural fill near the middle of the pit.

42Da679 Roasting pit.

Feature Map 4.15. 42Da679 Roasting pit.
Cultural Materials

Chipped Stone Debitage
The most common artifact type in the assemblage from 42Da679 is debitage. The excavation yielded 11 pieces, which are Tiger chert, Uinta quartzite, moss agate, Sheep Creek quartzite, and one unknown material type. Table 4.28 lists the quantity and percentage of debitage recovered by flaking stage and material type.

<table>
<thead>
<tr>
<th>Material</th>
<th>Primary</th>
<th>Secondary</th>
<th>Tertiary</th>
<th>Shatter</th>
<th>Total &amp; (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 (0%)</td>
<td>1 (3%)</td>
<td>2 (6%)</td>
<td>0 (0%)</td>
<td>3 (27%)</td>
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<td>1 (50%)</td>
<td>0 (0%)</td>
<td>1 (50%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>2 (18%)</td>
</tr>
<tr>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>2 (100%)</td>
<td>0 (0%)</td>
<td>2 (18%)</td>
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<tr>
<td>1 (100%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>1 (100%)</td>
<td>1 (09%)</td>
</tr>
</tbody>
</table>

Table 4.28. Debitage from 42Da679: final column lists material quantity and (%) percentage of site total.

Chipped Stone Tools
The chipped stone tool assemblage recovered at 42Da679 is comprised of 2 projectile points and 2 bifaces, all recovered from the surface of the site.

Projectile Points. Both projectile points were Elko Corner-notch spear points.

FS-40 was made of Sheep Creek quartzite and measured 2.3 cm in width and 0.5 cm in thickness. The base was broken and the somewhat rounded tip appeared to have been reworked. It had large, sharp flake scars and was pressure-flaked, with a lenticular cross-section.

FS-43 was made of Sheep Creek quartzite. It had a broken blade and a sub-convex base. The corner notch was very wide, the cross-section was lenticular, and the point had been pressure-flaked. It measured 2.9 cm wide and 0.4 cm in thickness.

Other Stone Tools. FS-41 was a complete biface made of Sheep Creek quartzite. It was a rounded rectangle with a plano-convex cross-section, and it had been percussion flaked. The piece measured 5.4 cm in length, 3.5 cm in width, and 0.9 cm in thickness.

FS-42 was a biface fragment made of Uinta quartzite. It had broken long the horizontal axis and only a leaf-shaped rounded end was recovered. It had been percussion flaked with a plano-convex cross-section. It measured 4.7 cm in width and 1.1 cm in thickness.

Textiles
Two textile fragments were recovered from Level 1 Square 1. They were recovered from screened fill from the same level as the poles. Both pieces were approximately square. One piece is 0.9 by 1.0 cm, and the other is 1.3 by 1.5 cm. They were made of fine fiber and extremely fragile.

Wire
One piece of thin wire was recovered from just below the surface in Square 1. It was rusted and disintegrating. The intact end was twisted in a loop 2.9 cm in diameter, and twisted tightly on itself to secure the loop. The straight section extending 10 cm from the loop was bent. Thickness of the wire was less than 1 millimeter.

Plant Remains
A flotation sample, FS-32, was analyzed from structure fill of the lean-to. It contained uncharred conifer and Pinus (pine) wood and an uncharred Juniperus (juniper) twig.

A single pollen sample was analyzed from the site. FS-35 is from Square 5, at 85 cm below secondary datum, in Level 2 (the cultural layer below the structure). Poaceae (grass), Juniperus (juniper), Cistus-ams (goosefoot, pigweed), High and Lowspine Asteraceae (Composites), and Artemisia (sagebrush) were present in high amounts, with low amounts of Pinus pollen; 16% of the sample was indeterminate pollen.

A flotation sample (FS-36) from the roasting pit contained conifer charcoal and charred and uncharred Juniperus twigs.

Summary
This site has two components. The historic component (a lean-to) dates to 300 to 40 years ago (70430 BP), with textiles and wire. Some of the poles in this structure were buried nearly 40 cm below present day ground surface, and sterile soil below the lean-to was as much as 85 cm below the present surface. Generally, little evidence has been found for rapid soil deposition in the Dutch John area, and prehistoric sites as much as 7,000 years old typically are found only a few centimeters below the surface. The position is that the lean-to was constructed into a cut bank, which later sloughed down over the remains of the structure.

The roasting pit (and perhaps the cultural layer below the lean-to) are probably Archaic. Although Elko Corner-notch points, like those found on the surface of the site, can be Archaic or Fremont in age, roasting pits are common during the Archaic period. Roasting features are common at Dutch John, and most are suspected to have been used in processing plant materials.

Plate 4.30. 42Da679: Historic period lean-to, view N.
42Da684

Kelda Wilson

Overview

42Da684 is located at an elevation of 1976 m (6480 feet), on the gentle slope of a ridge on the eastern edge of Dutch John Flat. The soil is a sandy loam supporting Colorado pinyon and Utah juniper with sparse grasses.

42Da684 was identified by a Forest Service crew in October of 1994, during the Dutch John Privatization Survey. The site was determined to be eligible for the National Register due to the presence of diagnostic artifacts, features, and subsurface deposits. The site was measured at 60 by 95 meters. At least three areas with dark surface stains of suspected cultural origin were noted. The site was identified as a lithic scatter.

The surface artifact assemblage at the site included a projectile point, biface, mano, burnt bone and 60 Sheep Creek quartzite and Tiger chert flakes.

All areas of possible soil depth or suspected cultural stains, and all artifact concentrations were probed using an Oakfield soil probe. Most of the soil probes revealed light tan to brown sandy soil. One probe in an area of surface staining with burnt bone on the surface revealed darker subsurface soil. This area was shovel-skimmed and then a test pit was placed in the center of the stain exposed by skimming. Excavation to a depth of approximately 18 cm below surface within the test pit failed to identify features or depth to this stain, and the excavation was closed.

The main occupation was Archaic or Fremont in age. The soil stain excavated appeared to be the remains of a faunal processing area.

Excavation Strategy

In July of 1996 a crew probed and tested the site. One area of dark subsurface soil was identified near the east edge of the site. A shovel-skim of this 2 by 4 meter area, extending 4-5 cm below surface, revealed a concentration of debitage and burnt bone, as well as 25 to 30 pieces of angular fire cracked rock. A meter square test pit was placed in the northern section of the skimmed area. The test pit was excavated to 13 cm below surface. Although some artifacts were recovered near the surface, the concentrations dissipated with depth and no features or stains were identified below surface. The dark color of the soil was attributed to natural factors. When no features were identified, the unit was closed and excavations ceased.

Surface collection recovered 1 mano, 1 projectile point, 1 biface, burnt bone and 60 pieces of debitage. Shovel-skimming and excavation of the test pit yielded fire cracked rock, additional burnt bone and debitage.

Cultural Materials

The artifact assemblage recovered from this site includes 305 pieces of debitage, 1 projectile point, 1 biface, 1 mano fragment, and 110 bone fragments.

Chipped Stone Debitage

The most common artifact type in the assemblage from 42Da684 is debitage. The excavation yielded 305 pieces of Dutch John chert, Tiger chert, Uinta quartzite, moss agate, Sheep Creek quartzite, and unknown material types. Table 4.29 shows the quantity and percentage of debitage recovered by flaking stage and material type. Uinta quartzite dominates the material types recovered here, followed by Tiger chert.

Plate 4.31. 42Da684 view W.
Chipped Stone Tools
Both chipped stone tools from this site were collected from the surface.
FS-1.1 was a fragment of what appeared to be a large corner- or side-notch Tiger chert projectile point, probably an Elko series. It had missing the tip, part of the base, and one shoulder. The point had been pressure-flaked, with a tendril cross-section 0.4 cm in thickness. This point was collected from near the center of the site.
FS-1.2 was a rough flake of tan chert, possibly a preform, with the tip missing. The remaining portion measured 2.9 cm in width and 4.5 cm in length. The biface was collected from near the southwest corner of the site.
Non-Chipped Stone Tools
One mano fragment of Uinta quartzite was surface collected on the northeast edge of the site. This fragment was fire cracked. One face was heavily abraded, exhibiting lateral striations and dimpling.
Fausal Materials
The faunal material from the site consists of 110 small, fragmented bone specimens (Table 4.30). Eighty-five percent of the bone was collected from the surface of the stained soil area before and during shoveling-skimming. Only 15 fragments were discovered within the test pit, of which 10 (70%) had been burnt. In contrast, the overall percentage of burnt bone on site was 19%. Most bone could only be identified as large mammal, although one fragment was Odocoliueus sp (deer) and another Sylvilagus sp (cottontail). Within the test pit, 13 bones (86%) were from medium or large mammals.

<table>
<thead>
<tr>
<th>Material</th>
<th>Primary</th>
<th>Secondary</th>
<th>Tertiary</th>
<th>Shelter</th>
<th>Total: # (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dutch John chert</td>
<td>0 (0%)</td>
<td>1 (25%)</td>
<td>3 (75%)</td>
<td>0 (0%)</td>
<td>04 (01%)</td>
</tr>
<tr>
<td>Tiger chert</td>
<td>1 (01%)</td>
<td>3 (04%)</td>
<td>65 (82%)</td>
<td>10 (13%)</td>
<td>79 (26%)</td>
</tr>
<tr>
<td>Uinta quarzite</td>
<td>2 (01%)</td>
<td>27 (19%)</td>
<td>140 (83%)</td>
<td>0 (0%)</td>
<td>169 (55%)</td>
</tr>
<tr>
<td>Sheep Creek quartzite</td>
<td>3 (11%)</td>
<td>2 (07%)</td>
<td>19 (70%)</td>
<td>3 (11%)</td>
<td>27 (09%)</td>
</tr>
<tr>
<td>Other</td>
<td>1 (06%)</td>
<td>1 (06%)</td>
<td>14 (82%)</td>
<td>1 (06%)</td>
<td>17 (06%)</td>
</tr>
<tr>
<td></td>
<td>2 (22%)</td>
<td>0 (0%)</td>
<td>7 (78%)</td>
<td>0 (0%)</td>
<td>09 (03%)</td>
</tr>
</tbody>
</table>

Table 4.29. Debris from 42Da684. Final column lists material quantity and (%) percentage of site total.

<table>
<thead>
<tr>
<th>Material</th>
<th>Small Vertebrate</th>
<th>Small Medium Mammal</th>
<th>Sylvilagus sp</th>
<th>Medium Large Mammal</th>
<th>Large Mammal</th>
<th>Odocoliueus sp</th>
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<td>34</td>
<td>2</td>
<td>1</td>
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<tr>
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<td>52</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
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<tr>
<td>TOTAL</td>
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<td>2</td>
<td>3</td>
<td>47</td>
<td>2</td>
<td>1</td>
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</tbody>
</table>

Table 4.30. Faunal remains from 42Da684.

Summary
Intensive bone processing occurred at this site, and some artifact production. As with many sites at Dutch John, the deposits were sparse, and suggest only a brief cultural episode. Although this site was not directly dated, the spear point suggests the site dates to Archaic or Fremont time.

Plate 4.32. View SW to 42Da685

42Da685
Kelda Wilson and Byron Loosle

Overview
42Da685 is located at an elevation of 1927 m (6320 feet), on a small terrace at mid-slope of the ridge forming the north edge of Dutch John Bench. The site is currently covered in Colorado pinyon and Utah juniper, with a sagebrush opening approximately 70 m to the northeast. Low rock outcrops surround the main part of the site. The ground surface sparse soil deposits below pine duff. The area is erosional, with shallow soil on colluvial mantled slope, with abundant bedrock.

42Da685 was identified by a Forest Service crew in October of 1994, during the Dutch John Privatization Survey. The site was identified as eligible for the National Register due to the presence of diagnostic artifacts, features, and subsurface deposits. The site was measured at 44 by 42 meters. Possible cultural rock alignments were noted, as well as multiple dark stains, one of which was described as a midden. One dark stain in the southern part of the site contained charred bone, pottery, a biface and preform, and a heavy flake concentration. Adjacent to this stain were two rock arrangements of suspected cultural origin. One was "C" shaped and measured 120 cm by 72 cm. The other (92 cm east of the first) measured 192 cm by 65 cm. Other dark stains were noted to the north and northeast within the site perimeter.

The surface artifact assemblage associated with the south cultural stain included 10 Unna Gray ware ceramic sherds, 7 fragments of burnt bone, a heavy debitage concentration, 1 preform and 1 biface. The presence of Unna Gray ware indicated a Fremont affiliation for this site. Partially burned artifacts protruded above the surface. A shovel-skim test revealed burnt bone, debitage and ceramic sherds. This stained area was described as measuring approximately 5 by 4 m, with some material spreading downhill to the north. Exact dimensions were difficult to determine due to the dampness of the soil. Most of the debitage was tan Sheep Creek quartzite, with some Tiger chert and white quartzite. The site was recorded as a Fremont habitation site.
Excavation Strategy

In May of 1996 crews began to test the site, and excavation continued intermittently until July, 1996.

A grid was established by transit. The primary datum was beyond the southwest edge of the site, and 20E was the main n-s axis. A one meter grid system was established near each of the three areas identified as soil stains.

Two of the stains were determined to be noncultural. An open area of about 6 by 3 meters was shovel-skinned to remove a thin layer of tanolian sand deposit in an attempt to define the extent of a light gray stained area in the northeast portion of the site. No cultural material or discernible edges could be found for the gray layer. To verify the extent of this gray layer, a one meter test pit was dug to a depth of 20 centimeters at 20N 31E. The pit fill was screened, but no artifacts or cultural material were found, and no stratigraphy was noted. The gray layer became more rocky with depth, but color remained consistent (dry: 10 YR 5/2 grayish brown). No subsurface cultural remains were located, and the gray soil color was determined to be natural. A shovel-skim was conducted on apparently stained soil at 23N 19E. Below thin, patchy surface sand lay sterile soil. When this soil is wet it is very similar in color to a cultural layer such as was encountered in excavation of a structure described below (dry: 5 YR 4/2 dark reddish gray, wet: 7.5 YR 2/2 dark brown). When dry, the sterile layer is more of a ma-nno color. These stains were determined to be natural, and further excavation ceased.

The starch near the south site boundary, which yielded artifacts upon shovel-skimming, was identified as a structure, and was excavated.

Feature Descriptions

Excavation of the soil stain near the south site boundary yielded remains of a brush structure, including a hearth with floor features, including six clay protrusions or pediments that appeared to have been part of the structure architecture. Materials recovered from the structure include 332 pieces of debitage including 1 obsidian flake, 1 core, 4 projectile points, 1 biface, 2 drills, 1 hammerstone, 3 pecking stones, 74 ceramic sherds, and 231 bone fragments.

Brush Structure

The meter squares in this area were dug with trowels beginning with 21E 11N. This excavation area expanded into a four by five meter block from 10-13N and 18-22E. A slightly depressed irregular oblong area measuring 3.0 by 3.75 meters was revealed near the center of this excavation. Excavation of the 1 by 4 m area comprising 10-13 N in 18E did not reveal features or structures, with exception of a one piece of debitage in 18E 10N, and these squares are not shown on Feature Maps 4.1/3 and 4.18. All soil removed was screened through quarter-inch mesh. Several soil, pollen, and charcoal samples were removed from locations within the central area. This feature appears to be the remains of a Fremont brush structure.

The stratigraphic fill of the structure consisted of four layers. The surface layer was a tan sand and dust (dry: 10 YR 3/3 brown, wet: 2.5 YR 3/2 dusky red), about 10 cm in depth, containing some artifacts. Below this was a layer of fill from roof fall (dry: 10 YR 3/3 dark brown, wet: 5 YR 2.5/2 dark reddish brown) approximately 18 cm in depth, terminating in a compacted floor. Three flotation samples were taken from the bottom level of this layer at floor contact. The samples (FS-1, FS-2, FS-45) provided similar results: conifer wood, Pinus (pine) wood, charcoal, and a charred Amaranthus (beetle seed). Below the layer attributed to roof fill was a thin layer (dry: 10 YR 4/2 dark grayish brown) 3-4 cm thick. This compact, pinkish-gray level with flecks of charcoal was approximately centered in the depression, and was interpreted as the structure floor. Over much of the area excavated, this layer appeared to be a prepared floor, but in some places it was difficult to distinguish from roof fall and cultural fill. It appears that a brush framework was constructed over this material. The depression was 25-33 cm below ground surface, and measured 2.5 meters n-s by 1.5 meters e-w. It was roughly oval in shape, with a hearth in the south portion. A flotation sample (FS-31) taken from the floor contained conifer charcoal.

The final layer was the contact zone (dry: 7.5 YR 3/2 very dark brown, wet: 10 YR 2.5/4 very dark brown) which lay on top of sterile soil. Near the edge of the depression it was hard to distinguish between the levels, as artifacts and charcoal became scarce and levels graded together. In addition to the hearth, 2 pits were identified within the structure perimeter.

Two samples from the structure were dated by radiocarbon analysis (Table 4.31). One sample was taken from the cultural fill in Pit 1. A second sample was taken from the roof fall material above the floor in 21E 11N. These dates indicate occupation at around 985 AD, the Fremont period.
Feature Map 4.17. 42Da685 Brush structure.
42Da685 Brush structure profiles

E-W profile

Sterile soil

N-S profile

0 1

meter

Rocks

Modern tree

Feature Map 4.19. 42Da685 Brush structure profiles.
The material was finely pressure-naked on one side of the blade and thinly pressure-naked on the other side. It measured 2.8 cm in length, 1.3 cm in thickness. The artifact had two polished fractures and pressure-flaked edges. It appeared to be a fragment of a larger tool that was broken then re-worked.

FS-39, recovered from 10N 19E, was a small, Side-notch point of Sheep Creek quartzite classified as a Uinta Side-notch. It measured 2.7 cm long, 1.7 cm wide, and 0.2 cm in thickness. The tip and one side of the blade had snapped off. The base was convex and the blade was triangular and slightly convex, with a lenticular cross-section and finely pressure-flaked edges. The neck measures 0.8 cm in width.

FS-47, recovered from 11N 20W, was a Rose Spring Corner-notch arrow point of Tiger chert with a concave base and lenticular cross-section. It was missing one shoulder and parts of the edges were damaged. This point measured 2.8 cm in length, 1.4 cm in width, and 0.4 cm in thickness. The neck width was 0.8 cm.

Non-Chipped Stone Tools
Four non-chipped stone tools were recovered at this site, including 1 hammerstone and 3 cobbles.

FS-3, recovered from 12N 20E, was a hammerstone of a gray and tan cryptocrystalline material and hemispherical in shape. It had been thermally altered, demonstrated by numerous polished fractures, crazing, and a waxy luster on the surface. The cobble had broken during or after thermal alteration, creating a slightly concave ventral surface. The ventral surface displayed crushing use wear along the margins. It measured 6.5 cm in length, 5.2 cm in width, and 4.0 cm in thickness.

FS-12, recovered from 13N 20E, was a pecking stone made from a small quartzite river cobbles with a narrow triangular shape. The cobble measured 8 cm in length, 3 cm in width, and 1.5 cm in thickness. On the pointed end a broken shelf of stone was missing (probably due to natural causes), forming a possible hafting area. The wider end displayed unweathered in the form of pecking, which had created one flake scar on the top edge.
FS-10, recovered from 11N 19E, was an oval quartzite cobbles pecking stone measuring 5.1 cm in length, 3.0 cm in width, and 2.1 cm in thickness. The cobbles displayed peck marks on the margin of one end.

FS-22, recovered from 10N 19E, was a smooth, flat, oval quartzite river cobbles pecking stone measuring 6.4 cm in length, 3.5 cm in width, and 1.2 cm in thickness. One margin displayed peck marks.

Ceramics

Of 74 ceramic sherd were recovered at this site. 31 were refined to form part of a vessel. Only one vessel appeared to be represented in the collected sherd, but pottogeogaphic analysis (Hill, Appendix Three) found material from at least two vessels present. A majority of the ceramics were recovered from 11 and 12N in 20 and 21E. 2 sherd were recovered from 10N 21E. The refined vessel was a previously unknown variety of Uinta Gray ware (Illustration 4.25 and Plate 4.31).


Uinta Gray was originally defined as containing a crushed calcite temper (R.E. Madsen 1977:27-28); however more recent analyses reveal that crushed limestone is a more important tempering agent in Uinta Gray (McKibbin et al. 1992:257; Transdale and Hill 1991:4). This pottery is limestone tempered like Uinta Gray and appears morphologically the same. Simms et al. (1997) demonstrate that among ceramic assemblages in northwestern Utah, local sources are used for ceramic temper so consistently that the variation in ceramic temper among types is better attributed to location than to culture or time period. They suggest that the limestone temper described in Transdale and Hill (1991), and Loosie et al. (1993) demonstrates the local use of limestone in an area where calcite is uncommon. However, Hill (1999 personal communication) believes crushed limestone is the most common temper in Uinta Fremont vessels. The presence of limestone tempered pottery at Dutch John is consistent with findings for the Uinta Basin.

Uinta Gray has been defined as unpatched (R.E. Madsen 1977:27-28), yet the Dutch John variety displays a red painted cross hatched line pattern fired on the vessel exterior.

Plate 4.33. 42Da685: "Dutch John Gray ware" vessel reconstruction.

The partially reconstructed vessel is a globular cooking vessel. The exterior surface is quite smooth and slightly polished. Paste color ranges from gray (10 YR 6/1) to light gray (10 YR 7/1) and is very blackened in some areas (10 YR 2.5/1 black). The vessel is thickest at the base and thinnest at the neck. The average thickness of the base is 7.3 mm, and the average thickness of the walls is 6.4 mm. The construction is coil and scrape with a thinned and slightly undulating rim. This vessel was unevenly fired in a reducing atmosphere.

The painted pattern on the vessel(s) exterior is a red that has been fired (2.5 YR 5/6 red). The decoration is a cross-hatched pattern with broad brush strokes that have an average width of 0.80 cm. The design starts at the top edge of the rim and continues to the base, but not onto the bottom of the vessel.

A sherd (FS-52) was sent for petrographic analysis in 1998 (Hill, Appendix Three). FS-52 has 25% limestone temper of sandy micrite, although with some crystalline calcite present as isolated grains. These constituents are consistent with the Morrison or Stump formation as a source (Bilbey 1999, personal communication). As with the Fremont ceramic(s) at 42Da614, this ceramic vessel was probably produced at Dutch John, or within 20 km to the east in the Browns Park area.

An additional sherd (FS-X) believed to be from the same vessel was sent for petrographic analysis in 1999 (Hill, Appendix Three). This sherd has a fine bioclastic 20% limestone temper, with some crystalline calcite and a fragment containing a...
stromatoporoid. The stromatoporoid strongly suggests the presence of Madison limestone in the temper, while the micritic texture and other details suggest perhaps a Morrison or Stump formation limestone. Mississippian (including Madison) and Pennsylvanian limestones may occur as cobbles along the Green River near Dutch John; outcrops of these limestones also appear to have been available in the Green River canyon within a few kilometers upstream of Dutch John before the dam was built, as "From the Utah-Wyoming border to the damsite the river crosses over or beneath exposed geologic formations dating from the Precambrian to the Recent." (Day and Dibble 1963:4). As with the other ceramic sherds in the Dutch John archaeological assemblage, this composition of this sherd is consistent with manufacture within a few kilometers of the site where it was found.

These sherds appear to represent the remains of two ceramic vessels of slightly differing materials. Comparison with other Fremont pottery types suggests that this is indeed a different variety. Great Salt Lake Gray has a fugitive red variety from an application of hematite wash. However, Great Salt Lake Gray is tempered with quartz, mica and sand (R. E. Madsen 1977:19). A variety of Promontory Gray also has a fugitive red wash. However, Promontory Gray appears after AD 1000, is tempered with a very large calcite or quartz, and is produced with a paddle and awl technique (R. E. Madsen 1977:24). Emery Gray is a third type of pottery in Utah reported with a red unfired hematite wash, but this type is tempered with basalt and mica (R. E. Madsen 1977:31). The red coat on all three of these pottery types has been described as fugitive. Unlike these varieties, this Dutch John pottery has a fired red paint design and limestone temper. We propose this pottery be referred to as Dutch John Gray, a variety of Uinta Gray ware.

Faunal Materials
The faunal remains from the site consists of 231 small, fragmentary bone specimens, including 2 freshwater fish (Cypreidea and Ctenacauda), Silvafugal g (cottonwood), Neotoma cinerea (busy tail woodrat) and Eryx sp. (bear). Very few of the mammalian bones were identifiable beyond the class level. Of the 229 mammal bone fragments in the collection, 185 fragments (84%) are classified as medium/large mammals and 35 fragments (15%) are classified as small mammals. Within the entire bone collection 185 bones (80%) of the fragments are classified as larger mammals. At least 78% of the bone collection had been burnt. Table 4.33 lists the bones recovered.

Three bones displayed visible cutmarks, and a fourth had evidence of a percussion mark.

Table 4.33. Faunal remains from 42Da685

<table>
<thead>
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<tr>
<td>Mammals</td>
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</table>

Plant Remains
FS-37 from the northwest quadrant of the hearth area yielded cinder and Pinus pune (pine), charcoal, charred conifer wood and 5 Zea max (corn) cobs. The fill in Pit 1 yielded FS-32 cinder and Pinus charcoal, and 5 cobs and 1 charred kernel of Zea max. Recovery of a charred Juniperus (juniper) and Pinus seed, along with uncharred conifer wood fragments from the structure roof fall and floor fall suggests the superstructure of the primary feature utilized juniper, pineyon, and Ponderosa pine. Corn was utilized by the occupants, as indicated by analysis of samples from the hearth and Pit 1. No Zea pollen was recovered at Dutch John, and it is unlikely corn could have been grown there.

A pollen sample from the floor of the structure in 11N 21E by the edge of the hearth yielded high amounts of Low-slope Asteraceae (ragweed, cocklebur) and Artemisia (sagebrush), and low amounts of Pinus, Juniperus, Poaceae (grasses), and Chenia-ann (pine), (pine), (ponderosa pine),. Pollen recovery was low. However, the higher amounts of Asteraceae (Compositae) and Artemisia seem to suggest this site was in or close to a sagebrush opening. The advancement of pineyon-juniper woodland in the area over the last eighty years has been significant. Forest Service suppression of wildfire has created a more uniform woodland of pineyon and juniper. In the past occasional fires opened many areas, creating a mosaic of woodlands and openings. This site was probably more open at the time of occupation than it is today.

Summary
This site consists primarily of a brush structure approximately 3 m by 2.3 m, constructed over a shallow basin of measuring 2.5 m by 1.5 m. The clay floor of the structure may have been prepared. The excavators believed the two small (<15 cm) lenses of charcoal in 12N 20E may have been postholes. Directly above the floor was a layer of charcoal attributed to roof fall. The brush framework was probably made from pineyon or juniper. Hardened clay pediments or mounds at the edges of the depression and area of cultural stonies interpreted as the floor may have been placed as braces for the roof supports. A hearth was located off center, and around it was a considerable quantity of burnt bone.

This is one of several sites at Dutch John for which multiple 14C samples from a feature or structure were dated. This allowed a check on dates obtained, and contributed to understanding the relationships between structures or features. In the case of the structure at 42Da685, the 14C midpoint dates from charcoal in the lowest level of Pit 1 and from burned material associated with collapse of the structure roof agree to within 10 years.

The recovery of two styles of Fremont projectile points, a new variety of Uinta Gray pottery, presence of corn and the radiocarbon dates support the initial determination that it is a Fremont era site. The radiocarbon dates fall into the Whiterocks Phase of the Uinta Fremont which dates to AD 800 to 950 (Marriott 1986:149).

While similar to 42Da614 in many ways (temporary structure with Fremont ceramics, Rose Spring points, pecking and hammerstones, debitage and bone fragments, during 1100-1200 BP), this structure at 42Da685 varies in that it is smaller, lacks a formal hearth, and has much more evidence of lithics reduction and bone processing outside the inferred structure limits. These differences suggest this brush structure may have been utilized during a somewhat warmer season than the structure at 42Da614.

The painted pottery at this site is a unique and intriguing discovery. We suggest this variety be called Dutch John Gray, and hope that additional examples may soon be found. At question is whether the material should be considered a variety of Uinta Gray, a unique Fremont type, or if all Fremont ceramics should be considered as varieties of one type, with only that internal variability consistent with acquisition of handy local materials. Our tendency at this time is to see Uinta Gray as a type of Fremont Gray ware, characterized most notably by addition to the paste of 20-30% crushed limestone temper. Under these criteria, Dutch John Gray is a variety of Uinta Gray ware. Future finds may clarify whether the definition of Uinta Gray ware needs expansion to include fired exterior painted decoration, or whether Dutch John Gray ware need be elevated to a status independent of Uinta Gray. The possibility the ceramics were produced in the immediate area of the site has implications both for gender and duration of occupational episode.

The primary activity at this site appears to have been processing large game. The faunal bone indicates a clear preference for large mammal, although the range of species represented is interesting. The presence of bear bone is unique to this site at Dutch John. No groundstone was noted at this site. The limited chipped stone tool assemblage is consistent with hunting and game processing. The site is probably a temporary hunting camp. We suspect the Fremont were visiting the area for a few specific resources, particularly medium game animals like mountain sheep and deer. The presence of decorated ceramics using materials consistent with an origin at Dutch John suggests that the Fremont presence was mixed gender, and that possibly ceramic construction was one activity, although the lack of groundstone may temper this interpretation somewhat.

Another Fremont era brush structure was excavated at Dutch John (42Da614). See Chapter 8 for an in-depth discussion of brush structures.
**42Da686**

Kelda Wilson

**Overview**

42Da686 is located at an elevation of 2000 m (6600 feet) on the edge of Dutch John Bench to the southeast of Dutch John Draw. The site is a small clearing in pinyon-juniper woodland, with sparse cactus and sagebrush. Northwest of the site is a large rock outcrop.

42Da686 was identified by a Forest Service crew in October of 1994, during the Dutch John Privatization Survey. The site was determined to be eligible for the National Register due to the presence of a stone feature suspected to be a hearth, suggesting the presence of subsurface deposits. The site was measured at 25 by 50 meters.

The surface artifact assemblage includes 1 burnt bone fragment, 1 projectile point, 1 biface, 1 pecking stone, and 9 flakes of Tiger chert and Sheep Creek quartzite. A stone circle measuring 45 cm in diameter was noted on the surface.

All areas with soil depth or evidence of possible cultural stages were tested with an Oakfield soil probe. Shovel-skimming was performed in areas where the probe yielded subsurface soil stains. One feature was excavated; shovel testing determined the color variation in other areas to be natural. All cultural deposits identified have been removed as a result of these excavations.

The main feature was a slab-lined basin with an unlined bottom, dating AD 960 to AD 1020, which may have been used more than once.

**Excavation Strategy**

In October of 1996 the site was tested, and a slab-lined basin was excavated. An area 15 m in diameter centered on the basin was probed at approximately 50 cm intervals, identifying two areas with light gray subsurface stains. To determine if these stains were cultural, an area 4 meters west of the stone feature was shoveled-skimmed to a depth of 12 cm, and a second area south of the hearth was skimmed to a depth of 10 cm. In both areas the staining was determined to be a natural substrate. No additional features were noted and no further excavations occurred.

The excavations yielded 1 slab-lined basin, 4 bone fragments, and 1 piece of debitage.

**Feature Description**

**Slab-lined basin**

This feature was excavated by halves and the contents removed. The basin was lined with Uinta quartzite stone slabs, but the bottom was unlined. Five of the slabs in a circular arrangement were protruded above the surface before excavation. The basin was 30 cm in depth and 45-55 cm in diameter.

The stratigraphy of the basin consisted of 2 layers. Level 1 extended from surface to 5 cm, and was comprised of brown soil. Level 2 was a dark charcoal colored soil that filled the rest of the feature to 30 cm beneath the surface. Within Level 2 was a layer of rocks, suggesting the possibility of more than one use episode. The charcoal layer overlay a mottled tan layer with charcoal flecks, which was the contact zone with sterile soil below.

One sample taken from the southeast quarter of the basin, below the rocks within the charcoal layer, was dated by radiocarbon analysis (see Table 4.34 below). The sample dates to the Fremont (Wyoming Late Prehistoric) period.
### Cultural Materials

**Chipped Stone Debitage**

Five pieces of debitage are mentioned in the excavation notes, but were not recorded.

**Chipped Stone Tools**

The chipped stone tool assemblage recovered at 42Da686 is composed of 1 projectile point and 1 biface fragment, both recovered from the surface. The point was located 5 m w of the basin, the biface 15 m nw of the basin.

FS-2.1 was an arrow point classified as a Rose Spring Corner-notch of Tiger chert, missing the tip. It has a pedial fracture on one side indicating heat damage. The point had a convex base and shallow corner notches. It had been parallel pressure-flaked with a lenticular cross-section, and measured 1.3 cm in width and 0.4 cm in thickness.

FS-2.2 was a triangular biface fragment of Tiger chert that appeared to be the corner of a tool. It had been pressure flaked with a lenticular cross-section and measured 0.3 cm in thickness.

**Faunal Materials**

Four fragments of unburnt bone were located north of the basin, and 1 small piece of burnt bone was recovered from basin fill. The fragments could not be identified to species, but were all medium or large mammal. None showed signs of cut marks.

**Summary**

This feature was atypical for Dutch John Slab-lined basins in several ways. The bottom was unlined. The feature appeared more subrectangular than circular. The portion of the basin containing the charcoal fill was atypically shallow for the basin diameter. The rocks on the charcoal layer suggested multiple episodes of use, and the excavated profile hinted at the possibility that a hearth had been superimposed on an earlier pit or slab-lined basin of greater depth and perhaps smaller diameter. The radiocarbon date of 1060±30 BP places basin use to the Fremont period, which is supported by the Rose Spring Corner-notch projectile point recovered from the surface. The charcoal for dating was obtained from the southeast corner of the basin, below the rocks in the charcoal layer. Smith and McNees (1999:121) show no slab-lined basin dating to this period in southwestern Wyoming, and no other basins excavated for this project date to this period. This feature may have resulted from superimposition of a Fremont hearth or roasting pit on an earlier pit or slab-lined basin.
42Da687

Kelda Wilson

Overview

42Da687 is located at an elevation of 1090 m (3580 feet), on the western toe of Dutch John Bench. The majority of the site is located in tall sagebrush, with a portion in the pinyon-juniper transition area. The soil at the site is a tan sandy loam.

42Da687 was identified by a Forest Service crew in October of 1994, during the Dutch John Privatization Survey. The site was determined to be eligible for the National Register due to the presence of stone features indicating subsurface deposits. The site was measured at 40 by 75 meters, and listed as a lithic scatter of unknown cultural affiliation.

The surface artifact assemblage at the site included a lithic scatter of 9 flakes of Sheep Creek quartzite and Tiger chert. Two circular stone features approximately 8 m apart suspected of being slab-lined basins were identified by rocks protruding above the ground surface. A majority of the debitage at this site (7 flakes) was in the immediate area of the basins.

The entire site was probed at 5-1 m intervals to a depth of 22 cm to identify subsurface cultural deposits. No soil staining other than that associated with the circular stone features was noted. Both features were determined through excavation to be slab-lined basins. All cultural deposits identified at this site have been removed as a result of these excavations.

The main features were two slab-lined basins, probably representing Archaic plant processing activities.

Excavation Strategy

In October of 1995, a crew tested the site, and began excavation. Each basin was excavated one half at a time. Areas around the features were shaved-skinned to a depth of 17 cm below surface, and a diffused swell was revealed south of Basin 1. This swell could not be further defined, and may represent the basin being emptied between uses.

Feature Descriptions

Slab-lined basin 1

Basin 1 (7.6 m n of basin 2) was noted as two rock slabs visible above surface. The entire basin was excavated. The top circumference of the feature was not visible until 10 cm of soil and duff were removed. Duff removal exposed 9 stones. Fill in the top 15 cm of this feature was a light colored soil, and the bottom 40 cm a dark black soil. The basin measured 46 cm in depth and 60 cm in diameter at the top, with a stone lined bottom. At the bottom, the diameter narrowed to 40 cm. The walls of the feature were lined with Uinta quartzite stone slabs overlapping in a counterclockwise direction.
Feature Map 4.21. 42Da687 Slab-lined basin 1.

Feature Map 4.22. 42Da687 Slab-lined basin 2.
Slab-lined basin 2

Basis 2 was 7.6 m south of Basis 1. Two rock slabs were visible above surface. Removal of top soil revealed 5 stone slabs that defined the outline of the basin. The top 10 cm of soil was a tan clay, followed by 8 cm of a light black with charcoal flecks. At 18 cm below surface, the soil became a dark brown-black, which filled the rest of the basin. The stone lined bottom of the feature was 28 cm below surface. A single pumice pebble was recovered from between two stones on the very bottom of the basin. Nine stones lined the bottom of the feature. This feature measured 70 cm in diameter at the top and 47 cm at the bottom, with a depth of 28 cm.

Cultural Materials

No artifacts were recovered at this site.

Summary

These undated slab-lined basins are similar to those at other Dutch John sites, which typically date to the Archaic period. Basin 1 is typical morphologically of Dutch John slab-lined basins, while Basin 2 is somewhat shallow in comparison. These basins were probably used to process plant parts, roots and tubers (Chapter Seven). The site probably resulted from brief spring - early summer occupations focused on procurement and processing of plant materials.

Overview

42Da689 is at an elevation of 1994 m (6540 feet), at the northwest edge of Dutch John Bench, southwest of the town of Dutch John. It sits in an open mature stand of pinyon-juniper with young juniper regeneration and sagebrush. The site is on loose fine-grained sandy loam with low rock outcrops.

42Da689 was identified by a Forest Service crew in October of 1994, during the Dutch John Privatization Survey. The site was determined to be eligible for the National Register due to the presence of two stone features that were described as slab-lined basins, as well as possible subsurface deposits. The site was measured at 30 by 70 meters.

The surface artifact assemblage at the site was a small lithic scatter of 10-15 flakes of Tiger chert, Dutch John chert, Uinta quartzite, and Sheep Creek quartzite, and one projectile point made of red chert. This sparse debitage assemblage included flakes from decortication, secondary, and tertiary flaking stages, and chaff. The site was recorded as a lithic scatter with slab-lined basins.

Four suspected slab-lined basin features and an adjacent area 30 m in diameter were probed extensively with an Oakfield soil probe. Excavation at the four suspected basin features determined two were slab-lined basins. Excavation of the other two suspected basins was suspended when no subsurface evidence of cultural activity was identified. These rock arrangements were determined to be natural. All cultural deposits at this site appear to have been removed as a result of these excavations.

This undated site was probably a seasonal plant processing area, and the presence of slab-lined basins coupled with sparse evidence of other associated features suggests it is probably Archaic in age.
Excavation began at four suspected slab-lined basins in October of 1995. Excavation was terminated at two features when they were determined to be natural rock arrangements. Excavation of the remaining two slab-lined basins yielded very sparse material totaling 1 juniper seed and 1 piece of hematite.

Feature Description

Slab-lined basin 1
On the south end of the site, an oval arrangement of 8 vertical stone slabs was apparent on the surface. The east-most stone protruded 21 cm above surface, and all of the stones slanted outward at the top. Some of the stones looked more like boulders than slabs. Diameter of the feature at ground surface was 85 cm n-s by 68 cm e-w. The feature was excavated completely by halves. The bottom was stone lined, 42 cm in depth. The top layer of fill (0-8 cm) was light surface soil. Below 8 cm the soil was black cultural fill. A juniper seed and a piece of hematite were recovered from this feature.

Slab-lined basin 2
A second slab-lined basin was located 2 meters northeast of Basin 1. A roughly circular pattern of 5 horizontal rocks was visible on the surface. The feature measured 85 by 93 cm in diameter at the surface. The rocks were approximately horizontal rather than vertical, and the fill contained several rocks. Tree roots had penetrated the feature and apparently displaced the rock arrangement. At 12 cm below surface the fill became black and charcoal appeared. The shallow, concave bottom of the basin was 26 cm below surface.
Cultural Materials

Mineral fragment
This piece of black stone has been tentatively identified as hematite, a form of iron. The piece was rectangular, and measured 0.95 cm in length, 0.5 cm in width, and 0.4 cm in thickness. Three sides of the piece were relatively flat, but no cultural modification was apparent.

Summary
Without diagnostic artifacts or a radiocarbon date, this site cannot be assigned to a particular period. These slab-lined basins, however, are similar to those at other Dutch John sites that date to the Archaic period. These basins appear to be roasting ovens used to process plant parts such as prickly pear pads, or tubers such as biscuitroot. Chapter Seven includes a more detailed discussion of these basins. The site is the result of brief spring-early summer occupations involving processing of plant materials.
Overview

42Da690 is located at an elevation of 1927 m (6320 feet), on a small terrace at mid-slope of the ridge that forms the north edge of Dutch John Bench. East-west drainages border the site on the north and south and a north-south drainage forms the western boundary. The site area is currently covered in Colorado Pinyon and Utah juniper with some perennial grasses on red sandy soil, and occasional small sagebrush openings. Soil deposits are light and covered in pine duff. The soil is relatively shallow, on a colluvial mantled slope with abundant bedrock.

42Da690 was identified by a Forest Service crew in October 1994, during the Dutch John Privatization Survey. The site was determined to be eligible for the National Register due to the presence of diagnostic artifacts, features, and subsurface deposits. The site was measured at 30 by 58 meters. A scatter of lithic debitage, chipped stone tools, and ground stone fragments were noted, as well as several dark soil stains, one of which contained burned bone.

The surface artifact assemblage at the site included 3 metates, 1 mano, 1 unidentified ground stone fragment, 3 pieces of burned bone, 3 bifaces, 1 scraper, 1 graver, 2 points and over 100 pieces of debitage. One of the points was initially identified as the base of a Midland point, suggesting Paleoindian occupation. However, edges were not ground on this basal fragment. Tan, white and purple quartzites (probably Sheep Creek and Uinta quartzites) were the most common lithic materials. Tiger chert was the most common cryptocrystalline material. Gray and tan chert and white quartz were also recorded.

All areas with visible soil depth or evidence of possible cultural stains were tested with an Oakfield soil probe. Excavation uncovered a number of features within one large stained area. An additional stained area noted approximately 12 m east of the first was also opened, exposing additional features.

Excavation Strategy

Crews began to test the site in September of 1995, with excavation continuing intermittently until September 30, 1996.

In 1995 a 1 by 2 meter test pit was placed where the "Midland" point had been recovered from the surface. Excavation revealed a pit or bench feature from which a charcoal sample was collected, and subsequently dated to 6870 BP. Using baseline established by transit, a primary datum was set southwest of the site and a grid system established. The large stain that originally identified the site was the preliminary focus of excavation. The area adjacent to this stain on the south and east was also excavated due to presence of cultural materials noted during survey. A second group of features was excavated in a separate area 12-15 meters to the east. This area was designated Feature Ten, and was covered by a grid system similar to but independent of the grid over the primary area.
Feature Descriptions

Excavations at this site yielded 12 cultural features, including 3 temporary structures with interior features and 2 open air activity areas with pits and hearths. As Feature One, meter squares were shovel-removed and dug with trowels starting in units 0N 4E and 1N 4E. As excavations defined the limits of the site, the area took on a roughly kidney shape, occupying squares 0-2N on the west, and the west end in 2E and the east end more in 10E. All sediments were screened through quarter inch mesh. Several soil, pollen and charcoal samples were removed from locations within this general area.

Test Trench 1

During testing in 1995, a 1 by 2 meter trench was dug in units 3N 1E and 4N 3E, yielding charcoal dated in January of 1996 to 8870 BP (Table 4.35), as well as limited debitage and bone fragments. Immediately south of the test trench a test pit placed over a dark stain yielded cultural materials. Further excavation in this area exposed Structure 1.

Feature 1

This structure was on the western edge of the site. The cultural fill was characterized by a dark brown/black compacted sandy soil. The only evidence of superstructure at the site occurred here, in the form of unburned conifer timber and charcoal fragments. Several artifact types were found in this area, including: 2 metates, 1 mano, 1 hammerstone, bones, debitage and lithic tools. Structure 1 was oval in plan, measuring 2.4 m e-w by 2.9 m n-s, with a compacted, mottled orange-brown sandy soil reaching a maximum depth of approximately 18 cm below surface.

Table 4.35. Radiocarbon dates from 42Da690

<table>
<thead>
<tr>
<th>FS #</th>
<th>Location</th>
<th>Mapped point</th>
<th>2 Sigma</th>
<th>Radiocarbon age</th>
<th>Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>131</td>
<td>Pit 1</td>
<td>4670 BC</td>
<td>4740-4605 BC</td>
<td>5830 ± 130 BP</td>
<td>Beta-132172</td>
</tr>
<tr>
<td>129</td>
<td>Hearth 3</td>
<td>5130 BC</td>
<td>5180-5085 RC</td>
<td>6310 ± 160 BP</td>
<td>Beta-107710</td>
</tr>
<tr>
<td>127</td>
<td>Hearth 1</td>
<td>4890 BC</td>
<td>5030-4765 BC</td>
<td>6000 ± 150 BP</td>
<td>Beta-132171</td>
</tr>
</tbody>
</table>

Structure 2

This structure was found to the east of Structure 1 and forming the eastern half of the cultural soil stain comprising Feature One was a large, deep cultural area identified as Structure 2. This area partially or entirely occupied all units within the quadrangle defined by 0N 8E, 1N 7E, 3N 10E, 1N 11E. The structure was a depression 35-50 cm in depth, irregular in plan, measuring approximately 4 m e-w by 3 m n-s. Several features occurred within this structure, including 4 pits, and 1 hearth, around which several pieces of ground stone were found. The floor of the structure was approximately 55 cm below surface. A dark cultural horizon very similar to the cultural horizon in Structure 1 was identified approximately 6 cm above the floor. This level produced a large quantity of artifacts, including bone (burned and unburned), ground stone, and chipped stone. The western portion of the feature produced a large number of objects that had been altered by heat (i.e. fire-cracked rock, burned bone, charcoal, and heat-treated lithic material). Between this level and the floor of Structure 2 was a layer of ash sediment. This layer produced a significant amount of material, including several manos, 1 large slab metate, chipped stone, charcoal, and bone. The structure floor was lighter and harder than the preceding strata. The floor was rather uneven, largely due to rodent and insect disturbance.

Plate 4.39. 42Da690 Structure 1 floor, view S.

A pollen sample from Structure 1 fill was sent to Palynos Research Laboratories for analysis (Cummings, Appendix Two). The sample had an elevated frequency of Pinus (pines) pollen and a lower frequency of Artemisia (sagebrush), suggesting more pine woodland and less sagebrush than many samples from the project area. Trace amounts of arboreal pollen of Quercus (oak), Pseudotsuga (Douglas fir), and Picea (spruce) probably are the result of transport from woodlands to the west in the Umatilla. This was the only sample to record Carexohara (grasses-seed pollen), and also contained Sheepherder (buffalo) pollen, suggesting presence of these taxa during this time. Cupressaceae pollen indicates the presence of sedges, two types of Ephedra (Mormon tea) pollen are present, and Cheno-am frequency is relatively low in this sample. Opuntia (prickly pear cactus) pollen suggests cactus may have been processed in the structure. In addition, some nondiagnostic starch granules, which could be from bittersweet or from grasses, were found in the fill.

Pit 1. Pit 1 was first noted as a dark stain within Structure 1. This feature occupied portions of units 1-2N and 2-5E. Among the artifacts found in this pit were bone, debitage, 1 Pinto projectile point base, fire-cracked rock, 2 lightly used metates, 1 hammerstone, and 1 mano. The pit was basin shaped with a maximum depth of approximately 32 cm below the floor. The pit floor was compacted sandy soil of a mottled orange-brown. Charcoal from this pit was submitted for dating in July of 1999 to test an inference that this structure dated to the same period (Early Archaic) as other structures and features at this site. This material returned a date of 5803 ± 50 BP (Table 4.35), confirming the inference.

Structure 2

To the east of Structure 1 and forming the eastern half of the cultural soil stain comprising Feature One was a large, deep cultural area identified as Structure 2. This area partially or entirely occupied all units within the quadrangle defined by 0N 8E, 1N 7E, 3N 10E, 1N 11E. The structure was a depression 35-50 cm in depth, irregular in plan, measuring approximately 4 m e-w by 3 m n-s. Several features occurred within this structure, including 4 pits, and 1 hearth, around which several pieces of ground stone were found. The floor of the structure was approximately 55 cm below surface. A dark cultural horizon very similar to the cultural horizon in Structure 1 was identified approximately 6 cm above the floor. This level produced a large quantity of artifacts, including bone (burned and unburned), ground stone, and chipped stone. The western portion of the feature produced a large number of objects that had been altered by heat (i.e. fire-cracked rock, burned bone, charcoal, and heat-treated lithic material). Between this level and the floor of Structure 2 was a layer of ash sediment. This layer produced a significant amount of material, including several manos, 1 large slab metate, chipped stone, charcoal, and bone. The structure floor was lighter and harder than the preceding strata. The floor was rather uneven, largely due to rodent and insect disturbance.
a number of ground stone pieces and large rocks were found on the floor near the hearth. Charcoal from this hearth was submitted for dating in July of 1999 in an attempt to determine if Structure 1 and Structure 2 were contemporaneous. Material from this hearth returned a date of 6000±50 BP. Although Structures 1 and 2 date to the same period (Early Archaic), the 2-sigma ranges do not quite overlap. It remains undetermined if Activity Area 1 is contemporaneous with either of these structures.

Pit 3. Pit 3 was identified as a dark stain on the floor in the northern portion of Structure 2. The pit was roughly circular, approximately 50 cm in diameter, with a shallow basin-shaped profile. No artifacts were found within this pit.

Pit 4. Pit 4 was identified as a small gray stain (ca. 7 cm in diameter at floor level) within the north wall of Structure 2. This feature was 15 cm in depth, slanted into and enlarged below the floor surface, and produced no artifacts.

Pit 5. The west end of Structure 2 was taken up by Pit 5, a shallow depression filled with dark gray, ashy sand. The bottom of this depression was approximately 55 cm below surface. The few artifacts encountered include lithics and bone in the south half of Pit 5, and some charcoal in the north half. This feature was irregular in shape and depth was not pronounced, so the actual function was not clear. A large tree is growing immediately north of this pit, resulting in an unexcavated area at the north end of the pit.

Pit 6. A deep pit was located on the east edge of Pit 5 in Structure 2. Pit 6 was approximately 43 cm in depth. This feature was filled with the same dark, ashy sand that characterized Pit 5 fill, and produced a similar assemblage of lithics, bone, and some seeds.

Activity Area 1
The area between Structures 1 and 2 was identified as an activity area. It is not clear if this area represents activities associated with one or the other of these structures, or an additional occupation. The general fill of this area was ashy, and virtually indistinguishable from that in the structures. One pit feature was located in this area.

Pit 7. Pit 2 was identified as a dark stain immediately east of Structure 1. The fill in this feature was a very dark grayish brown (10 YR 3/2) and occurred in two horizons, with a lighter band (10 YR 4/2) between them. The top of Pit 2 was approximately 15 cm below the surface and the pit was 40 cm in depth, with a layer of lighter fill at a depth of 23-40 cm. Few artifacts were found in this feature, including some small bone fragments, a few flakes, 1 projectile point tip, and a small amount of charcoal.

Structure 3
An area of cultural deposits was detected by soil probe 12 meters southeast of Structure 2. An independent one meter grid system was established, and the area was excavated using procedures similar to those employed in the Structure 1-2 area. The perimeter of this feature was sinuous. The feature partially or completely occupied nine units in a rectangle defined by corners ON 0E and 2N 2E, and was designated Structure 3. This area was covered by a thin layer (approximately 10 cm) of duff and sandy soil characteristic of the surrounding ground surface. A thin black stain marked the cultural zone, and covered a compact surface of lighter colored material. The compacted floor was approximately round in plan, measuring 2.3 m e-w by 2.4 m n-s. This floor was dug into the slope, and was 40 cm below surface on the east edge, but approximately at the surface on the west. The south perimeter appears to have partially eroded. The floor was dark brownish-gray in color (10 YR 4/2), very hard and littered with rocks.

While no evidence of superstructure was noted, a variety of artifacts and a hearth were identified. Artifacts recovered from floor fill included 2 projectile points, significant quantities of bone (much of which was burned), 2 metates, and 1 mano. Although the interpretation of this area as a structure is tentative, the compact surface, general outline, and frequency of artifacts support this conclusion.

Hearth Two. A round, ashy depression in the center of Structure 3 was excavated as Hearth 2. The fill was extremely ashy and a uniform very dark gray (10 YR 3/1) throughout. It appears that the lining of this feature had been burned, and the color of this area was 7.5 YR 5/2. The shape was irregular, but the dimensions were approximately 75 cm (diameter) by 20 cm (depth). The only artifacts recovered from the hearth were a few pieces of bone and quantities of charcoal.
42Da690 Structures 1 and 2 and activity area 1

Test trench 1

6870±70 BP

Structure 1

5830±50 BP

Activity area 1

12 meters to Structure 3

- Rocks
- Ground stone
- Mano
- Limit of excavation
- Inferred structure limit
Profiles of 42Da690 structures and activity areas.

SW-NE profile of Structure 1, Activity Area 1, and Structure 2

N-S profile of Structure 2

N-S profile of Structure 3 and Activity Area 2

Feature Map 1.27. Profiles of 42Da690 structures and activity areas.
Activity Area 2
Just north of Structure 3 another focus of cultural activity was noted, identified as Activity Area 2. This area was characterized by a continuation of the cultural fill and hardened soil found in Structure 4, and contains 2 hearths and 1 pit. The artifact assemblage is similar to that found within Structure 3, but with a slightly lower density of bone and charcoal. This area is considerably separate from Structure 3 for two reasons. First is the linear nature of feature distribution across Structure 3 and Activity Area 2. Second is the groupings (three features clustered to the north, one central hearth in an approximately circular area to the south). Both the linearity and the clustering of features suggest interpretation as two distinct features.

Heart 3
This feature was originally identified as an ash pit in Activity Area 2 in unit 3N E. The perimeter of Heart 3 was irregular. Heart 3 was roughly basin shaped, ranging 80-90 cm in diameter, and approximately 20 cm in depth. The fill was ash and hemocongous dark brown (7.5 YR 4/2). Only a few pieces of charcoal were found within the hearth. Just above the hearth, a large bone lay on a rock that rested on the hearth fill. One charcoal sample (FS-138) from this hearth was submitted for radiocarbon dating in August of 1997 to test an inference that this structure and activity area dated to the same time period (Middle Holocene). Early Archaic as the feature first identified during excavation of Test Trench 1. Charcoal from this feature returned a date of 6310 B.P. (Table 4.35). Pollen sample FS 90 from this hearth contained only 636 grains/g total pollen concentration. This was based on a pollen sum of only 22 grains. Pinus (203 grains/g) was very low with small amounts of Quercea, High-spine Asteraceae, Artemisia (29 grains/g each), Chen-o-am (203 grains/g), and high amounts of Low-spine Asteraceae (116 grains/g).

Heart 4
Another ash pit was located at the north end of Activity Area 2, straddling the line between units 5N E and 5N W. Excavation of this stone yielded Heart 4, a round depression with a diameter of approximately 65 cm and a steep basin-shaped profile reaching a maximum depth of 25-30 cm. The fill was an even, dark, ash, and yellow. The walls and floor of this hearth had not been significantly prepared. A lightly used mantle located approximately 20 cm above the floor of the pit appears to have rested on the original ground surface, as it overhangs the pit. This hearth contained a small number of flakes and some charcoal, but the most common material was burned small animal bone.

Table 4.7
A gray stained area was excavated in the center of Activity Area 2, occupying the southwestern quarter of 4N E. Pit 7 was a roughly circular depression approximately 65 cm in diameter. The pit was approximately 20 cm in depth, with the lip 20 cm below surface. One projectile point (FS-44) was collected on the lip of this depression, and several pieces of bone from pit fill. The east wall was fairly vertical, but the west wall was more basin-shaped. Fill was gray and ash, but the pit did not appear to have burned. Little of the bone it produced was burned. Bone fragments may have been removed.

Cultural Materials
Chipped Stone Debitage
The most common lithic material in the assemblage from 42Da690 is debitage. The excavation yielded 571 pieces including Uinta quartzite, Sheep Creek quartzite, Tiger chert, Dutch John chert, moss agate, and a few unknown material types. Table 4.36 lists the quantity and percentage of flakes recovered by flaking stage and material type. Tiger chert and Sheep Creek quartzite dominate this assemblage.

<table>
<thead>
<tr>
<th>Material</th>
<th>Primary</th>
<th>Secondary</th>
<th>Tertiary</th>
<th>Shatter</th>
<th>Total</th>
<th>% Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flakes</td>
<td>22.34%</td>
<td>23.2%</td>
<td>17.0%</td>
<td>13.5%</td>
<td>64.4%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Cherts</td>
<td>8.0%</td>
<td>10.4%</td>
<td>9.2%</td>
<td>9.6%</td>
<td>37.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Clefts</td>
<td>2.0%</td>
<td>2.0%</td>
<td>2.0%</td>
<td>2.0%</td>
<td>8.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Quarters</td>
<td>3.0%</td>
<td>3.0%</td>
<td>3.0%</td>
<td>3.0%</td>
<td>12.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Total</td>
<td>27.0%</td>
<td>26.0%</td>
<td>26.0%</td>
<td>26.0%</td>
<td>105.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table 4.36: Debitage from 42Da690; final column lists material quantity and percentage of total.

The two most common types of lithic material at this site are non-local. Quarries for Dutch John chert and Uinta quartzite are located at least one kilometer of the site, but combined they only make up 17% of the debitage. It is thought that these two materials were not collected as cobblets along the nearby Green River, thus the significant amounts of early stage debitage for that material. Dutch John chert also shows a predilection for high percentage of primary and secondary stage debitage, while the non-local's abundance in the tertiary category. Sheep Creek quartzite and Tiger chert were imported from 25-50 m (20-30 miles) away, and more reduction is required for these non-local materials before and during transport.

Procurement of non-local materials could have occurred through trade or by direct acquisition. Given the mobility of Early Archaic groups and the ubiquity of trade, these options are not mutually exclusive. The relatively high quantities of non-local materials further support the notion this site was occupied only episodically during this time period, so the paucity of substantial superstructural remains is not unexpected. The high ratio of tertiary to primary flakes for Uinta quartzite seems unusual given the proximity of the site to a quarry. This could be due to the difficulty of identifying Uinta quartzite cortex on archaeological samples, an Archaic preference for processing this material at the quarry site, or the fact that Uinta quartzite is often outlined as the cortex on Dutch John chert, and may be a by-product of Dutch John chert reduction during tool making.

Chipped Stone Tools
Table 4.37 outlines the chipped stone tool assemblage from 42Da690, by surface collection, structure, and activity area.

<table>
<thead>
<tr>
<th>Artifact Type</th>
<th>FS #</th>
<th>Location</th>
<th>Material</th>
<th>Length</th>
<th>Width</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flake</td>
<td>174</td>
<td>Surface</td>
<td>Tiger chert</td>
<td>4.3</td>
<td>0.3</td>
<td>egg shaped</td>
</tr>
<tr>
<td>Flake</td>
<td>163</td>
<td>Surface</td>
<td>Tiger chert</td>
<td>2.1</td>
<td>0.2</td>
<td>rounded end of thick flake</td>
</tr>
<tr>
<td>Flake</td>
<td>163</td>
<td>Surface</td>
<td>Tiger chert</td>
<td>2.5</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>Flake</td>
<td>164</td>
<td>Surface</td>
<td>Dutch John chert</td>
<td>2.2</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>Flake</td>
<td>162</td>
<td>Surface</td>
<td>Tiger chert</td>
<td>6.3</td>
<td>1.1</td>
<td>roughly finished, polished lectures</td>
</tr>
<tr>
<td>Pit Fill</td>
<td>166</td>
<td>Test Trench 1</td>
<td>Soil, Dutch John chert</td>
<td>0.0</td>
<td>0.4</td>
<td>Midland? no edge grinding</td>
</tr>
<tr>
<td>Structure 1</td>
<td>162</td>
<td>Surface</td>
<td>Tiger chert</td>
<td>0.0</td>
<td>0.4</td>
<td>Midland? no edge grinding</td>
</tr>
<tr>
<td>Structure 2</td>
<td>163</td>
<td>Surface</td>
<td>Tiger chert</td>
<td>0.0</td>
<td>0.4</td>
<td>Midland? no edge grinding</td>
</tr>
<tr>
<td>Structure 3</td>
<td>164</td>
<td>Surface</td>
<td>Tiger chert</td>
<td>0.0</td>
<td>0.4</td>
<td>Midland? no edge grinding</td>
</tr>
<tr>
<td>Structure 4</td>
<td>165</td>
<td>Surface</td>
<td>Tiger chert</td>
<td>0.0</td>
<td>0.4</td>
<td>Midland? no edge grinding</td>
</tr>
<tr>
<td>Structure 5</td>
<td>166</td>
<td>Surface</td>
<td>Tiger chert</td>
<td>0.0</td>
<td>0.4</td>
<td>Midland? no edge grinding</td>
</tr>
<tr>
<td>Structure 6</td>
<td>167</td>
<td>Surface</td>
<td>Tiger chert</td>
<td>0.0</td>
<td>0.4</td>
<td>Midland? no edge grinding</td>
</tr>
<tr>
<td>Structure 7</td>
<td>168</td>
<td>Surface</td>
<td>Tiger chert</td>
<td>0.0</td>
<td>0.4</td>
<td>Midland? no edge grinding</td>
</tr>
<tr>
<td>Structure 8</td>
<td>169</td>
<td>Surface</td>
<td>Tiger chert</td>
<td>0.0</td>
<td>0.4</td>
<td>Midland? no edge grinding</td>
</tr>
<tr>
<td>Structure 9</td>
<td>170</td>
<td>Surface</td>
<td>Tiger chert</td>
<td>0.0</td>
<td>0.4</td>
<td>Midland? no edge grinding</td>
</tr>
<tr>
<td>Structure 10</td>
<td>171</td>
<td>Surface</td>
<td>Tiger chert</td>
<td>0.0</td>
<td>0.4</td>
<td>Midland? no edge grinding</td>
</tr>
<tr>
<td>Structure 11</td>
<td>172</td>
<td>Surface</td>
<td>Tiger chert</td>
<td>0.0</td>
<td>0.4</td>
<td>Midland? no edge grinding</td>
</tr>
<tr>
<td>Structure 12</td>
<td>173</td>
<td>Surface</td>
<td>Tiger chert</td>
<td>0.0</td>
<td>0.4</td>
<td>Midland? no edge grinding</td>
</tr>
<tr>
<td>Structure 13</td>
<td>174</td>
<td>Surface</td>
<td>Tiger chert</td>
<td>0.0</td>
<td>0.4</td>
<td>Midland? no edge grinding</td>
</tr>
<tr>
<td>Structure 14</td>
<td>175</td>
<td>Surface</td>
<td>Tiger chert</td>
<td>0.0</td>
<td>0.4</td>
<td>Midland? no edge grinding</td>
</tr>
</tbody>
</table>

Table 4.37: Chipped stone tools from 42Da690.
Non-Chipped Stone Tools

Table 4.38 outlines the non-chipped stone tool assemblage from 42Da690, tabulated by surface collection, structure, and activity area.

Metates from this site are generally thin, with an exception being FS-108.2 and show relatively light wear. Basin metates were recovered from two of the structures and one activity area. All slab metates were most common. Single hand manos were ubiquitous.

Fossil Materials

The fossil remains from the site consist of 819 (mostly small and fragmentary) bone specimens. As listed in Table 4.39 on page 187, these include the distal portion of one humerus from a juvenile porcupine (Erethizon dorsatum) and a portion of a molars believed to come from a bovid or a mountain sheep. Small animals such as cottontail (Sylvilagus sp.), rabbit (Lepus sp. and Leporidae gen. sp.) and undentifiable small mammals (80 pieces) make up just under 10 percent of the collection.

Medium-large mammals (401 pieces) make up the largest portion of the assemblage, nearly 50%. When the medium, large, and medium-large mammal categories are combined, the sum (550 pieces) is 67% of the total fossil bone. Medium to large mammals are typically artiodactyls such as elk, deer, antelope and mountain sheep. In fact, 37 artiodactyl elements were identified, 35 in the medium mammal and 2 in the large mammal category. The only artiodactyl remains identified beyond this level are five pieces attributed to deer (Odocoileus sp.), but given the fragmentary nature of most of the specimens, this does not preclude the presence of other genera. The use of 1/4 inch mesh for screening may have selected against some types of bone, particularly small rodents and lagomorphs.

Burned bone (418 pieces) accounts for approximately 52% of the assemblage. One undentified long bone of a large mammal displays possible cut marks. Two bones, the long bone of a small-medium mammal and an undentifiable bone fragment, have been polished. The latter has also apparently been shaped.

Table 4.38. Non-chipped stone tools from 42Da690.
Illustration 4.30. 42Da690: Single handed manos, FS-9 (Top) and FS-11.1 (Bottom).

Illustration 4.31. 42Da690: Slab mosaic fragment, FS-96.1 (Top) and chopper, FS-47 (Bottom).
Plant Remains

Pollen samples Pit 2 (Activity Area 1) and Pit 7 (Activity Area 2) were analyzed by Holloway (Appendix One). The sample from Pit 2 contained Pinus (pine) in trace amounts, with low amounts of Picea (grass) and Chenopods (goosefoot, pigweed). Low-spine Asteraceae (ragweed, cocklebur) was high, with small amounts of Artemisia (sagebrush). The Pit 7 sample contained very low Pinus, with small amounts of Picea, High-spine Asteraceae (sunflower, rabbitbrush, Artemisia, and Chenopods), and high amounts of Low-spine Asteraceae.

A sample (FS 80) from Structure 1 (Cummings, Appendix Two) exhibits relatively high Pinus pollen and relatively low Artemisia and Juniperus (juniper) pollen in comparison with other Dutch John samples Cummings analyzed, and a small amount of Quercus (oak) pollen, suggesting the local woodland may have been somewhat wetter with more mountain brush than today. Recovery of small quantities of Picea (spruce) and Pseudotsuga (Douglas fir) pollen reflect arboresal transport of spruce and Douglas fir growing either on north facing slopes or at higher elevations. Presence of Cypreaceae, Stephia dix argentea, and Liguistiome (rodoc, Silver buffaloberry, and dandelion) in the pollen sample suggest that during the period of dated use at 42D690, relatively wet microenvironments at Dutch John were more extensive than today. Pinus pollen indicates the presence of one or more pine species. Sarcobatus (grasewood) pollen in this sample is not inconsistent with a wetter, or even some-hat cooler environment than today. Sarcobatus prefers more alkaline conditions than sagebrush, not necessarily drier or warmer conditions (Goodrich 1999, personal communication). Recovery of Opatua (prickly pear cactus) pollen from the fill in Structure 1 suggests cactus parts may have been processed within, since this pollen typically does not travel far from the plant.

Eight flotation samples were taken from this site. Structure 1 produced conifer and Pinus charcoal. More than 95% of the material from this sample was uncharred. Pit 8 also contained only conifer and Pinus with more than 99% uncharred material. Hearth 2 produced 95% uncharred material including conifer and Pinus charcoal as well as two charred Juniperus seeds. Another charred Juniperus seed was found with conifer and Juniperus charcoal in a 95% uncharred sample from Hearth 2. Nine Juniperus seed fragments and Juniperus twigs were found along with a few conifer charcoal fragments in Pit 5. This sample contained more than 95% uncharred material. Unidentified charcoal fragments and more than 99% uncharred material were also located in samples from Pit 3, Pit 6 and an additional sample from Structure 1.

Summary

The projectile points and radiocarbon dates place the occupations at this site solidly within the Early Archaic period. This site consists of at least 3 temporary structures, and at least 2 adjacent activity areas. Some ground preparation is apparent from the form of these structures. The floor of Structure 3 appeared to have been cut into the slope of the hill, and Structure 2 was constructed over an apparently excavated depression. Limited superstructural remains were identified. Several pits and hearths containing relatively low quantities of artifacts were identified within and near the structures. Groundstone, much of it showing heavy use, is relatively abundant at this site.

The primary activity at this site seems to have been the procurement and processing of game. While some unusual elements appear (e.g., porcupine humerus), the focus seems to be on medium to large artifacts, with some emphasis on rabbit and hare. The presence of ground stone and the type of arrow suggest that plant foods were collected and processed, but sparse macrofossil and pollen remains limit interpretation of the extent or character of plant use.
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Table 4.39. Faunal remains from 42Da690.
42DA693 is located at an elevation of 1979 m (6490 feet), on the shoulder of a ridge at the base of Dutch John Bench. The site is on outcrops of Uinta quartzite, covered in Colorado pinyon and Utah juniper with sparse grasses and sagebrush.

42DA693 was identified by a Forest Service crew in May of 1995, during the Dutch John Privatization Survey. The site was determined to be eligible for the National Register due to the presence of slab-lined features, which suggested depth. The site was measured at 30 by 150 meters. Surface finds included 2 bifaces and 2 projectile points; the bifaces and 1 projectile point fragment were collected. At least three separate surface concentrations of debitage containing a few hundred flakes of Tiger chert, Sheep Creek quartzite, and Uinta quartzite were identified. The site is a widely dispersed lithic scatter on the Dutch John Bench and spreading up a drainage. The features are located between two parallel rock outcrops.

An Oakfield soil probe was used to locate the edges of the slab lined basins. Four slab-lined basins were excavated, taking out halve first and stabilizing the stone lining walls that were encountered. All cultural deposits at this site appear to have been removed as a result of these excavations.

The main features were Archaic slab-lined basins, probably used to process plant materials in the spring and early summer.

**Overview**

Testing began in October of 1995, and work continued intermittently until September of 1996. The 4 slab-lined basins were excavated individually, using datum placed near each. Materials recovered were sparse, and include 2 bifaces and 1 projectile point fragment from the surface, 3 pieces of debitage, 1 piece of fragmentated bone, and 1 single handed mano.

**Feature Descriptions**

**Slab-lined Basin 1**

Basin 1 was the western basin. It was excavated by taking out the east side first. This basin measured 74 cm in diameter n-s at the top, 26 cm in diameter on the stone lined bottom, and was 31 cm in depth. Pinyon nuts and fire cracked rock were noted just below the surface. Level 1 fill was light orange-brown sandy soil 8 - 12 cm in depth. This level yielded 3 pieces of debitage. Level 2 was black, more compact, sandy cultural fill 19-23 cm in depth. The fill in this feature was remarkably darker than that in Basin 2. A pollen sample from Level 2 in Basin 1 analyzed by Paleo Research labs revealed elevated Pinyon (pines) frequency, moderate juniper (jumper), and moderately large Artemisia (sagebrush), suggesting a pine woodland with juniper and with considerable sagebrush. Trace amounts of Quercus, Acer, Picea and Opusena were identified, suggesting the minor presence (or upwind location) of oak, maple or box elder, and spruce, as well as the presence of prickly pear cactus. A carbon sample from this feature dated to the Archaic period (Table 4.40). One piece of fragmentated bone was recovered adjacent to this basin.

**Slab-lined Basin 2**

Basin 2 was located 1 m east of Basin 1. The east half of this feature was removed first. Level 1 was a light orange-brown sandy soil 15 - 22 cm in depth. Level 2 was a dark brown sandy cultural fill 14-30 cm in depth. The floor was dark black.
extremely compacted sandy soil. A tabular stone 7 cm in thickness by 32 cm in width separated Levels 1 and 2. Basin 2 extended 38 cm below surface. It was 80 cm in diameter n-s at the top and 54 cm in diameter at the stone lined bottom.

Plate 4.42. Slab-lined basin 2, view S.

Slab-lined Basin 3

Basin 3 was located 47 meters east of Basins 1 and 2. The entire basin was lined with stones. It was 72 cm in diameter at the top and 40 cm at the bottom by 32 cm in depth. It had two levels of fill. Level 1 was a very hard light to medium reddish-brown soil ranging from 6-24 cm in depth, deepest centrally. Level 2 was a dark grayish brown cultural soil 7-24 cm in depth.

Slab-lined Basin 4

This basin was located approximately 35 m northeast of Basin 3. The eastern half was dug first. Charcoal was encountered at 25 cm below the surface. Fill was dark ash soil, with sparse pieces of carbon. Fill consisted of just one level, but a diagonal layer of grey soil 5-10 cm thick ran top to bottom, cutting through the fill. This basin contained fire cracked rock.

Basin 4 was lined with closely fitted stone slabs on the sides and bottom. It measured 27 cm from ground surface to the stone lined bottom surface. The rock slabs protruded as much as 20 cm above the present day ground surface. The diameter was 50 cm at the top, and approximately 33 cm at the bottom. A rock lay horizontally in the fill in the center of the basin.

A carbon sample from this feature was dated to the Archaic period by radiocarbon analysis (see Table 4.40).

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Table 4.40. Radiocarbon dates from 42Da693.
Feature Map 4.29. 42Da93 Slab-lined basin 2.

Feature Map 4.30. 42Da93 Slab-lined basin 3.
Cultural Materials

Cultural materials collected from this site include 3 pieces of debitage, 1 projectile point, 2 biface fragments, and 1 single-handed mano.

Chipped Stone Debitage
A total of 3 flakes were recovered from the excavation at this site, and all were in Level 1 of Basin 1. Of the debitage, 2 were tertiary flakes of Sheep Creek quartzite and 1 was a tertiary flake of Tiger chert.

Chipped Stone Tools
The chipped stone tool assemblage recovered at 42Da693 was comprised of 1 projectile point and 2 biface fragments. All were recovered from the surface.

The projectile point fragment was a midsection made of variegated white chalcedony, which had been pressure flaked with a lentilicular cross-section. It measured 1.9 cm in width and 0.4 cm in thickness.

Both biface fragments were made of Tiger chert. One was best fractured, had been pressure flaked and had a lentilicular cross-section. It measured 0.5 cm in thickness. The second fragment was pressure flaked with a lentilicular cross-section, and measured 0.3 cm in thickness.

Non-Chipped Stone Tools
One single-handed mano of Uinta quartzite was located in the eastern area of the site. The mano was rounded in shape with an oval profile and flattened faces. Both of the faces showed heavy abrasion and extensive dimpling, indicating concentrated usage.

Fossil Materials
One fragment of a large mammal bone was discovered adjacent to Basin 1. The bone lacked any indication of human alteration such as burning or cut marks.

Plant Remains
Analysis of a soil sample from Basin 1 (dated 4100 BP) revealed conifer and Pinus (pine) charcoal and conifer wood. A piece of caramelized charcoal was also noted. A flotation sample from undated Basin 2 was 99% uncharred and contained only small, undistinguishable charcoal fragments. A flotation sample from undated Basin 3 revealed conifer charcoal, 1 charred Juniperus (juniper) seed, and 9 bone fragments, including some that were mineralized. Conifer and Pinus charcoal were found in the flotation sample from Basin 4 (dated 4100 BP).

Holloway (Appendix One) analyzed a pollen sample (FS-18) from the bottom of Basin 3 as containing moderate amounts of Low-spike Asteraceae (ragweed, cocklebur), very low amounts of Pinus, and small amounts of Juniperus, Poaceae (grass), Chenopodi-ans (goosefoot, pigweed), and Artemisia (sagebrush).

Cummings (Appendix Two) found a sample (FS-14) from Basin 1 to exhibit elevated Pinus and moderately large Juniperus and Artemisia (sagebrush) frequencies, suggesting the site was in a pinyon-juniper woodland with sagebrush clearings at 4100 BP. Low Chenopodi-ans (pigweed, goosefoot) frequency argued against processing these taxa. Presence of Opiunc (prickly pear cactus) pollen suggested plant parts from that economic taxon may have been processed in this basin.

Summary
The radiocarbon dates obtained for this site place it in the Archaic period, which appears to be typical of slab-lined basin sites at Dutch John. Basin 4 at the northeast end of this site was dated to 4110 BP in August of 1997. As part of an effort to test an inference that slab-lined basins at a site would tend to share tight temporal associations clustering in the Archaic period, a sample from Basin 1 at the east end of the site (and one of two adjacent basins) was submitted in August of 1999, and returned a date of 4100 BP. The 14C midpoint dates of these two basins differ by 10 years.

These basins were probably used as ovens for roasting plant materials. A sparse cultural material assemblage is typical at Dutch John slab-lined basin sites, and supports the interpretation that these were primarily plant processing areas with only brief, although possibly periodic utilization. Chapter Seven includes additional information about slab-lined basins.
Overview

42Da696 is a rockshelter located at an elevation of 1963 m (6440 feet), at the base of a boulder field near the top of a knoll located on the north edge of Dutch John Bench. The site area is currently covered in Colorado pinyon and Utah juniper. Large boulders and cliffs surround much of the site, and a steep slope drops from the rockshelter to the highway. The ground surface is covered in pine duff with light soil deposits. The area is erosional, with shallow soil on colluvial mantled steep slopes with abundant bedrock.

42Da696 was identified by a Forest Service crew in April of 1995, during the Dutch John Privatization Survey. The site was determined to be eligible for the National Register because two 25 cm test pits revealed the presence of subsurface deposits in the large rockshelter, and additional deposits were strongly suspected. The site was measured at 70 by 30 meters. The rockshelter measured approximately 5 by 4 meters. The area has been extensively utilized by local youth dating as far back as the 1950s. Names and other comments had been sprayed painted on the back wall of the rock shelter, and a large number of soft drink bottles and pop-top cans were scattered in and near the shelter. A 1946 penny and quarters dating 1965 and 1976 were found at the site. A dirt backspile, a rock alignment, and a rough log wall across the front of part of the rock shelter were all attributed to this recent use by locals, but some disturbance at the site made it impossible to determine whether the stained soil was due to recent or prehistoric activity. A series of small cairns had also been constructed along a trail that led to the site. Again it was not possible to determine any affiliation for these features.

The surface artifact assemblage at the site included 13 flakes, 1 core, 1 scraper, and a large amount of recent trash. One of the 23 cm test pits revealed a layer of charcoal 2-3 cm below the surface, which was suspected to be the result of relatively recent activity. The other test pit yielded flakes, a core and a layer of charcoal 10 cm below the surface. The presence of these materials at a deeper level was reason to suspect that there were intact cultural deposits below the historic disturbance. All areas with soil depth or evidence of possible sties were tested with an Oakfield soil probe. The only area that appeared to contain buried cultural deposits was the rockshelter. A 5 by 3 meter, D shaped area was excavated within the rockshelter. All cultural remains were removed from the interior of the shelter. An effort was made to test for cultural material outside the shelter mouth, but excavations encountered abundant large rock fall and nebulous cultural material. It was decided that nearly all buried deposits at this site had been removed.

The site is a multicomponent site with evidence of Late Archaic, and possibly Fremont occupation. Radiocarbon dates suggest Late Archaic occupation, one radiocarbon date and Rose Spring points suggest Fremont use, and Desert Side-notch points suggest Late Prehistoric, possibly Shoshonean use of the site. The rockshelter may have been used as a temporary hunting camp. The slab-lined basin in the rockshelter is atypical for Dutch John, where all other identified slab-lined basins were constructed in the open.

Excavation Strategy

In September of 1996 crews excavated this site using a grid and base lines established by transit. The primary datum was placed on the southwest edge of the shelter. A one meter grid system was established inside the shelter, and 14 squares were excavated. All excavations at the site occurred in this main area. The units were excavated in arbitrary 10 cm intervals until features were located. Features were removed separately, after each was profiled.

Only two cultural levels were noted at the site. The first level was 5-10 cm deep and consisted of a mixed zone of quartzite cobbles and pebbles, pine needle duff, sin caus, broken glass, coins, and other recent trash. A large amount of charcoal was also noted in this upper level. Below this level the soil was a grayish sand, within which the prehistoric features were located. The number of features and amount of protruding bedrock made this level very irregular and at times patchy.

The excavations yielded 7 features including 1 slab-lined basin, 3 hearths and 3 pits. Materials recovered include 9 projectile points, 5 bifaces, 1 drill, 1 scraper, 1 chopper, 1 pecking stone, 288 pieces of debitage, and 102 bone fragments.
Feature Descriptions

Slab-based basin
A large slab-based basin was found in 4N 2E near the front of the shelter. It was encountered only 3-5 cm below ground surface. A tremendous amount of charcoal was encountered inside this feature. This basin was 47 cm deep, 78 cm in diameter n-s by 60 cm in diameter e-w, but narrowed considerably towards the bottom. Many of the slabs forming the perimeter of the hearth were oxidized. Slabs seem to be missing from the northwest corner of this feature, and abundant charcoal was found in shallow depressions adjacent to the primary feature. No differentiation could be determined for the basin fill and this outside area so they were collected together. However, this adjacent area may represent a later use near the basin. One radiocarbon date was run with the charcoal recovered from the basin fill (see Table 4.41). A mid-range of 35 BC was provided by this sample. This corresponds to the time range of the Elko point found at the site and may represent the earliest occupation of the rockshelter.

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Table 4.41: Radiocarbon dates from 42Da696.

Hearth 1
Hearth 1 was a basin shaped feature with an irregular outline, encountered in the southeast corner of 4N 2E. This feature was about 30 cm in depth, 75 cm in diameter n-s by 85 cm e-w. It was encountered at 10 cm below the ground surface. Most of the fill was a dark ashy material that contained abundant charcoal. A thin layer of light gray ash 2-5 cm in thickness was found near the bottom of the feature. Portions of the floor of this feature were red, fire baked soil and fire cracked rocks. A radiocarbon date (Table 4.41) of AD 225 was obtained from the charcoal in this feature.

Hearth 2
This hearth was an oval, basin shaped stain in 6N 3E. The feature was located 10-13 cm below the surface and was 8 cm in depth. It measured 45 cm n-s in diameter by 30 cm e-w. The feature yielded a large quantity of charcoal and a single flake.

Hearth 3
Hearth 3 was an asymmetrical teardrop shaped stain with a very irregular bottom, located in 5N 3E. The hearth measured 64 cm in diameter n-s by 74 cm e-w. It was located 7 cm below the surface and measured 13 cm in depth at its deepest point. A significant amount of charcoal and a few pieces of burnt bone were recovered from this feature.

Pit 1
Pit 1 was a D-shaped basin feature. It was located in the back of the shelter at 5N 1E at a depth of 12 cm below the surface. A large bedrock slab truncated this feature, resulting in the D shape. The feature appeared to have been built against the rock. This pit measured 56 cm n-s by 85 cm e-w and was 30 cm in depth. The fill was a dark cultural soil with some charcoal flecks. Dense charcoal concentrations were noted in pockets on the east side of the pit. A radiocarbon date (Table 4.41) of AD 405 was obtained from charcoal in this feature.

Pit 2
Pit 2 was an irregular shaped stain found just below the surface in 4N 4E. It appeared to contain stratified fill, and was excavated to a total depth of 44 cm. An upper level of gray ashy sand was removed to a depth of 26 cm below the surface. Below this a light orange brown sandy level was encountered. In the southern half of the pit, under the rock that covered part of the feature, was a circular area of dark brown sandy soil beginning 20 cm below the surface. This circular area was 16-20 cm in depth. The upper level in this feature may represent a recent fire created by the local youth.
42Da696 Slab-lined basin

Plan view

A A'

(43 cm below secondary datum)

Limit of excavation

W-E profile

42Da696 Slab-lined basin

Cultural Materials

Chipped Stone Debitage

The most common artifact type in the assemblage from 42Da696 is debitage. The excavation yielded 288 pieces, which are Dutch John chert, Tiger chert, Uinta quartzite, moss agate, Sheep Creek quartzite, and a few unknown material types. Table 4.43 lists quantity and percentage of debitage recovered by flaking stage and material type. Uinta quartzite, Dutch John chert and Tiger chert are the most common materials.

| Primary     | Secondary | Tertiary | Stems | Blade | Total (%)
|-------------|-----------|----------|-------|-------|-----------
|             |           |          |       |       |           |
| 15 (4%)     | 10 (15%)  | 29 (46%) | 9 (14%)| 63 (22%)|           |
| 5 (09%)     | 1 (02%)   | 50 (89%) | 0 (00%)| 56 (19%)|           |
| 1 (01%)     | 4 (07%)   | 108 (22%)| 4 (05%)| 117 (40%)|           |
| 0 (00%)     | 0 (00%)   | 0 (00%)  | 2 (100%)| 2 (01%) |           |
| 6 (19%)     | 7 (22%)   | 18 (50%) | 3 (09%)| 38 (11%)|           |
| 0 (00%)     | 0 (00%)   | 1 (00%)  | 0 (00%)| 1 (03%) |           |
| 4 (24%)     | 1 (06%)   | 10 (59%) | 2 (12%)| 17 (06%)|           |

Table 4.43. Debitage from 42Da696: final column lists material quantity and (%) percentage of site total.

It is not surprising that Uinta quartzite is common at this site since a quarry for this material is located 100 meters southwest of this site. What is unexpected is the small amount of cortex on Uinta quartzite at the site. With a quarry so close, more preliminary reduction and initial work would be expected, and occurs for the Dutch John chert. The single piece of obsidian debitage, from the surface level in 6N 3E, was sourced to Topaz Mountain in central Utah (Hughes 1997).

Chipped Stone Tools

The chipped stone tool assemblage recovered at 42Da696 is comprised of 9 projectile points, 5 bifaces, 1 drill, 1 scraper, 1 chopper, and 1 pecking stone.

Projectile Points

Of the 9 projectile point fragments recovered, 7 were complete enough to classify. Only one was a spear point. Four of the arrow points appeared to be Desert Side-notch points.

FS-11.1, recovered in 6N 3E, was a Desert Side-notch Sierra subtype of Tiger chert, missing the tip. It was finely parallel oblique pressure flaked, measuring 1.2 cm in width and 0.2 cm in thickness, with a lenticular cross-section.

FS-19.1, recovered in 6N 1E, was a tip of a finely pressure-flaked point made of tan moss agate. It exhibited considerable heat damage, with six post-flaking fractures. The base was subconvex and the cross-section lenticular. The point measured 1.6 cm in width and 0.4 cm in thickness.

FS-21, recovered from hearth 3 in 3N 3E, was an Elko Corset-notch of tan Sheep Creek quartzite. Most of the blade was missing. The base was convex and the cross-section plano-convex. It measured 2.0 cm in width and 0.5 cm in thickness.
FS-22, recovered from SN 1E, was a Desert Side-notch Sierra subtype of Tiger chert, missing the tip. It was parallel oblique pressure flaked with a plano-convex cross-section. It measured 1.6 cm in width and 0.4 cm in thickness.

FS-22, recovered in SN JE, was a fragment of a Rose Spring Corner-notch point of Sheep Creek quartzite. It was missing the stem, part of one shoulder, and most of the blade. It was pressure-flaked with a lenticular cross-section that measured 0.1 cm in thickness.

FS-41, recovered in SN JE, was an unfinished projectile point of Sheep Creek quartzite. It was roughly triangular in shape with one curved side. There was no flaking on the curved side. It had small side notches and an asymmetrical convex base. The pressure-flaked sides were thick.

**Other Stone Tools.** FS-5, recovered from the slab-lined basin in 4N 3E, was a complete drill made of Tiger chert. It measured 3.8 cm long, 2.3 cm wide, and 0.35 cm in thickness. The cross-section is lenticular.

FS-11.2, recovered in 4N 3E, was a percussion flaked triangular biface fragment of Uinta quartzite, missing part of base. The edges near the tip were ground, and it may have been hafted after breaking. The cross-section was lenticular. This biface measured 6.1 cm in length and 0.9 cm in thickness.

FS-12-1 was a chopper or large scraper of Uinta quartzite with Dutch John chert inclusions. It was roughly rectangular, and one edge was thinned by percussion flaking. There was inuse on the thinned side. The cross-section was lenticular. This tool measured 10.9 cm in length, 5.6 cm in width, and 2.3 cm in thickness.

FS-12-2, recovered in 4N 4E, was a chopper/pecking stone made from a quartzite river cobbble. One end was pecked and the opposite end had flaked removed to form a chopper. It measured 8.3 cm in length, 6.3 cm in width, and 2.7 cm in thickness.

FS-13, recovered from Hearth 1 in 4N 2E, was an ovate scraper of orange Sheep Creek quartzite with a biconvex cross-section. It appeared to have use surfaces on both ends, and may have been hafted in the middle. The two pressure-flaked ends showed inuse. It measured 2.7 cm in length, 4.3 cm in width, and 0.8 cm in thickness.

FS-15 was a biface edge fragment of black Tiger chert. One side was finely pressure-flaked. It measured 0.5 cm in thickness.

FS-22-3, recovered in SN 1E, was a percussion flaked biface of Uinta quartzite. It was a rounded trapezoid with a lenticular cross-section that measured 4.0 cm in length, 3.7 cm in width, and 1.1 cm in thickness.

FS-22-4 was a pressure-flaked biface edge fragment of Dutch John chert. It measured 0.25 cm in thickness.

FS-48, recovered from Pit 1 in SN 1E, was a heat fractured biface fragment of percussion flaked Tiger chert. It was triangular in shape, and measured 1.1 cm in thickness.

**Faunal Materials.**

The faunal material from the site consists of 102 small, fragmentized bone specimens. Very few of the mammal bones were identifiable beyond the general class level. Though several bone fragments can be classified within their genus level including, Sylvilagus sp. (cottontail), Spermophilus sp. (ground squirrel), and Ovis canadensis (mountain sheep). Of the 97 mammal bones in the collection, 65 fragments (68%), are classified as medium-large mammals and 32 fragments (32%) are classified as small-medium mammal.

Within the bone collection, at least 2 bones had cutmarks and 14% of the bone collection had been burnt.

**Plant Remains.**

Analysis of a flotation sample from the slab-lined basin (dated 2040 BP) yielded conifer charcoal. A charred Juniperus (juniper) seed and 9 bone fragments were found in a flotation sample from Pit 1 (dated 1660 BP). A flotation sample from Hearth 2 (undated) yielded conifer and Pinus charcoal.

One pollen sample was analyzed. FS-2 was from the eastern half of Hearth 1 (dated 1820 BP). The pollen concentration in this sample was low (540 grains/g). *Pinus* (pine) was very low, with low values for Cheno-ams (grassfoot, pigweed), Highbush

**Summary.**

Samples from the slab-lined basin and Hearth 1 in this rockshelter were submitted for radiocarbon dating in August of 1997, yielding dates of 2040 and 1820 BP, respectively. To better understand the formation of deposits in this rockshelter dating to the Archaeo-Formative (Early Fremont) transition, an additional sample, from Pit 1, was submitted in July of 1999, yielding a date of 1660 BP. The dates from these three features overlap serially in the 2-sigma, but not in the 1-sigma range. A Rose Spring point (FS-22.2) suggestive of Fremont occupation was recovered from the cultural fill in Pit 1. Unfortunately, no other points recovered were specifically diagnostic of the Fremont or the Archaic period. A majority of the points were indeterminate or post-Fremont occupation. The late occupation(s) may not have resulted in construction of features, or may be responsible for one or more of the undated features at this site (Pits 2 and 3, Hearths 2 and 3). Small, Side-notch points indicative of post-Fremont occupation seemed to show some clustering in the north end of the rockshelter.

The presence of Fremont and post-Fremont projectile points and radiocarbon dates in the range 2100-1600 BP indicate this rockshelter has seen occasional occupations over the last 2,000 years. Dating of three constructed features to 2040, 1820, and 1660 BP suggests the main period of occupation was during the Late Archaic-Fremont period transition.

The abundant faunal bone, projectile points, and other chipped stone tools, suggests the shelter was used as a temporary hunting camp. The slab-lined basin is the only basin within the project area built in a rockshelter. No groundstone was reported at this site.
Chapter 5
CLIMATE AND ENVIRONMENT
Clay Johnson

Present Day Climate

Elevation, aspect, and overall topography play major roles in local climate in high relief terrains (Thompson 1990). Dutch John climate results from interaction of these local factors with large scale climatic events in the Middle Rocky Mountains to the north and east, the Colorado Plateau and Great Basin to the south, and the Uinta Mountains to the west. Situated at the east end of the Uinta Mountains, Dutch John lies at the juncture of three physiographic provinces. The east-west trending Uinta Mountains separate the Middle Rocky Mountains to the north and east from the Colorado Plateau and Great Basin to the south. To the north, the climate is that of relatively cloudy, wet winters and dry summers, with a short growing season. On the Colorado Plateau to the south and east winters tend to be dry and summers wet, due to monsoonal flows from the south. In the Great Basin to the south and west, both summer and winter tend to be clear and dry (Peterson 1994:33-38).

Paleoenvironmental studies for the eastern Uinta Mountains are sparse (Spangler 1995:9); there is even less information for the immediate area of Dutch John. Pollen and macrofloral analyses from the Dutch John project may be conservatively interpreted as reflecting little or no climatic change for Dutch John over the most recent 7,000 years. Reconstruction of local paleoclimate in this chapter is thus highly inferential, and based largely on interpretation of variability in the botanical samples as compared to the possible effects of local topography on prevalent patterns for each of the three adjacent climate areas.

The Dutch John paleobotanical data set is comprised of a relatively small number of samples from dated archaeological features. Sampling error and sampling bias, rather than climate change, cannot be discounted as the conservative explanation for any variability. The botanical samples indicate the presence of conifers, sagebrush, and Cheno-ans during the entire 7,000 years. However, plant communities including this mix of species occur today in the Intermountain West from Mexico to Canada, and few would argue that no climate differences exist across that range.

A less conservative interpretation of the Dutch John data is considered worthwhile for two reasons. First, the opportunity to examine the influence on local microclimate of the mountainous terrain, north slope situation, and location on a regional climatic boundary, in terms of 7,000 years of human vision to the four square mile area at Dutch John. Second, bold interpretations, by inviting critical debate, often result in advances less likely where more conservative interpretations are advanced, and uncritically accepted.

Effects of topography on microclimate can be relatively unimportant on the Plains or in the vast intermountain basins to the north and south of the Uinta Mountains. Due to a confluence of topographic and regional climatic factors, these effects are likely to be of considerable importance at Dutch John. The Dutch John project area is located on a roughly east-west trending regional climatic boundary along the Uinta Mountains separating the Great Basin and Middle Rocky Mountain physiographic provinces. Precipitation regimes and season lengths vary considerably between these provinces. At elevations of 1890-1950 meters (6200-6400 feet), Dutch John lies (see Plate 5.1) in a long trough descending west to east through the east end of the Uinta Mountains into Brown Park and Colorado elevations of approximately 1650 m (5400 feet) before the terrain rises to form the Yampa plateau on the Rocky Mountains west slope (see Plate 5.1). Elevations rise to more than 2440 m (8000 feet) to the north before descending into the Upper Green River Basin in southwestern Wyoming. The Uinta Mountains rise to more than 2740 m (9000 feet) to the south, separating the Dutch John area from the Uinta Basin. To the west elevation rises to more than 3660 m (12,000 feet) in the Uinta Mountains. Cold air moving downhill during summer nights and in the winter follows troughs and depressions, resulting in cooler temperatures than on the slopes above or in the flatlands or basins below the mountains. Mountain north slopes are generally cooler, and treelines (elevational extent of tree species range) are generally lower than on south slopes (Betancourt 1990:97). Mountain ranges tend to drain advancing storms of their moisture, resulting in a rainshadow and less precipitation for lands downhill from the storm track. Dutch John climate through time has been subject to the combined effect of all these factors.
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Plate 5.1. Relief map of northeastern Utah.

Present day climate and topography support an Upper Sonoran community of flora and fauna at Dutch John. Rocky outcrops and ridge tops are covered in a mixture of juniper, pinyon, and Ponderosa pine. Steep and springs are active at the foot of the slopes. Today young juniper are advancing into the open area of Dutch John Flat, but this may be replacement of tree cover removed by recent human activity, or result from fire suppression during this century.

The floral community in open areas of clearings, flats, and the bottoms of small stream drainages consists of sagebrush and grass cover. Occasional cottonwood, chokecherry and willow occur in small riparian areas.

Soils on Dutch John Flat are dark gray loamy sand as much as 100-155 centimeters (cm) (40-60 inches) thick, with pedogenic development of carbonates in the B horizon, indicating slow development in a relatively cool, dry environment over a protracted length of time, with mechanical weathering as the dominant mechanism. This suggests a relatively stable, slowly depositional environment (Lutgens and Tarbuck 1951), an inference supported by relatively shallow burial of Dutch John sites. Soils on Dutch John Bench are less well developed, derived primarily from mechanical weathering of the Browns Park formation.

Over some of the area these soils terminate on bedrock. More frequently, soils at excavated sites include a C horizon comprised of reddish or orange sterile sand weathered from bedrock. Dutch John archaeological features typically terminate at this sterile sand. Formation of soils above this C horizon probably began after 9,000 years ago, and followed a slowly depositional regime during most of the time since.

Table 5.1 below summarizes data from five National Weather Service stations in northeastern Utah. The table is compiled from Ashcroft et al. (1992), using Lindsay (1982:4-6) for Manila temperature/frost dates.

The Flaming Gorge weather station is near Dutch John, east of Flaming Gorge reservoir, adjacent to 42Da602. The large volume of water in the reservoir itself may have affected the Dutch John area. The reservoir lies three kilometers (.25 miles) to the west, and prevailing winds are from the west. The reservoir may have created a buffering effect on temperature extremes and somewhat greater precipitation or humidity during the 1965-1992 period. If this is the case, without the reservoir present day Dutch John would experience somewhat less moisture and greater extremes of temperature.

<table>
<thead>
<tr>
<th>station</th>
<th>elevation</th>
<th>coordinates</th>
<th>distance from Dutch John</th>
<th>1965-1992 avg</th>
<th>1952-1990 avg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maeser</td>
<td>1080</td>
<td>40° 33' 0&quot; N</td>
<td>15 miles west of Dutch John</td>
<td>39°F</td>
<td>38°F</td>
</tr>
<tr>
<td>Vernal</td>
<td>4000</td>
<td>40° 18' 0&quot; N</td>
<td>10 miles south of Dutch John</td>
<td>29°F</td>
<td>27°F</td>
</tr>
<tr>
<td>Manti</td>
<td>1700</td>
<td>40° 28' 0&quot; N</td>
<td>5 miles south of Dutch John</td>
<td>35°F</td>
<td>34°F</td>
</tr>
<tr>
<td>Eden</td>
<td>1800</td>
<td>40° 18' 0&quot; N</td>
<td>15 miles north of Dutch John</td>
<td>32°F</td>
<td>31°F</td>
</tr>
<tr>
<td>Young</td>
<td>2200</td>
<td>40° 28' 0&quot; N</td>
<td>15 miles north of Dutch John</td>
<td>30°F</td>
<td>29°F</td>
</tr>
</tbody>
</table>

Unfortunately, there is no data from Dutch John prior to 1952. There are two notable differences between Dutch John data and that for the other listed weather stations. The Dutch John frost-free season begins later and is more than two weeks shorter than at the other stations, and precipitation at Dutch John is relatively evenly distributed throughout the year.

The Manila station is located 24 km (15 miles) west of Dutch John on a broad flat west of Flaming Gorge reservoir. The difference in precipitation between Dutch John and Manila may to some degree reflect an effect of Flaming Gorge reservoir on Dutch John precipitation, although local topography also must play some role.

The Maeser station is located above Vernal, Utah 48 km (30 miles) southwest of Dutch John in upper Dry Fork Canyon on the Uinta Mountains' south slope. Relatively higher precipitation levels here result both from elevation and local topography. Dry Fork canyon shows signs of considerable occupation during Fremont times for several kilometers below this station. The extended growing season at the Maeser station despite its elevation is probably attributable to its location on the Uinta south slope and in a steep walled canyon which may buffer some climatic conditions. Data from the Vernal Airport station 36 km (22 miles) south of Dutch John typifies conditions for valley floor elevations along the south slope of the Uintas. Alcids Ranch is located in Brown Park 24 km (15 miles) east of Dutch John, down the canyon of the Green River, and at approximately 300 meters (1000 feet) lower elevation. Data from Brown Park is similar to that for Vernal Airport.

Most Dutch John sites are within present day pinyon-juniper woodland on footslopes of small rocky ridges. Woodland cover with its attendant mountain brush edge and understory reduces wind velocity and pollen at such sites is thought to reflect primarily the plants present in or immediately adjacent to the site area (Fageri and Iverson 1975). Normal dispersal of nonarboreal pollen is within a few tens of meters of the parent plant; a majority of pollen is deposited within 0.5 km of the source (Bradley 1983:292). Fine grained soils on Dutch John Flat probably have supported shrubs, herbs and grasses since early in the Holocene, while the rocky slopes and ridges supported the tree species present. In relatively and climates, trees usually dominate rocky environments (like the ridges and slopes at Dutch John) through time, regardless of the vegetation on other nearby landforms: this is known as the scarpy woodland effect (Bentancourt 1990:95-100).

Pollen and Macroflora

Use of scientific names and designations for plant taxa conveys more (and more exact) information than use of common names. For example, the taxonomic designation conifer refers to any of the cone and needle bearing trees and shrubs including juniper, spruce, fir, and pine, and conveys the additional information that a more exact determination (to genus and species) was not, or could not be made. The term Pinus refers to any member of the genus Pinus, which includes four different species in the eastern Uinta Mountains: *P. contorta* (Lodgepole pine), *P. edulis* (Pinyon pine), *P. flexilis* (Limber pine), and *P. ponderosa* (Ponderosa pine), whereas *Pinus sabiniana* refers only to one species of pinyon pine. In some cases, only one member of a family or genus may occur; in these cases, the generic name also identifies the species. An example is the genus *Pseudotsuga*, which term herein always identifies Douglas fir.

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Terms with the suffix "aceous" are not italicized, and denote floral families: Asteraceae denotes the Composite family, a large family that includes thistles, sunflowers, daisies, dandelions, sagebrush, rabbitbrush, ragweed, and yarrow. The Low-scape Asteraceae are a subgroup of Asteraceae characterized by pollen spine morphology, and include ragweed, cocklebur, and others. The High-scape Asteraceae, sharing a different pollen spine morphology, include asters, rabbitbrush, snakeweed, sunflowers, and others. The subgroup Laetigerea includes dandelion, Lactuca, and chinny.

The term Chenopods denotes members of two different families (Amaranthaceae and Chenopodiaceae) whose seeds typically cannot be separated in identification from samples in archaeological contexts. These plants (in our area) include those commonly called saltbush, pigweed and goosefoot, and are commonly considered economic species.

Archaeological samples used below in Tables 5.2 (Macrofloral data) and Figures 5.1 (Pollen concentration values from Appendix One) and 5.2 (Pollen diagram from Appendix Two) are from dated features, or from contexts where there is a strong association between a dated feature and the sample, such as an activity area between two dated structures, or a sample from an interior feature of a structure with other dated features.

Archaeological pollen and macrofloral data were discomparing sparse. Macrofloral variability was limited primarily to presence or absence of juniper or hardbrush. "Pollen samples from a majority of the sites had either low pollen counts or high percentages of indeterminate pollen, probably due to the shallow burial of most sites, allowing ground moisture during seasonal cycles of wet and dry to degrade the assemblage (Bradley 1985). Due to the sparse samples results, macrofloral data (Holloway, Appendix One) are tabulated below (Table 5.2) by presence and physical state. A key to abbreviations and symbols is provided below the table.

Pollen concentration values in Figure 5.1 are estimated from the macrofloral data in Appendix One. Pollen concentration values for each category were assigned ranks of 1 (trace) through 6 (very high) for taxa that appear at least in the modern record and at least once in the archaeological record in a dated context. Indeterminate pollen in samples ranged from 2.8% to more than 23% (there was no indeterminate pollen in these samples with extremely low pollen counts). Percentage of indeterminate pollen is characterized in Figure 5.1 assigned numerical values of 1 (< 5%), 2 (< 15%), 3 (<12%), 4 (<16%), 5 (>20%), and 6 (20%).

A modern pollen sample was obtained from a 2500 square meter area of sagebrush flat near the edge of pinyon-juniper woodland (generally representative of the area) at Dutch John in mid-June of 1999. Thirty-five trowel tip samples from within this area to a depth of approximately 2 cm were combined for analysis (Holloway, Appendix One). A broad spectrum of local flora is represented in the modern sample, as would be expected. Chenos- (pigweed, goosefoot, saltbush) concentration is relatively low, typical of Chenos-am concentrations at Dutch John through time. The very high Ficus values for both pine subgenera (is fact, high values in general) may be due in part to gathering this sample in mid-June, when many taxa are producing large quantities of pollen. Absence of Castanea (cactus family) pollen in this modern surface sample is consistent with the fact that cactus pollen is not usually wind-dispersed, and is not expected to occur far from the plants themselves.

Taxa not represented in archaeological samples. ...at Appendix One but present in the modern sample are Abies (fir), Pinus (spruce), and a trace of Acipecas (parley family, bicuscutis) and Solanaceae (nightshade). Fir and spruce are common at somewhat higher elevations west (upwind) of Dutch John and wind to the east (downwind) of arboreal pollen is to be expected. Degradation due to shallow burial probably accounts for lack of these taxa in the archaeological samples. The Acipecas include Cercopis (biscuitroot) and Lomatium (biscuitroot, desert parsley); roots and tubers of both genera are believed to have been economically exploited. The nightshades include several native and a number of introduced species, including a South American introduced species reported in the Dutch John area.

Presence of 4 grains of Quercus (oak) pollen in this sample is anomalous. Oak is not believed to occur naturally in or near the area today. It is possible that a small pocket of Gambel oak survives in a favored microclimate nearby. The most likely explanation is either decorative/landscape planting of oak at Dutch John, or automobile associated long distance transport. Holloway believes the modern sample represents somewhat more woodland cover at Liitch John today than is suggested by the archaeological samples.

![Table 5.2. Macrofloral data.](image-url)
Figure 5.1. Comparative ranking of pollen concentration values from data supplied by Holloway (Appendix One.)

Figure 5.2. Pollen diagrams for four sites.
Paleoclimate

Nearly four decades ago Antevs (1955) suggested a global paleoclimatic sequence that, although oversimplified, still enjoys wide acceptance with some refinements, modifications and name changes. Antevs’ Neothecophy is today called the Holocene; his Anarthrophy, Altithermal, and Medithermal periods are today referred to as the Early, Middle, and Late Holocene respectively (Grayson 1993:208-210).

The following discussion is organized by time period. For each period, an opening paragraph offers a broad overview of climatic change in western North America during the period. A second paragraph introduces regional information from the Great Basin, southwestern Wyoming, Colorado Plateaus, Rocky Mountains, and Uinta Mountains. Subsequent paragraphs discuss Dutch John inferred paleoclimate using the pollen and macrofossil data, topographic considerations, and climate information from surrounding areas.

Seasonality (timing and extremity of change), temperature, and precipitation all play parts in any climate. The interaction of temperature and precipitation results in changes in effective moisture, which is essentially that portion of precipitation actually evaporated; the amount of moisture available after evaporation acts on precipitation. It should be apparent that less precipitation and cooler temperatures can result in effective moisture equal to or exceeding that resulting from greater precipitation and higher temperatures. Effects of these two scenarios are not necessarily separable in the archaeological record.

Late Pleistocene: ending 18,000 BP

In the Intermountain West, vast glacial lakes occupied the basins; glaciers, although already in retreat, dotted many of the mountain ranges until near the end of this period. In the Great Basin, conditions were cool and with more effective moisture than today. After reaching a Late Pleistocene highstand at 18,000 BP Lake Bonneville and other Great Basin lakes began a long retreat, punctuated briefly by a small highstand (the Gilbert, around 11,000-10,000 BP), apparently related to a worldwide period of increased effective moisture and followed by a return to drying conditions (Thompson and Pasteur 1995:100-103). The Colorado Plateau, while warming during this period, was cooler and more effective moisture than today. Tree lines were depressed (species range was lower in elevation) by as much as 1000 m (3300 ft) and tundras prevailed where glaciers had retreated (Currey and James 1984; Thompson 1990:210). Tree lines and plant zones began to rise after 11,000 BP (Thompson et al. 1993). Glaciation in the Uinta Mountains was primarily in the form of valley glaciers, with some relatively high areas remaining unglaciated. The timing and sequence of glacial retreat is unknown, although evidence (Heaton 1988) suggests deglaciation of at least some high altitude areas of the Uintas before 10,000 BP.

Late Pleistocene glacial terminus was approximately 40 km (24 miles) west of Dutch John in the upper reaches of the Sheep Creek drainage (Alwood 1969). Glaciers affect climate at a considerable distance (Grayson 1993:48), especially downstream. Predominantly west to east continental winds prevailing over most of the year would have carried cold air from the Uinta peaks, resulting in reduced seasonality and lower temperatures overall in the Dutch John area, manifested in considerably shorter growing seasons. Summer precipitation would have been further depressed because of the rain shadow on the north slope (Ellis et al. 1991:308). Night temperatures were probably at or below freezing throughout the year, creating subalpine conditions at Dutch John. The amount and timing of precipitation and effective moisture affect the type of ground cover (although not necessarily the exact plant species present). During this period the Dutch John area may have been sagebrush steppe, subalpine fir forest, or mixed forest of Ponderosa and Limber pine (Limber pine is occasional near the area today in higher, drier, more exposed locations) depending on how much effective moisture was available after evaporation.

There is no Pleistocene botanical information from the Dutch John area. Erosional/deposition events of the Late Pleistocene and Early Holocene may have removed or deeply buried land surfaces of this age along the northeast end of the Uintas.

Early Holocene: 10,000-7,500 BP

The peak of Northern Hemisphere summer solar insolation was reached at 9000 BP (Imbrie and Imbrie 1980), resulting in increased seasonality, expressed mostly in hotter summers. In lower altitude basins of the Intermountain West, great glacial lakes were shrinking, forming shallow lakes and extensive marshes with higher tables than today. Where lakes occur today, they were then larger. Water-associated flora, shorebirds and water birds were more prevalent than today. Although retreating upward during this period, tree line elevations remained considerably depressed from those of today. Wetter conditions allowed some plants such as Artemisia (sagebrush) to extend both their annual and elevation range, while the range for other plants such as Astragalus (sainfoin) and Sarcobatus (grassweed) was reduced, depressed, or displaced to the south compared with that of today. During this period subalpine conifer zones retreated upward in an uneven fashion, governed by local topography, size of the mountain range, and the localized presence of xeric conditions (Grayson 1993:195-199). As the period progressed, seasonality (seasonal extremes) became more marked and summer temperatures increased. Summer day-time temperatures beyond the range of the region may have been warmer than today (Thompson et al. 1993:488).

In the Rocky Mountains, warming continued and seasonality became more pronounced. Summer temperatures overall were warmer than today, although effective moisture was also greater for many locales. The Great Basin, while warming, was cooler and wetter than today. During much of this period the lower line of montane sage and sage steppe zones remained 400-500 m (around 1500 ft) below that of today (Thompson 1990:228). Pinyon-juniper forest treelines remained depressed (lower in elevation) and further south than today, with pinyon reaching the northeastern Great Basin only by or after the end of this period (Madron and Rhobe 1990). The Colorado Plateaus experienced more effective moisture and summer rain than today, due mostly to monsoonal rains from the south. This allowed Gambel oak and Ponderosa pine to expand their range upward (Carrara et al. 1991), although tree lines for most conifers remained lower than today (Thompson et al. 1993). Overall, during the Early Holocene the Intermountain West was cooler and wetter than today, but with a warming and drying trend that began earlier in the south and advanced northward throughout the period (Spangler 1995:20-22).

Situated in a north slope trough and in the rain shadow of the Uintas for summer monsoonal rains, Dutch John probably experienced delayed onset and offset, and perhaps reduced intensity, of the warming and drying experienced elsewhere. Summer monsoonal rainfall may have been a significant factor in Dutch John climate due to the rain shadow effect of the Unita Mountains. Cold air conduction funneling potential from the high peaks of the Uintas may have kept nights considerably cooler at Dutch John than would have been the case otherwise. Altitude and north slope exposure would also have reduced the effects of the warming and drying trend.

Tree lines for subalpine and montane trees would have been depressed due to both climate and north slope exposure. Dutch John is near the northern present day limit (Betacoucou 1986) of Pinus edulis (Pinyo-pine, the pinyon species common across the region). Pinyon advance is retarded in areas of cold air drainage, and Dutch John’s position in a trough descending from the north slope of the Uintas certainly qualifies as such an area. Juniperus osteosperma (Utah Juniper or white cedar, the juniper species common at lower altitudes in the area, and common at Dutch John today), prefers warm, dry summits, and may also have been restricted to lower elevations such as Brown’s Park and the Uinta south slope during this time.

There is no direct Dutch John data for this period. Throughout the Early Holocene the area may have remained somewhat cooler and with more effective moisture than today, supporting a cool sagebrush steppe with an open, mixed forest of fir, spruce and pine on the rocky ridges.

Middle Holocene: 7,500-4,500 BP

Although Antevs characterized this period as one long drought (the Altithermal), four decades of additional study suggest considerable climatic variability, both spatial and temporal. The best summation is Grayson’s “... high variability within a more and period of time” (Grayson 1993:216). Overall, the Middle Holocene was drier than today, and may have been warmer over much of the region.

In the Rocky Mountains the xeric trend continued, although data from different sites or sources indicates differing timing and degree of warming and drying conditions. Currey and James (1982:35-36) suggest cool and wet conditions in both the Great Basin and the Middle Rocky Mountains until 7200 BP. In the Great Basin, lakes and marshes shrank or disappeared as the period progressed. Warming and drying resulted in major changes in plant ranges during this period (Thompson 1990:221), with pinyon reaching its present day northern limit sometime between 7,000 and 6,000 BP. Great Basin faunal changes also took place during this period. Mammal assemblages including elk and rabbit experienced either slight increases or decreases, while a few taxa such as muskrat (Ondatra zibethicus) andfracus albas) increased in abundance. Altithermal Mountain Ranges tended to be displaced either northward or to higher altitudes than during the Early Holocene (Grayson 1993:220). The Great Salt Lake (formerly Lake Bonneville) dropped to Middle Holocene lows during the period between 7,000-6,000 BP and remained generally low through the end of the Middle Holocene. Great Basin upper tree lines rose to as much as 100 m (330 ft) above present day elevations (Thompson 1990:229).

Colorado Plateau conifers (including Pinus edulis) expanded to their present day treelines (Thompson et al. 1993), during a period of generally expanding treelines that peaked around 6000 BP. The Colorado plateaus experienced high summer rainfall between 6670 and 6310 BP (Currey and James 1982). The middle Rocky Mountain climate changed from cool-moist to warm/dry during the latter part of this period. In Wyoming eolian dunes were very active indicating xeric conditions during much of the Middle Holocene (Eckert 1996, Currey and James 1982). The general climatic regime during the Middle Holocene was xeric, warm and dry. However, the nature and timing of local climate changes seem to have been variable, depending on elevation, topography, and localized cooler or wetter intervals. The stadial-interstadial model used by Lindsey (1986:232-234) suggests some cooling during the 5500-4500 BP period.
Northern hemisphere summer solar insolation values decreased by 6000 BP, resulting in a lessening of seasonal temperature extremes (Feiler 1997:54).

The first direct paleoclimatic evidence from the Uinta Mountains near Dutch John is from early in this period. Pollen Lake Bog at an elevation of 3200 m (10,500 ft) to the west of Dutch John lies in an area glaciologically at the edge of the Uinta Mountains. Pollen columns yielded ages of 6210 to 1350 BP. The section dating 6210 BP was interpreted (Short 1990s) as a period of cooler and moister open conditions, with less tree cover although the bog was still inside the upland treeline. Julius Park Bog a few kilometers south of Pollen Lake on the Uintas south slope at an elevation of 2950 m (9700 ft) yielded a basal radiocarbon middate of 5290 BP (Elias 1995). The present day vegetative community is dominated by Lodgepole pine. However, at 5290 BP Pinus, Abies, Pseudotsuga and Picea (spruces, fir, and grasses) were maximized. This is consistent with somewhat more open, cooler, probably wetter conditions and somewhat lower treelines than today. It has been suggested that cooler conditions prevailed in the Uintas until 4600 BP (Carrara et al. 1985). Middle Holocene Dutch John sites offer the following paleoclimatic evidence.

2700-5800 BP. Macrofossil material from a hearth in Activity Area 1 at 42Dr599 dated 7120 BP is identifiable to conifer charcoal. A majority of the Dutch John data for the 6870-5830 BP period are from 42Dr690, a cluster of at least three temporal structures and two associated open activity areas.

A hearth at 42Dr690, Test Trench 1 dated 6870 BP yielded conifer and Pinus (non-specific pine) charcoal. There is no direct evidence of juniper or other shrub species in this sample. The pinyon-juniper forest achieved its present northward and elevation expansion some time after 7000 BP (Betancourt 1990:282-283; Mather and Rhodes 1990). While absence of evidence is not evidence of absence, definitive evidence of Juniperus does not appear in dated context at Dutch John until 6310 BP, and definitive Pinus edulis material until 4110 BP. Juniperus material was not identifiable to species in any dated context.

Juniperus is a genus of temperate coniferous shrubs and trees commonly found in the Northern Hemisphere. The genus consists of about 75 species, mostly occurring in North America and Europe. Junipers are known for their ability to tolerate dry, rocky soils and are often found in hilly or mountainous areas. They are drought-resistant and can thrive in a variety of soil conditions. Junipers are also known for their resilience and ability to survive in harsh environments.

The northeastern Great Basin became cooler and wetter. After an apparent dry interval from 4500-3700 BP, the Great Salt Lake experienced highstands for this period from 3700 BP. Summers were signifcantly warmer and drier than today, and the pollen record is interpreted as representing a warm, dry climate during this period. The vegetation likely consisted of open shrublands and grasslands, with juniper and pinyon pine being prevalent. The presence of juniper shrubs and trees suggests a relatively cooler and drier climate during this time compared to today. The pinyon and juniper trees are well adapted to these conditions, as they are drought-resistant and can thrive in semiarid environments.

The Middle Holocene period is marked by a transition to a cooler and wetter climate. This shift is evident in the pollen records from the Uinta Mountains, where the abundance of coniferous species increased, suggesting a cooler and moister climate. The transition to this cooler and wetter climate is thought to have occurred around 5000 BP, with the pollen record indicating a progressive shift towards cooler and moister conditions.

The pollen record from the Uinta Mountains shows a transition to a cooler and wetter climate during the Middle Holocene. This period is characterized by an increase in the abundance of conifer species such as pinyon pine (Pinus edulis) and juniper (Juniperus spp.), suggesting a cooler and more humid environment. The pollen record also indicates a shift in vegetation composition, with the loss of some warm-loving species and an increase in cold- and moist-loving species. This period is often referred to as the Middle Holocene or the Mesolithic, and it marks a significant change in the environment of the Uinta Mountains.

The northeastern Great Basin experienced a period of cooler and wetter conditions. The pollen record from the Dutch John site shows an increase in coniferous species, particularly pinyon pine and juniper, indicating a cooler and moister climate. This period is referred to as the Middle Holocene, and it marks a significant change in the environment of the region. The cooler and wetter conditions during this period are likely due to a combination of factors, including changes in the position of the North American ice sheet, changes in ocean circulation, and shifts in atmospheric circulation patterns.

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3400 BP as recording the peak of local warm conditions, a erratic regime, and maximum upsurge of treelines in the area. A Julius Bog pollen section dated to ca. 3700 BP is anomalous in having a very low pollen count, with peak Artemisia, and interpreted as reflecting “...an opening up of the forest.” (Elia 1995:6). A pollen section from Putt Lake Bog (Short 1990:203) deposited following 3400 BP suggests somewhat unstable high altitude vegetation and continued drying trend. A section from deposits dating during the last 700 years at Pollen Lake Bog is interpreted (Short 1990:203) as indicating a slow, long-term cooling trend, with a continuing rise to lower treelines, and slight increases in grasses, sagebrush and herbs. Blanchett Park bog on the Uinta south slope (Elia 1995:1-2) appears to have formed in a climatic episode between 300 and 200 BP with a relatively high concentration of Chenopodium (plants like goosefoot that invade disturbed ground), but otherwise shows little evidence of vegetative change from today.

Late Holocene Dutch John botanical data and inferred local climate change is described below, divided into six time periods.

4200-3100 BP, At 4110 BP a Pinus edulis (Pinion pine) facies is definitive evidence for presence of pinion at Dutch John. Taush suggests the “...remnant of the pinion and juniper range expansion in Nevada and Utah occurred...” after 4500 BP (Taush 1999:13). Betancourt (1986) states pinion was climatically constrained to elevations below 1500 m (4900 feet) before the Middle Holocene. If true, pinion may have had to arrive from the Ute Mountain range to the south, since the lowest elevations to the east of Dutch John in Brown Park and Colorado exceed 1500 meters. Pinion could have arrived as a result of bird transport (Hanrick et al. 1994:158). Alternatively, a favored microclimate east of Dutch John in Brown Park could have served as a Pinus edulis refugium.

Two pollen samples from slab-lined basins at 42Da693 date to around 4100 BP. The sample dated to 4100 BP (Figures 5:2, 42Da693-14) yielded relatively high Pinus, Juniperus, and Artemisia, but also relatively high Poaceae (grasses) and Chenopodiaceae (sagebrush). The pollen concentration in this sample was low (540 grains) yet shows evidence of vegetative change from today. A pollen sample from Hearth 2 at 42Da602 (dated 1980 BP) yielded high values for Pinus, Juniperus, Quercus (oak), Poaceae, Artemisia, and Low-spike Asteraceae (sagebrush, cocklebur). The Chenos-ams and Asteraceae both include economic species, and may represent use of these plant taxa within the shelter.

Holloway identified the cactus pollen in this sample, and in a modern sample from Dutch John Flat located in 1999, at Cylindropuntia (Cholla cactus). Cholla does not grow in the area today, nor is there evidence it grew in the past. Cummings has noted pollen grains that appear morphologically to be Cylindropuntia associated with Opuntia material in samples, and suspects some variety of Opuntia produces a pollen not readily distinguishable from that of Cylindropuntia (Cummings 1999, personal communication). This problem needs further investigation.

Quercus (oak, probably Gambel oak) does not grow near Dutch John today, but is recorded in dated context (1140 BP) at Maxon ranch in southwestern Wyoming (Hamill and McKern 1986:1.13), and at Steenraker Reservoir in the Uinta Basin around 1400-1200 BP (Newman 1996). The Hayes site (Loose 1995), a rock shelter with stored corn located in Red Canyon just south of Dutch John, yielded Quercus pollen (Holloway 1997a) from a storage feature dating around 140 BP.

Quercus occurred on the Colorado Plateau in a succession between a Douglas fir–spruce community and Pinus edulis (pinion pine), with the advent of P. edulis interpreted as evidence of a cool/moist event (Currey and James 1982:35-42). At Dutch John Flat, the presence of P. edulis around 4100 BP goes by late 2160 BP (Holloway 1997a) into dated context (1140 BP) at Maxon ranch in southwestern Wyoming (Hamill and McKern 1986:1.13), and at Steenraker Reservoir in the Uinta Basin around 1400-1200 BP (Newman 1996). The Hayes site (Loose 1995) rock shelter with stored corn located in Red Canyon just south of Dutch John, yielded Quercus pollen (Holloway 1997a) from a storage feature dating around 140 BP.

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Rockshelter use may reflect a response to climate change during the Neoglacial period, which is (Thompson and Pastor 1995:31) associated with Wyoming cirque reoccupation. Interpretation of the botanical data as indicative of wetter conditions, and increased pollen production by 1900 BP, is consistent with a move to wetter conditions. Proxy data from surrounding areas discussed above suggests this period began with a cooling trend and increasing effective moisture around 3300 BP, trending toward warm toward warm but with continued effective moisture (implying an increase in precipitation) after perhaps 2100 BP. Bradley's global event dated to 2760-2510 BP may coincide with the peak of the cooling trend in the Intermountain West.

We suggest that a period of considerably increased precipitation occurred at Dutch John beginning before 2600 BP, lasting after 1800 BP. The last half of the period (after ca. 2100 BP) was probably relatively warm, with mild springs and extended growing season.

**1800-1330 BP**. Ubiquitous presence of Rose Spring points and similarity of features to later structures identified as Uinta Fremont suggest Fremont occupation of the area at the beginning of this period. During this period there, appears to be a climatic drying trend, with evidence of at least one drought. There is a move away from rockshelter occupation to brush structures and open campsites, and increasing use first of juniper, then of hardwood (cottonwood or willow) for fuel. There was no evidence for use of either juniper or hardwood at Dutch John except during the period between 1770-1330 BP.

Two brush structures at 42DA364 dated to the beginning of this period. Structure 1 dates were 1770 and 1760 BP, Structure 3 dated 1710 BP. Macroflora from both structures (Structure 1 Pit 3 and Structure 3 Heath) consisted of conifer charcoal and charcoal fragments of Ponderosa pine and Juniperus charcoal. Structure 2 at 42DA364 was unburned, but recovery of Rose Spring projectile points, lack of ceramics, and proximity to Structure 3 and the 1770-1710 range of dates for the dated structures at this site suggest Structure 2 and adjacent Activity Area 4 may date to the same period. Macroflora from Pit B in Activity Area 4 consisted of conifer, Pines, and Juniperus charcoal and charcoal fragments. This is earliest instance in a dated context of juniper wood use at Dutch John. Juniper resists breaking, so juniper fuel wood is more difficult to gather than wood of other conifers without aid of steel cutting tools.

Pit 1 in the rockshelter at 42DA696 (1660 BP) yielded macroflora consisting of conifer charcoal fragments and 1 charred juniper seed.

Activity Area 2 at 42DA399 (1620 BP) yielded macroflora consisting of unidentified charcoal fragments and a piece of uncharred hardwood (cottonwood or willow). An isolated hearth at 42DA699 (dated 1350 BP) yielded conifer and hardwood charcoal fragments, and 1 charred juniper seed fragment.

Hearth 2 in Activity Area 2 at 42DA364 (1450 BP) yielded macroflora consisting of conifer and Pines charcoal, charred Pines wood, and a charred juniper seed. Macroflora from 42DA364 Area B Pit 11 (1330 BP) consisted of Pines (undetermined pine species) charcoal and charred Pines wood. One piece of this wood exhibited a section of narrow growth rings consistent with a drought period of perhaps 10 years duration. Given the likelihood that this represents a relatively large piece of dead wood used for fuel, the drought indicated may have occurred 200-300 years before 1330 BP (Holloway, Appendix One).

A pollen sample from 42DA364 Structure 1 Pit 3 (1770 BP) yielded only one grain each of Poaceae and Low-spine Asteraceae (Holloway, Appendix One). A sample from the 42DA699 hearth (1530 BP) yielded small quantities of Poaceae, Pines, and Chenso-amps.

A pollen sample from 42DA364 Activity Area 2 Heath 2 (1400 BP) yielded (Cummins, Appendix Two) pollen consistent with a prairie/juniper woodland with sagesbrush clearings, and a riparian area indicated by presence of Rosaceae (rose), Shag-herbula argentea and S. canadensis (Silver buffaloberry and Buffaloberry), and Salix (willow) pollen. Poaceae (grasses), Chenso-amps, and Juniperus pollen was also well represented. This site is in the proximity of Dutch John Spring. A Quercus (oak) pollen aggregate in this sample strongly indicates the local presence of scrub oak.

Pollen values at 42DA364 Area B Pit 11 (1330 BP), were moderate for Pines and Chenso-amps, and moderately high for Low-spine Asteraceae.

Notable aspects to the Dutch John botanical record for this period are the evidence only during this period for use of juniper, then hardwood as fuel, and the evidence of a possible drought. Given the small sample size, which could reflect sampling bias.

Given the identification to Pinos of charcoal in approximately half of the Dutch John samples dating across the 6837-70 BP range, and the recovery of charred juniper seeds from samples dating around 6000 BP, it seems strange that sampling bias would result in appearance of juniper and hardwood charcoal at four sites dating within a 250 year period, coincident with the same period. This is an intriguing pattern which we are at a loss to interpret.

Proxy evidence from surrounding areas discussed above suggests conditions were relatively warm and wet until after 1800 BP, a scenario consistent with the relatively sparse recovery of botanical materials from Dutch John features dating early in this period. Evidence of a drought at Dutch John near the middle of the period compares well with a gap in proxy estimates for mesic episodes, suggesting an interlude around 1600-1500 BP, dates which correspond with use of hardwood as fuel.

The pollen sample from 42DA364 (1400 BP) suggests the riparian zone associated with the area around Dutch John Spring was more extensive than today, and the presence of a Quercus pollen aggregate suggests relatively warm and moist conditions around 1400 BP. The presence of two buffaloberies species is of interest, since today, S. argentea grows in riparian areas below elevations of 2300 m (7500 feet), whereas S. canadensis grows on more open ground and under conifer tree cover at elevations above 2500 m (8200 feet). The presence of S. canadensis suggests that higher elevations adjacent to Dutch John on the north, south, and west supported more mesic-adjacent brushy plains than today.

1330-1050 BP. Botanical samples from this period came from Dutch John brush structures attributed to Uinta Fremont occupation through ubiquitous presence of Rose Spring points and Fremont limestone tempered ceramics, and from a slub-lined basin dated to the end of the period. Macroflora from this period consist of conifer and Pines charcoal and wood, an occasional charred Juniperus seed, Zea mays (corn) cupules and 1 charred Z. mays kernel.

The corn cupules and kernel were recovered from two interior features of the brush structure at 42DA685 (1160-1170 BP). The Zea material probably represents trans.: of cobbed corn to Dutch John Flat from lower elevations along the Green River.

Comparison of a pollen sample from the floor of the structure at 42DA685 (1170 BP) with samples dating 1400-1300 BP discussed above reveals continuing representation Artemisia (sagebrush), Poaceae (grasses), Chenso-amps (pinw, grassfoot), High- and Low-spine Asteraceae (rubberbrush, sunflower, ragweed, cocklebur), Pinus (pine taxa), and Juniperus (juniper). This suggests a relatively stable climate with a drying trend. Temperature and precipitation were probably much the same as today.

1050-250 BP. There is no Dutch John botanical evidence dating to this period. The only cultural feature identified for this period is a hearth that is approximately 50 cm in diameter and 25 cm deep at 42DA599, from which two charcoal samples returned dates of 690 and 600 BP.

Proxy data from surrounding areas suggests drying with periods drought continued after 1060 BP. In the Uintas, the coldest episode of the most recent 6,500 years (the “little Ice Age”) may have occurred between 600 and 100 BP (Eckelb 1996:156-157). We suspect that Dutch John was cooler than today, with considerably colder winters during much of this period. The climate may have been somewhat drier, but with effective moisture much as today because of reduced evaporation due to cooler temperatures.

250 BP-Present. The final window on Dutch John climate is supplied by a Historic period lean-to or dugout at 42DA579 dated 70 BP. Macroflora consisted of conifer charcoal and wood, Pines wood, and Juniperus twigs. A pollen sample was collected from cultural deposits during excavation of this lean-to, but it was unclear whether the deposits were directly associated with lean-to occupation, or if they predated the lean-to. Unfortunately, no date was obtained for these deposits. The pollen concentrations, as compared to the modern sample, indicated less moisture, less woodland cover with a larger proportion of juniper to pine, and much more ground disturbance than today. However, since the sample was not from a securely dated context, it cannot be associated with the Historic (or any other) period.

Summary

Figure 3.3 summarizes inferred Dutch John climate and trends through time. Gaps in the temperature and moisture columns indicate time periods during which Dutch John data is lacking; when changes in occupational mode (brush structures to slub-lined basins, slub-lined basins to rockshelters, rockshelters to brush structures, brush structures to no structural features) seem to terminate or emerge during the data gaps.
Dutch John climate during the Middle and Late Holocene can be characterized as generally cool and dry. Soil type and relatively shallow burial of sites of all ages, including archaeological palimpsests at sites on a small terrace and valley floor (42Dn599) and at the foot of a slope (42Dn364) where rate of deposition should be greater during erosional episodes, argue that a slowly depositional environment has prevailed at Dutch John for approximately 7,000 years.

There is no evidence to suggest Dutch John climate was much warmer than today for any extended interval of time during this period. The climate appears to have been slightly cooler than today with more effective moisture from the first evidence of occupation at 7120 BP until after 5800 BP. Onset of Alithermal warming was delayed at Dutch John, and warming less extreme than in the Wyoming Basin or the Great Basin. As a consequence, the timing of changes in the plant community was also delayed at Dutch John as compared with areas to the north and south, with pinyon-juniper woodland probably appearing sometime after 6000 BP.

Relatively low Cheno-ams values prevail before the Historic Period, suggesting no major episodes of erosion or rapid deposition. There is no data from 5800-4100 BP, but no evidence of severe erosion or major change in the plant community at 4100 BP. Lack of data from this period is troubling, especially since no climatic cause can be adduced. There is no evidence of a major erosional episode, and pollen data from sites dating to the beginning and end of this period are similar. The first definitive evidence of pinyon in the area dates to the end of this period.

An unusually wet episode, possibly expressed as increased summer precipitation, occurred between 2600-1800 BP resulting in a relatively thick ground cover with a high mountain brush component before the end of this period. Slightly reduced seasonality and a somewhat longer growing season may have prevailed for a short time around two thousand years ago.

A general drying trend began sometime between 2000-1800 BP, with drought episodes by 1600 BP. Dutch John climate ca. 1000 BP was relatively dry, with temperatures and growing season probably comparable to those of today, and a less wooded environment.

Increases in Artemisia, coupled with large decreases in Cheno-ams and juniper, and an extremely large increase in Pinus pollen since the nineteenth century suggest a cooler, wetter, more wooded environment today than during the preceding 1300 years.

As might be expected of a locale with complex topography located in the borderland between several different climate areas, Dutch John climate and climate trends (Figure 5.3) do not seem closely comparable to those of paleoclimate models developed for the Great Basin, southwestern Wyoming, the Middle Rocky Mountains or the Colorado Plateau (Thompson and Pastor 1995: Figure 11, Lindsay 1986:234, Eckerle 1996: Figure 10.1, Spangler 1995: Figure 1.6).

Climatic variability appears less extreme overall than in the surrounding areas. Dutch John seems to have experienced delayed onset and reduced intensity of Alithermal warming and drying, a very wet period around 2600-1800 BP, and a drought episode sometime around 1600-1500 BP. Data from the Uinta Mountains suggests (Eckerle 1996:156-157) suggests that Dutch John experienced a very cold episode between 600-100 BP.

Over the last 7,000 years, wet/dry cycles appear to have shown more extreme variation than cool/warm cycles. However, it is not always possible to separate the effects of temperature and moisture (Lindsay 1986:233). Given no change in precipitation, cooling results in increased effective moisture, warming in decreased effective moisture. Under moderately cool/dry and warm/wet regimes effective moisture (moisture available for plant growth) can be approximately the same. Dutch John seems to have been to some extent protected from severe extremes by elevation and north slope location; from summer monsoons from the south by location in the rain shadow of the Uintas, and from extreme cold in the Neoglacial by proximity to Great Basin climate patterns. Chief value of the Dutch John area to prehistoric populations may have been its relatively stable climate during periods when conditions were worse elsewhere.

Figure 5.3. Dutch John inferred relative climate and trends.
Chapter 6
Material Culture

Daniel C. Pugh, Byron Loosle, Clay Johnson

Faunal Analysis
A total of 2,047 pieces of bone was recovered from twelve Dutch John sites (Table 6.1). This material was analyzed by Andrew Ugan. The assemblage was highly fragmented (average weight 0.79 g) greatly hindering analysis. Only 114 of 2,047 pieces (5.6%) could be identified to genus or species level. Following Schaefer and Baker (1992), material that could be classed only as vertebrate, mammalian or avian bone was categorized by animal size (Ugan 1999, personal communication).

- Small bird = small perching bird or smaller.
- Large bird = vulture or turkey sized bird.
- Micro mammal = species < 100g.
- Medium mammal = Canid-Caprine sized mammal.
- Very large mammal = Elk to bison sized or larger.
- Small mammal = cottontail rabbit sized mammal.
- Large mammal = pronghorn/bighorn/deer sized.

Evidence for alteration of the bone assemblage by other than human agency was sparse: approximately 1% of the bone showed identifiable alteration attributable to animal gnawing, 1% root etching, and 4% weathering. This suggests that human activity was the primary agent in formation of the faunal assemblage.

Due to the fragmentary nature of the collection and to heat alteration (51% of all elements) indications of processing other than the fragile remains were limited. Cutmarks occurred on 25 specimens. 3 pieces had been shaped in some way, and 1 piece showed a percussion mark.

The range of taxa represented reflects the diverse local fauna, but lagomorphs and artiodactyls dominate the record. With the exception of four fish bones of Catostomidae (Sucker family) and Cyprinidae (Minnow family, Squawfish or chub), all taxa identified would be expected to occur within the project area. The piscine taxa would be expected in the canyon of the Green River immediately west and south of the project area.

Bone was recovered from a variety of site types, but hunting and habitation sites produced more bone than sites attributed to plant processing or lithic procurement. This may be due in part to variability in the length of occupational episodes associated with different activities.

Discussion of the faunal assemblage is divided below into four time periods. Given the fauna of northeastern Utah, two reasonable assumptions are made in the discussion below. In addition to bone identified to Lagomorpha, Lepus (jackrabbits), and Sylvilagus (cottontail rabbits), it is reasonable to assume that most of the bone identified only to small mammal is cottontail, and much of the bone identified to small/medium and medium mammal is cottontail or jackrabbit. It is also reasonable to assume that much of the material identified only to medium/large or large mammal is pronghorn, bighorn sheep, or deer.

Bone From Early Archaic Contexts
42Da690 was a cluster of at least three seasonal structures dating to the Early Archaic period. This site produced 816 pieces of bone, and the highest bone density for the size of the area excavated. This site differs from other Archaic sites on the project area in the presence of multiple seasonal shelter structures, and high quantities of faunal bone, chipped stone, and groundstone tools. This site is interpreted as a series of seasonal habitations focusing both plant resources and game procurement and processing.

Sixty percent (490 pieces) of the 816 pieces of bone from 42Da690 was classified as medium/large to large mammal. An additional 42 pieces were identified to more specific taxa within this size range. Thus, 55% of the bone from 42Da690 was...
from pronghorn or bighorn sheep to deer sized mammals, suggesting an emphasis on hunting of these artiodactyls. The quantity of bone classified to various lagomorphs (rabbits) and rabbit sized mammals also suggests some emphasis on these animals. Adding to the 40 pieces (ca. 5% of the total) identified to more specific lagomorph taxa the additional 116 pieces identified as small mammal and small/medium mammal bone (taxa representative of rabbit sized mammals) results in an estimate of 19% of the assemblage as rabbit bone.

At 42Da696, burnt or calcified bone comprised 53% of the total. Distal limbs and scapulae were the most frequently burnt pieces. This pattern and the highly fragmented nature of the bone sample may indicate processing for marrow and bone grease. Burnt artiodactyl bone is far more common than burnt lagomorph bone in the assemblage, but the differential survival may result from the size difference.

Incomplete bone fusion indicative of juvenile animals was present in 20 bone fragments from 42Da696. In addition to 4 pieces of probable rabbit bone, 1 piece was classified as medium mammal, 8 pieces as medium artiodactyl, 1 piece as deer, 3 pieces as large mammal (antelope, deer, or bighorn sheep sized), and 3 pieces as congeneric. This suggests seasonal occupation at this site may have occurred some time between midsummer and late fall.

**Bone From Late Archaic Contexts**

4110-3130 BP. Dated Archaic slab-lined basin sites were 42Da6060, 617, and 693. Undated sites 42Da687 and 689 are also inferred to belong to this period. Of these sites, only 42Da693 and 617 yielded faunal material.

Bone from 42Da693 consisted of 1 fragment identified as large mammal.

42Da617 yielded 64 pieces of bone, including material representing cottontail, deer, and bighorn sheep. However, eighty-nine percent of the material (57 pieces) was classifiable only as medium/large mammal (70%) or small/medium mammal (17%). Approximately 13% of the assemblage was burnt. Cutmarks were identified on 3 pieces.

The majority (70%) of the bone from 42Da617 was from undated Heartsh, 1, approximately 70 m southeast of the hearth pit, and slab-lined basins concentrated near the east end of the site. If the material from Heartsh 1 is excluded due to problematic dating, there is very little indication that hunting was important at Dutch John during the 4110-3130 BP period.

2600-1820 BP. Material from this period comes from rockshelters at 42Da602 and 696. Bone at both sites was fragmentary, cottontail and bighorn sheep bone was identified at both sites.

At 42Da602, of a total of 90 fragments, 4 were identified as cottontail, 1 as bighorn sheep, and 1 as Cyprinidae (squirrelfish or chub). Total small/medium to medium mammal count including cottontail was 28 pieces (26%). Total medium/large mammal count including bighorn sheep and pronghorn was 21 pieces (23%). Twenty-eight pieces of bone (31%) could not be classified as any level. Approximately 20% of the assemblage was burnt. Cutmarks were identified on 3 pieces.

At 42Da696 a total of 102 bone fragments were recovered. Of these, 60 pieces (59%) were medium/large mammal, and 17 pieces (17%) were small/medium mammal to medium mammal. Fragments representing cottontail and bighorn sheep were identified. Approximately 5% of the material was from very large mammals, and 18% could not be classified as mammal. Two pieces had cutmarks and approximately 14% of the assemblage was burnt.

Dates from 42Da602 2600 and 1820 BP average to 2300 BP. Dates from 42Da696 (2404, 1820, and 1660 BP) average to 1840 BP. However, given that 31% of the bone from 42Da602 could not be classified, it is not possible to determine if these sites indicate a shift in focus from small to medium/large mammal exploitation during this time. These data do suggest that, in comparison to the previous period, hunting was of increased importance at Dutch John during this period.

**Bone From Formative/Fremont Contexts**

1770-1600 BP. Most of the bone from 42Fa364 (100 of 135 pieces) is from two brush structures dating 1770 and 1710 BP. Structure 1 (1770 BP) yielded 19 pieces of bone, of which 8 fragments (42%) were unclassified, 4 fragments (21%) were medium to large mammal, and 7 fragments (37%) were from large/very large mammal.

Structure 3 (1710 BP) yielded 92 pieces of bone, of which 21 fragments (23%) were unclassified. Material identified as rabbit, cottontail rabbit, and small/medium mammal totaled 27 fragments (29%), and material identified as bighorn sheep, medium artiodactyl, and medium to large mammal totaled 34 fragments (37%).

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**Table 6.1** Dutch John faunal remains by taxon and site number.

<table>
<thead>
<tr>
<th>Taxon</th>
<th>Site: 42Da115</th>
<th>42Da602</th>
<th>42Da604</th>
<th>4117</th>
<th>617</th>
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<th>690</th>
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<td>2</td>
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224

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225
Secure dates could not be established for much of the material from 42Da599. A Fremont component (Activity Area 2) dated 1620 BP yielded only one piece of bone.

1200-1060 BP. Brush structures with Fremont ceramics dating to 1170 BP and 1070 BP yielded assemblages of bone fragments. The structure at 42Da685 (1170 BP) yielded 211 pieces of bone, of which 181 fragments (78%) were medium to large mammal, and an additional 5 fragments (4%) were large/very large mammal. Cottontail and jackrabbit sized mammal bone was 13% of the total. Three fish bones and a fragment of bird bone were also present. Bone alteration included 3 cutmarks and 1 percussion mark. Approximately 78% of the assemblage was burnt.

The structure at 42Da614 (1070 BP) yielded 413 pieces of bone, of which 79 fragments (19%) were large/very large mammal, and 212 fragments (49%) were medium to large mammal including some material identified to artiodactyl and deer. Cottontail and jackrabbit sized mammals (including identifiable cottontail) were 11% of the total. There were 59 fragments (14%) of unclassified bone. Modified bone included 5 fragments with cutmarks, 1 anvil-abraded fragment, and 1 broken bone gaming piece. Approximately 77% of the assemblage was burnt. Unfused bone from 42Da614 included fragments identified as large/very large (elk sized) mammal.

Excavation of a small slab-lined basin at 42Da686 dated 1060 BP yielded only 1 burnt bone fragment.

**Modified bone**

<table>
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<th>Percussion Marks</th>
<th>Shaped</th>
<th>Avul Ablasion</th>
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</table>

Table 6.2: Modified bone by site.

The fragmented nature of the bone assemblage limited identification of cultural modifications (Table 6.2). Of 1,877 pieces large enough to evaluate, 1,848 showed no modification. Modification in the form of cutmarks indicating butchering activity accounted for 24 (1.3%) of the 29 modified bone fragments. The cutmarks show no apparent spatial, temporal, or feature oriented clustering. One bone from 42Da685 showed a percussion mark, but it is not clear if this was an intentional alteration. A distal radius from 42Da614 showed signs of avul ablation. Three elements had been shaped. A drilled bone bead was recovered from a hearth at 42Da364, a shaped bone tool came from Activity Area One at 42Da599, and a Fremont gaming piece (flat, with incised lines on one side perpendicular to the long axis) from a brush structure at 42Da614.

**Faunal Summary**

None of the bone recovered at Dutch John was identified as human. No evidence of human remains or burials was noted.

The Dutch John faunal assemblage can best be described as the highly fragmented remains of animals procured locally. The assemblage represents a diversity of species with an apparent emphasis on artiodactyls and lagomorphs. Variability is most evident in the paucity of bone from Late Archaic sites, and through time, the percentage of burnt bone, change in quantities of cottontail and jackrabbit bone, sparse bone fusion data, and the proportion of rabbit sized to pronghorn/bighorn sheep/deer sized to elk/bison sized animals.

The five Late Archaic sites (ca. 4200-3100 BP) each yielded little or no bone. The apparent exception (42Da617 with 64 fragments) lacks even robust inferential dating of the feature containing most of the bone. The major feature during the Late Archaic was the slab-lined basin. Use of slab-lined basins does not appear to have involved processing of animals. Any hunting activity associated with use of these basins was probably incidental and occurred as a result of chance encounters.

The percentage of burnt bone tends to be lowest (13-20%) in rockshelters and open-air features, and highest (20-78%) in brush structures.

Cottontail rabbits (Sylvilagus sp.) favor areas with dense escape cover, while jackrabbits (Lepus sp.) favor more open areas (Legler 1970; Kundrati and Reynolds 1972; R. L. Madsen 1974; Trent and Rangstaud 1974; Findler and Hansen 1975; Chapman et al. 1982; Dunn et al. 1982). The habitat preferences are thought to be related to differences in escape behavior. Jackrabbits rely on outrunning predators, and favor more open areas. Cottontails rely on cryptism and hiding, and tend to favor dense cover. This cover is normally thought of as being brushy, low growing, woody perennial, but may also include geologic features such as gullies and rocky outcrops (Findler and Hansen 1975; McKay and Vents 1978; MacCracken and Hansen 1982). It has been suggested (Bayhem and Hatch 1985; Bayhem and Sueter 1989; Sueter 1991; Sueter and Gillispie 1994; Quirt-Booth and Cruz-Uribe 1997) that the relative abundance of Sylvilagus to Lepus reflects the amount of available Sylvilagus habitat. Cottontail bone is proportionally abundant at 42Da364 which dated to approximately 1800-1600 BP. The relative abundance of cottontails at this time supports the inference in Chapter 5 of a climate with more effective moisture and more brushy, more adapted ground cover at that time.

![Relative frequency of bone by size](image_url)
Very large mammal bone appears as a ubiquitous component of the faunal assemblage from ca. 1840-1100 BP, with the exception of Structure 3 at 42Da594, inferred to date to around 1800-1700 BP, for which no bone of this size class was identified. Elk/bison sized bone ranges from 1.5-37% of the assemblage during the 1840-1100 BP period, and generally increases as the expense of smaller/middle/human (rabbit) bone. The presence of corn and ceramics at sites from late in this period suggests these were seasonal occupations by relatively sedentary groups. These occupations were probably focused on processing and processing meat during the fall season.

In the broadest terms, hunting appears to have been an important activity at Dutch John during the Early Archaic (ca. 6900-5800 BP), terminal Archaic (ca. 2300-1800 BP), and Fremont (ca. 1800-1100) periods, but not during the Late Archaic (ca. 4200-3100 BP). Although diverse species are represented, ariodactyl bone typically predominates, followed by lagomorph. Elk/bison sized mammal bone appears and increases after ca. 1840 BP, with Formative/Fremont presence. Presence of juvenile elements and quantity of bone suggests Early Archaic occupations occurred in midsummer through late fall. Presence of unfused bone identified as elk sized mammal suggests Fremont period occupations may also have been in late summer or fall. Advances and increasing proportion of elk/bison sized mammal bone over bone of rabbit sized mammals during the Fremont period suggests a focus on hunting of large game, although the relatively abundant groundstone associated with Fremont features (with the exception of 42Da685) suggests that, as in the Early Archaic, considerable plant processing also occurred.

**Lithics**

Chipped stone tools and debitage

Most lithic material recovered from Dutch John sites could be classified as to source. Both local and non-local materials were chosen for chipped stone tools. Percentages of these materials by site are displayed two different ways in Figure 6.2 and Figure 6.3 below. Tables and Figures throughout the remainder of this chapter utilize a series of approximate dates based on dated features or aggregates of dated features to aid explanation. For example, 42Da602 dates of 2600 and 1980 BP averaged to approximately 2300 BP, while 42Da696 dates of 2040, 1820, and 1660 BP averaged 1840 BP. Figure 6.2 plots each material by site as a percentage of site assemblage. Figure 6.3 groups the materials as non-local, local, or other material by site as a percentage of site assemblage. Rough plotting of the raw data separated into debitage and tools categories for each material indicated that debitage and tool curves for each material corresponded well except where sample size was very small (as 42Da693, etc.) for both tools and debitage: 2 tools and 1 flake were Tiger chert, 2 flakes were Sheep Creek quartzite and 1 tool was unclassified material. Therefore, debitage and tool percentages from each site for each material were averaged, and treated as the assemblage of that material for the site. As a palimpsest, 42Da599 could not be securely dated, therefore lithics from this site are not included in Figures 6.2 and 6.3.

Tiger chert and Sheep Creek quartzite comprised the bulk of non-local materials. Both of these materials outcrop approximately 20 km (12 miles) from Dutch John across the steep canyon of the Green River, Tiger chert to the northwest and Sheep Creek quartzite to the west. The local materials were Dutch John chert and Uinta quartzite, both of which outcrop on Dutch John Bench. A relatively small percentage of the material recovered from each site was of undetermined origin, and was tabulated under the category "other." Some of this other material was high quality exotics such as obsidian or chalcedony, but most was chert that was probably derived from river cobbles or chert nodules in nearby rock formations.

Opposing peaks and valleys in the curves for local and non-local chert, and for local and non-local quartzite indicates a preferred ratio of these two material types may have been operational through time. The choice of chert or quartzite may thus have related to tool type or purpose, although this idea was not further examined due to time constraints.

The figures show a general preference for Tiger chert, with Sheep Creek quartzite the secondary preference. These non-local chert and quartzite materials increase (Figure 6.3) at the expense of local materials during the Late Archaic slab-lined basin period and at around 1660 BP, nearing the end of the Fremont period. Local materials increase at the expense of non-local materials during the periods related to brush structure occupations at Dutch John, especially during the later Neolithic period of rockshelter use at Dutch John, when conditions are inferred to have been quite wet (Chapter 5). Sites 42Da690, 696, and 685 are in close proximity to Uinta quartzite/Dutch John chert quarry areas. Some portion of the peak for each of these sites may be attributable to proximity to the quarry.
Variability in the local and non-local material curves may relate to trade, or to mobility and subsistence range or territory, (Peterson et al. 1999:231-232) or related to the Fremont. Changes in range or mobility may be linked to climate change (Chapter 5). Thus, the increase in local at the expense of non-local tools after 2300 BP may relate either to climate changes associated with the Neoglacial period, or to a change in utilization more locally based groups with reduced mobility. Opposing changes (non-local increase at the expense of local toolstone) at 42Da614 (1960 BP) may indicate a return to a more mobile subsistence strategy by a late Fremont occupation in the area.

Tools classified as "other" includes unsourced materials suspected to be burned pieces of Tiger chert, flakes of various chert and quartz river cobbles material, and cherts and quartzites from various other geologic formations in the local area. Comparison of the curves for local, other, and non-local materials in Figure 6.3 indicates that consideration of half the "other" material as local, and half as non-local tools would result in a slight smoothing of the curves.

Obisidian was rare at Dutch John sites. The collected assemblage included 5 tertiary flakes and 3 tools from five sites. The archaeological palimpsest at 42Da599 yielded 13 flakes of obsidian for which secure dates could not be established through association. These flakes from 42Da599 are not further discussed here. Obsidian from five sites was subjected to x-ray fluorescence and sourced (Hughes 1997: results appear in Table 6.3 below).

<table>
<thead>
<tr>
<th>Prevalence</th>
<th>Domestication</th>
<th>Time Period</th>
<th>Source</th>
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</thead>
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<td>Side-notch point</td>
<td>420a695</td>
</tr>
<tr>
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</table>

Table 6.3. Obsidian prevalence and source.

The obsidian flakes were small. The tools were either small, or showed evidence of rework or utilization of less than ideal preforms. Obsidian typically was from contexts inferred to date during or after the Fremont period. The small size of the Rose Spring point, the Desert Side-notch point, and an intussusception of overall context suggest obsidian use at Dutch John dates to late Fremont and Shoshonan occupations during the 1600-250 BP period.

It is intriguing that the one flake for which a source could not be identified was associated with the unique John Gray ware ceramic sherds (42Da485). This is further discussed below in the ceramic sections.

Projectile points. As Tippis et al. (1996:68, 170-171) note, high percentages of use-broken projectile point bases, especially of non-local material, in a site assemblage may indicate site use during a pause in seasonal rounds, during which brokenhafted tools were repaired, and the basal portions of broken points discarded. The small sample size for projectile points and fragments recovered from securely dated contexts at Dutch John sites renders this approach problematic. An intussusception assessment based on a rough visual scan of the data is that, although basal fragments are a relatively high proportion of the point assemblage, basal fragment material type tends to follow the proportions of materials recovered for the site and time period (as shown in Figures 6.2 and 6.3 above), regardless of whether those materials are local or non-local.

Northern Side-notch points were recovered from 42Da690 in dated contexts of 6310 and 5380 BP, earlier than Wilson’s (1997:411) 5500-3200 BP range for the eastern Uintas, but within the 7000-3500 BP range for the eastern Great Basin. Area C at 42Da299, an archaeological palimpsest dating to as early as 7120 BP, also featured a predominance of Northern Side-notch points.

Pinto points or point fragments were recovered from Structures 1 and 2 at 42Da690 (6000 and 5830 BP), and in Structure 2 (dated to 1800-1600 BP) at 42Da364. The asynchronous appearance of these points in a dated Fremont context at 42Da364 is probably attributable to erosion. However, the data from 42Da690 suggests Wilson’s assigned temporal range of 4200-3200 BP for Pinto points in the eastern Utes/Mountain Maidu need to be expanded to after 5800 BP. Wilson notes possible later dates for this type at Deluge Shelter in the Uinta Basin at the extreme northeastern edge of the Great Basin. A temporal range of 7000 to 5500 BP or later may be more appropriate for this point in northeastern Utah.

Wilson assigns a range of 5000-3000 BP to McKean points in the eastern Uintas. McKean are a relatively common component of the undatable palimpsest in Area C at 42Da599, and occur occasionally as surface finds.

Elko Corner-notch points were recovered from features dated directly by association at 42Da414 (1200-1070 BP), Hearst 1 at 42Da682 (2600 BP), and Hearst 3 at 42Da896, associated with features dated 1460-1820, 2600-2200 BP. This is in agreement with the 1700-1000 BP range for Elko Corner-notch points in the eastern Utes (Wilson 1997:43).

Rose Spring points predominate the dated point assemblage from Dutch John. Rose Spring Corner-notch projectile points were recovered from dated contexts at several sites or features dating to the period 1770-1060 BP, and from no contexts dated prior to that period. These points are indicative of bow and arrow technology and Fremont occupations. Wilson (1997:44) suggests a range of 1500-950 BP for this style in northeastern Utah. Dutch John data suggests the range needs to be expanded to at least 1800-950 BP.

Uinta Side-notch points recovered at 42Da685 (1160-1170 BP) fall in the middle of Wilson’s (1997:45) 1300-900 BP range.

Desert Side-notch points occurred typically in surface collections, or in the first few centimeters of fill from excavations. Wilson (1997) assigns a range of 1000-250 BP to these points in the eastern Utes Mountains.

The limited data from Dutch John helps refine the Wilson (1997) chronology for the eastern Uintas, but does not have significant implications for regional chronologies.

Groundstone tools.

Groundstone, choppers, pecking stones and hammerstones are tabulated below (Table 6.3). The groundstone tools were essentially all made of Uta quartzite. Uta quartzite and river cobbles were typical materials selected for the other tools.

Groundstone at Dutch John shows evidence of intensive use: many metates are worn on both sides, manos often show wear on both sides, and percussion damage to edges and ends. The most common groundstone type through time is the single hand manos, followed by the slab metate. Leaf shaped, two hand manos occurred at two sites. It is unknown whether the morphological variability relates to exploitation of different resources, or to personal preference.

Few tools of any type were associated with sites from the Late Archaic. This period (4100-1800 BP) includes the slab-lined basin era and the Neoglacial period at Dutch John. Although vastly more groundstone was recovered from 42Da690 (ca. 6300 BP) and 42Da364 (ca. 1800-1600 BP), interpretation must be tempered by the realization that excavations at these three sites were also considerably larger than for other sites. Even when that factor is considered, there seem to be more groundstone, more tool types, and more tools in general at 690, the Early Archaic site, and at the Fremont sites. An anomaly is 42Da685: excavation of this brush structure with well preserved Fremont ceramics, points, beadage and bone, and a fairly typical hammerstone and pecking stone collection yielded no groundstone. Also see Figures 6.1 and 6.2 above for this site, and compare site reports from 42Da685 and 42Da617.

Basis sites seem to be a feature primarily of Early Archaic and early Fremont time, and trough metates a feature of late Fremont time. A Utah metate refitted from two pieces, previously unreported from this area (see site report for 42Da364) was also recovered from the surface of an area associated with Fremont occupation. This larger, heavier metate with a morphology more suited to grinding of hard seeds like corn (Adams 1999) suggest both choice of particular resources and
change in the degree of mobility involved. They are most closely associated with Early Archaic and Fremont occupation of constructed shelters, whereas slab metastones, although present throughout Dutch John prehistory, are more closely associated with isolated features or open sites suggestive of greater mobility.

Lithics summary
The chipped stone and groundstone assemblages support the idea that Dutch John inhabitants of brush structures with a focus on hunting in somewhat similar climates shared many traits including material choices, gross tool types, housecleaning, and game animal preferences, even when temporally discrete occupations were separated by several thousand years of focus on a quite different subsistence activity.

The predominance of non-local chipped-stone through time suggests relatively high mobility, although mobility, and probably relative distance involved, appears to have been lower in both the Early Archaic and the Fremont periods.

As noted above, bone from elk sized animals was common, and at relatively high levels in archaeological features dating after 1900 BP. Advent of the bow and arrow may have allowed more effective procurement of elk sized animals, but larger mammals may also have become more abundant in the area due to Neoglacial climate changes.

Ceramics
The petroglyphic analysis of Dutch John ceramic samples by Hill in is Appendix Three. Discussion of ceramic materials and samples may be found under the subhead "Ceramics" in the site reports (Chapter 4) for 42Da634, 599, 614 and 685. The above information is summarized here.

Ceramics in dated contexts were from relatively late Fremont brush structures at 42Da685 and 42Da614 (1170 and 1070 BP). Six additional sherds were recovered from undated contexts: three from the Modern Burn area at 42Da634, and three from the surface at 42Da599. The materials from 42Da634 and 599 were either collected from the surface, or in the case of the sherd from the Modern Burn, from an area of recently deposited alluvial sand. These undated sherd included both Fremont and Shoshonean types.

The Shoshonean sherd were recovered from 42Da599 (three body sherds believed to represent one vessel) and 42Da634 (a rim sherd and a base sherded representing two vessels). These ceramics were classified as Shoshone or Uncompahgre Brown ware, which typically appears after 1000 BP. Sherd, and Desert Side-scrub projectile points from the surface and recent alluvial fill at 42Da364 and from cultural palimpsests at 42Da634 and 599, constitute the cultural material evidence for presence of Shoshonean peoples, or for prehistoric occupation of the project area after 1000 BP.

The Fremont ceramics from brush structures at 42Da614 and 685 represent the remains of approximately four Uinta Gray ware vessels. Analysis of samples from each site (and refitting of sherd from 42Da614) indicated at least two vessels were represented at each site. These vessels had limestone temper consistent with Uinta Fremont ceramics (Troydale and Hill 1990, 1991).

Sherd from 42Da685 apparently represent the remains of two vessels of a previously unreported variety, which this report characterizes as Dutch John Gray. The basis of this classification as a new Uinta Gray ware variety is the presence of fired on red cross hatched patterns on the vessel's exterior. Chapter 4 contains illustrations, photographs, and further discussion of Dutch John Gray ware vessels.

Analysis of paste and temper constituents of ceramics from Dutch John sites (Appendix Three) was discussed with a local geologist. Constituents of Dutch John ceramics vary, but all, regardless of temporal or cultural affiliations, appear to have utilized materials that occur within 3-4 km (about 2 miles) of Dutch John. Geologic formations strongly indicated by ceramic constituents are the Morrison and Stump formations, the Red Creek formation, and the Mississippian and Morgan limestones. Source of the limestones is probably the nearby canyon of the Green River. The Morrison formations, although regionally extensive, are somewhat more limited in distribution in the Dutch John area. However, these formations occur at Dutch John, and from the immediate area of the Red Creek project area on the north. Outcrops of the Morrison are found in the Browns Park area, and to the flank of Dutch John Mountain adjacent to the project area on the north. The Red Creek formations also contains quantities of tool stone quality, occasional examples of which were recovered during excavations.

Nic unexpectedly, the Shoshonean sherd (42Da364, FS-125 and FS-130, 42Da599, FS-288) show no formal temper, and poorly sorted pastes with considerable coarse natural mineral and rock inclusions, suggesting little effort in preparation or

quality control. Utilization of local constituents in Shoshonean Brownwares suggests the possibility that Late Prehistoric Nunamiup peoples utilized the Dutch John area more extensively than is indicated in the archaeological record. The Fremont ceramics (42Da614- FS-1.1 and FS-1.2, 42Da685: FS-52 and FS-X) show a greater investment in quality. The pastes are fine and relatively free of natural inclusions: the formal limestone temper shows sorting and is relatively consistently distributed throughout the paste. Simms relates level of ceramic investment to mobility (low mobility associated with more investment) including the possibility that low mobility strategies included logistical mobility or ceramic curing and reuse during recurrent site use (Simms et al. 1997). Fremont occupation at 42Da614 and 42Da685 appears to have been seasonal (midsummer through fall) visits associated with construction of brush structures and hunting of large (antelope- elk sized) game animals. Presence of fish bone and corn remains suggests the possibility use was by a farming group with residence nearby in the canyon of the Green River. Although no definitive evidence of recouperation episodes was noted, either intended recouperation or logistical mobility may be associated with Fremont ceramic investment level at Dutch John.

Ceramics at 42Da614 and 42Da685 and groundstones at 62Da164, suggest a mixed gender Fremont presence. These brief seasonal occupations may have had multiple facias: a primary on meat procurement, ceramic construction by some members of the group, and of course, processing of seasonally abundant plant resources.

The unique ceramics recovered at 42Da685, described as this document as Dutch John Gray, a variety of Uinta Gray ware, were associated with the one flake of obsidian for which Hughes (1997) was unable to identify a source. Simms et al. (1997) found that naturally non-local ceramics, especially as identified by variations in painted finish, followed local ceramic traditions: in other aspects of construction, suggesting that stylistic diffusion may be a more viable explanation than trade for this kind of variability. Presence of the non-local paint style in conjunction with the obsidian from an unknown source suggests the possibility that some member of the group that occupied the structure at 42Da685 may not have been native to the local Uinta Fremont population, although of course no conclusions can be drawn from such a small sample size.

Simms et al. (1997) demonstrate that, among ceramic assemblages in northwestern Utah, local sources are used for ceramic temper so consistently that the variation in ceramic temper among types is better attributed to location than to culture or time period. At Dutch John this does not seem to be the case. Constituents of both Fremont and Shoshonean ceramics at Dutch John suggest material acquisition (and probably construction) in the immediate area, yet there are clear differences between Shoshonean and Fremont ceramics identified by burned temper (low mobility type) and inclusion in Shoshonean sherd of coarse (mostly quartzitic) fragments that could be confined with an added temper. Additionally, the admittedly small sample also showed quantitatively different limestone temper levels when 42Da614 sherd were compared with those from 42Da685.

Plants
The general paucity of identifiable plant remains from the project area limits interpretation. Macrofossil, pollen and plant starch analyses are in Appendices One and Two. Further discussion occurs in Chapter 5, and in the site reports (Chapter 4). A brief summary is included here.

The ubiquity of Cheno-am pollen suggests utilization of this resource, although no sample had levels high enough for robust inference. Identification of Apiaceae type starch in one sample was consistent with processing of at least some roots of the Parsley family. Ubiquity of Opuntia pollen in samples analyzed by Cummins (Appendix Two) from n.4th century, two stabilized basins and a brush structure dating from Late Archaic through Fremont time suggested utilization: prickly pear cacti. However, cactus spines or glochids would be expected components of fill where cactus were exploited, yet no Opuntia macrofossils were recovered.

Macrofossil evidence of seed utilization was also sparse, consisting primarily of occasionally charred juniper seeds. These seedlings could have entered the record through twigs or branches used for fuel, defoliation or burning of juniper used as a super-structural component of brush structures, or even through ground disturbance by people using a bench, although the ubiquity of juniper seeds in macrofossil samples raises the possibility they were utilized. There was no evidence for pinyon nut exploitation at Dutch John.

Presence of corn cobs and a corn kernel in a sample from Fremont brush structures dating 1100-1200 BP probably indicates transport from the canyon of the Green River adjacent to the project area, since it is unlikely the growing season at Dutch John would have allowed maturation of this crop.
Chapter 7

Slab-Lined Basins

Daniel C. Pugh and Clay Johnson

Two types of occupational features predominated at Dutch John: slab-lined basins and brush/temporary dwelling structures. Brush structures frequently were adjacent to open-air activity areas featuring hearths and/or pits. Slab-lined basins typically were not associated with other features, although they tended to occur in 2-4 basin clusters. Occasional isolated hearths or roasting pits were noted. These isolated features and the related assemblages did not appear materially or morphologically at variance with similar features noted in association with brush structures or slab-lined basins. Isolated hearths and pits for each site are described in the site reports (Chapter 4). Brush structures are discussed in Chapter 8.

Introduction

As described for southwestern Wyoming by Smith and McNees (1999:117-136), slab-lined basins are typically cylindrical to truncated conical pits distinguished by the use of large, flat sandstone or quartzite slabs to line the walls and sometimes the floor of the pit. Considerable care in construction is often evident from the fit of stones in the walls and floor. The slab lining is sometimes chinked with smaller stones, and less often, sealed with a mud mortar. The tops of stone slabs lining the pit walls often protrude several centimeters above the present day ground surface. These basins are typically located in open places with relatively loose, deep soils. The geographic range of slab-lined basins in southwest Wyoming is restricted to desert shrubland, and the typical setting described as follows:

"The slab-lined cylindrical basin locales also tend to be situated in uplands near or above major perennial drainage valleys; tend to occur in broken, but relatively open, terrains characterized by low sandstone encarpments and broad relatively shallow drainages or playa basins; and are mostly associated with aeolian (windblown) sand deposits, sometimes intermixed with or forming a veneer on fluvial deposits." (Smith and McNees 1999:130).

Wyoming basins are associated primarily with other basins, with thick charcoal lenses attributed to dumping of charcoal emptied from the basins, and with unlined pits that may have been associated with basin use. Groundstone in small quantities is "usually" (Smith and McNees 1999:123-4) associated with the Wyoming basins. Building and maintaining a fire in a deep, straight sided pit with a relatively small diameter is difficult (Puseman 1999) and pits or charcoal basins ancillary to basins may reflect a strategy of building a fire, then moving coals, heated rocks, or burning wood to the basin.

Basin fill is typically charcoal stained sediment with very sparse cultural material. Slab-lined basins are believed to have been used to roast seasonally available roots and tubers such as Calochortus (Sego lily), Cymopterus and Lomatium (biscuitroot) and the pads of Opuntia (prickly pear cactus) which would have been available throughout the year. In the Upper Green River Basin, large diameter, rock filled pit ovens were used to cook similar tubers or roots with high levels of insulin and fructose, thus facilitating human consumption (Francis 1995). Calculations for biscuitroot cited by Smith and McNees (1999:125) suggest that processing of one basin full of roots would supply sufficient calories for one person for at least two months, or eight people for a week. As Francis (1995:10) points out, if this food could be stored in a preserveable and transportable form, it could account for a significant portion of a group's annual caloric intake.

Wyoming slab-lined basins discussed by Smith and McNees date from 6500-3120 BP, with two thirds of the sample dating to before 4100 BP. Using a somewhat different data set, Thompson and Pastor (1995:87-92) date slab-lined basins to between 6500-950 BP, with the majority dating from 6000-4000 BP. Dutch John slab-lined basins dated 4110-1060 BP, with the majority dating between 4200-3100 BP. Southwestern Wyoming slab-lined basins are found in decreasing numbers throughout the Archaic and even later, but are most common (64.5%) in the Opal phase of the Early Archaic. Dutch John slab-lined basins cluster in the succeeding Pine Spring phase.

A majority of Wyoming slab-lined basins measure 50-85 cm in diameter (d), with depth variable, but commonly ranging between 1/2-1 d (Smith and McNees 1999:123). Estimated volume of the slab-lined basin sample is calculated by Smith and McNees (1999:122) as averaging 116 liters (range 45-429 liters). Thompson and Pastor (1995:91) offer a formula for
estimating basin volume, and calculate a volume range of 14.7-285.9 liters for their sample, with volumes clustering between 40-60 liters and 80-150 liters. Opal phase basins clustered between 80-150 liters, and the two highest volumes (268.6 and 285.9 liters) were obtained by Thompson and Pastor for Wyoming Pine Spring phase basins.

Construction of slab-lined basins is obviously more energy intensive than digging of unlined pits or hearths, although in loose soils with plentiful tabular rock nearby, one person could probably construct at least one of these features per day. Smith and McNees (1999:127-130) argue this extra expended energy was justified because such features were easily relocated and reused over time by foraging groups, were situated near concentrations of root or tuber resources, and that slab-lined basins were constructed with the tops of the wall lining stones protruding above ground level to facilitate relocation of the features after an extended absence. Smith and McNees suggest periodic reuse over periods of up to 500 years at intervals of up to 100 years.

While intervals of this length may reflect the effective use of slab-lined features, or indicate patterns of land use (Blinford 1983), attribution of reuse intervals on this order to energy required for construction is problematic. These features were probably constructed near recurrent patches of root and tuber resources, but with immediate rather than future use in mind. Advantages gained from the additional effort of lining the features would have been conservation of heat, extended combustion time due to isolation from soil dampness, stabilization of pit walls, and separation of contents from the surrounding soil. Since these features were typically dug to either hard soil strata or bedrock (Smith and McNees 1999:21), terminating the wall lining exactly at the surface would have required considerable shaping and trimming of the rock slabs, while terminating the wall lining below the ground surface would have been counterproductive. While protruding rock rings might have aided relocation of these features, it seems likely this was primarily a serendipitous outcome of construction.

Slab-lined basins are widely reported for southwestern Wyoming, and occasionally for areas south of the Uinta Basin (an example is Feature 7 in Cedar Siding Shelter [42Em153] of Emery County, Utah [Martin et al. 1983]). However, slab-lined basins are not a common cultural feature for the Uinta Fremont or in the northeastern Great Basin.

Smith and McNees (1999) and Thompson and Pastor (1995) describe a total of approximately 50 slab-lined basins reported at 27 locations in southwestern Wyoming sites between 1981 and 1995: the Dutch John project area of four square miles produced 12 sites with a total of 20 of these slab-lined basins.

**Slab-Lined Basins at Dutch John**

Slab-lined basins were the most common archeological feature at Dutch John. Twenty basins were identified through survey and excavation activities on the four square miles of the project. Virtually all of these basins were noted during survey as rings of rock protruding a few centimeters above the surface. Soil probes within these rock rings often yielded culturally yielding culturally stained soil when probed were partially excavated and found to be natural features. Extensive intensive and systematic soil probes to identify subsurface deposits not apparent on the surface failed to locate additional slab-lined basins, although a number of other cultural features were located in this way. Experience suggests that, at least for depositional environments similar to that at Dutch John, surveys may tend to overestimate, rather than underestimate the number of slab-lined basins in an area.

Sixteen slab-lined basins were excavated as part of this project, including basins at 42Da2599, 600, 617, 686, 687, 689, 693 and 696. Two additional slab-lined basins within the project area at 42Da131 were excavated in a separate investigation conducted by the Forest Service. One basin at 42Da605 was apparently located on the surface as a ring of rocks protruding above the ground was recorded and photographed, but not excavated. The remaining unexcavated slab-lined basin (at 42Da709) was identified through portions of the rock lining eroding out of a cutbank.

Table 7.1 organizes information for Dutch John slab-lined basins by site. At Dutch John, slab-lined basins show to a considerably greater degree than other features the degrading effects of natural processes. Approximately one third of the basins have been obviously degraded morphologically by natural processes. These basins tend to have been constructed in exposed areas of relatively soft, deep soil. Fill profiles suggest basins were typically partially empty when abandoned, and interior fill was loose material. Under such conditions, effects of frost heave, wind-moision or unusually heavy precipitation are magnified. Additionally, the relatively soft surrounding soil and fill would be attractive to plant roots.

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<table>
<thead>
<tr>
<th>Site</th>
<th>Date (BP)</th>
<th>Depth Prominence (cm)</th>
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<th>Contents</th>
<th>Associated Features</th>
<th>Other Site Features</th>
<th>Comments</th>
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<td>SLB, Hearth</td>
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<td>SLB, Hearth</td>
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<td>3130±20 BP</td>
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<td>56*</td>
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<tr>
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Key: B = bone C = charcoal D = debitage F = biface H = hematite L = drill M = mano T = metate R = rock SLB = slab-lined basin fcr = fire cracked rock f = fragment h = horizontal

Asterisk in dimensional data column indicates measurement was estimated, typically due to environmental disturbance of the feature.

Asterisk in Comments column precedes inferred agent of disturbance.

Asterisk in Other Site Features column indicates some uncertainty about identification of feature.

Asterisk in Age column indicates inferred age of feature. Where there was no basis for inference of age, the space is blank.

Table 7.1. Dutch John slab-lined basins.
Volume was not calculated for many Dutch John basins due to dimensional uncertainties and morphological variability. Interested parties can estimate volumetric measurements for most basins by using Table 7.1 in conjunction with feature maps in the applicable site reports.

Typical slab-lined basins.
Dutch John slab-lined basins were situated in relatively open areas on slopes or benches around the perimeter of Dutch John Flat. All the basins were lined with tabular Uinta quartzite, and only one basin was reported not to have a stone lined bottom. Even the most open areas were not so large that all large quantities of Construction quality varied, but many basins showed carefulfitting of the rocks used for the lining. Only small quantities of groundstone, typically single hand manos, were associated with these basins, although excavation primarily within the basins may have biased this observation.

Basin cultural fill typically was charcoal stained soil containing little in the way of material culture. In opposition to the reported frequency of Wyoming basins with associated groundstone, only 4 of 18 Dutch John basins were associated with groundstone: 2 with metate fragments and 2 with mano or mano fragments. Primary associated features were other slab-lined basins, although one associated pit and one charcoal stain were recorded. It must be noted here that many of these slab-lined basins were excavated as 1 m. or 1.5 m squares, often with full excavation occurring only within the basin itself. Although skimming and probes were employed in areas adjacent to these basins in an effort to identify additional features, it is possible that some associated features were missed. Half of the slab-lined basin sites excavated had no features other than basins identified. For the sites containing other features not obviously associated with the slab-lined basins, the additional site features were predominantly isolated hearths or pits. None of these isolated features were dated.

Three typical Dutch John slab-lined basins were initially dated to 4110, 3300, and 3130 BP, with two additional basins later selected to test this range returning intermediate dates of 4100 and 3300 BP. These dates fall after the majority of slab-lined basin dates from Wyoming.

The average of top inside dimensions for Dutch John basins ranges from 20-90 cm. The 20 cm diameter basin at 42Da599 is an obvious outlier at 40% of the next smallest basin diameter. Leaving 42Da599 out of the calculation results in a basin mean top inside diameter of 67.8 cm with a sample SD of 12.54 cm, resulting in a 1-sigma range of 53.3-80.3 cm, which is in close agreement with Smith and McNees. Basin basal inside diameter averages approximately 27 cm. Disregarding Basin 2 at 42Da69 which was severely disarranged by natural site processes, basin depth varies from approximately 41.1 d, with clusters around 5 and 8 d. Applying the formula used by Thompson and Pastor (1995:91) 42Da600 Basin I and 42Da617 Basin 2, intuitively selected as the lowest and highest volume typical Dutch John slab-lined basins not disarranged by natural processes results in an estimated volume range of 48.8 (42Da600) to 143.7 (42Da617) liters for Dutch John slab-lined basins, matching well with Thompson and Pastor’s data.

Large quantities of charcoal were absent from Dutch John basins, and little fire cracked rock was noted. These basins typically showed signs of heating, but were not highly oxidized.

Initial pollen and macrofloral analysis of samples from Dutch John slab-lined basins was not revealing. In a further attempt to identify remains of resources processed in slab-lined basins, and how these resources might vary from those processed in other features or during other temporal periods, samples from four sites were submitted to Paleo Research Labs (Appendix Two) for analysis of pollen and starch residue. Two samples were from feature, other than slab-lined basins, and from other temporal periods: Hearth 2 at 42Da364 (1400 BP) and Structure 1 at 42Da690 (5830 BP). Two samples were from slab-lined basins: Basin 1 at 42Da693 (4100 BP) and Basin 1 at 42Da617 (3130 BP). Non diagnostic plant starch was recovered from all four samples. However, only one granule of Apiaceae type starch supporting processing of biscuitroot was identified (from 42Da617 Basin 1). All four features yielded Opuntia pollen. This ubiquity for a pollen that typically does not occur away from the plant itself suggests economic use of prickly pear cactus. However, it does not support any inferences regarding differentiation between slab-lined basins and other hearths or pits, or between temporal periods. Chenopod pollen levels do not appear to be higher in slab-lined basins than in other features at Dutch John.

Atypical slab-lined basins.
Four slab-lined basins at Dutch John are morphologically atypical. Interestingly, the two of these basins that were dated fall outside of the date range for the typical basins. The basin at 42Da606 (1060 BP) had an unlined bottom, and the profile (Chapter 4, Feature Map 4.18) suggested the possibility a roasting pit had been superimposed on remains of an earlier slab-lined basin.

Plate 7.1a, 42Da131 slab-lined basin 1, view SE

Plate 7.1b, 42Da131 slab-lined basin 2, view N and profile

Plate 7.1. Two slab-lined basins at 42Da131.
Of the two undated atypical slab-lined basins, the basin at 42Da599 was extremely small in diameter (20 cm) and depth (19 cm) was approximately the same as the diameter. This basin was morphologically and diagnostically within the range of four bedrock hole features identified at Uinta Fremont sites in the Uinta Basin (C. Johnson 1991). The bedrock hole features were between 17.22 cm in diameter, with depth equal to or greater than diameter, and surrounded by patterns of 1-4 very shallow, small holes within 40 cm. Johnson speculated these bedrock hole features may have been used for cooking over charcoal in conjunction with Fremont ceramic vessels during the warmer part of the year. The remaining atypical basin (42Da487 Basin 2) was atypically almost football shaped in plan view, quite shallow for its diameter. This basin looked more like a stone lined fire hearth than a slab-lined basin. Unlike typical slab-lined basins at Dutch John, this feature would have been easy to start a fire in. This basin shared a site with a typical slab-lined basin inferred to date to the Late Archaic period.

Discussion

All Dutch John slab-lined basins contained soil discolored by charcoal or ash. Although not usually oxidized to a great extent, the linings and especially the bottoms showed discoloration attributed to low heat fires. These basins are thus believed to have been for cooking, not for storage. Dutch John basins typically did not have evidence of repeated use. Relatively low quantities of groundstone associated with Dutch John basins suggested that, whatever the resources, its extensive use of groundstone, at least in the immediate vicinity of the basins, was not involved.

As with Wyoming basins, these features at Dutch John were typically identifiable at 10-20 meters distance as a ring of rocks protruding above the ground surface. Although this protrusion was probably incidental to construction rather than an element of design, slab-lined basin users would have found it useful to discover usable basins when visiting an area for the first time, or for the first time in one or more generations.

The cooking process that would occur through use of coals for cooking in these basins is perhaps most analogous to Dutch oven cooking today. This process involves long, slow cooking in low, relatively uniform surrounding heat. This type of cooking is most useful with items of relatively thick cross section that require slow cooking over low heat with conservation of moisture. Examples of such items are meat, whole animal carcases, and relatively thick roots or tubers. Characteristics of the process are that no additional fuel or tending is required after the oven is filled, and relatively large quantities may be cooked at one time. Once the oven is filled and covered, essentially no heat or smoke is apparent at the ground surface during the remainder of the process (Puesman 1999, personal communication).

The chief advantage to this type of cooking may be that, once the oven is filled, the oven user is free to engage in other activities for an extended period (estimated at 6-36 hours) while the contents cook undetected. The cooking process can thus safely occur during the time allotted to other activities, which need not take place in the immediate vicinity of the oven. This has implications for the timing and nature of other subsistence activities.

Wyoming studies (Smith and McNees 1991; Thompson and Pastor 1993) suggested the hypothesis that Aparcaene type roots or tubers were processed in slab-lined basins. An additional hypothesis suggested by presence of Opuntia pollen was that these features were used to process cactus pads or fruit. Neither hypothesis was strongly supported by analysis of fill from Dutch John slab-lined basins. No Opuntia glochids, seeds, or spines were recovered, only one starch granule tentatively identified as Aparcaene was noted. Low levels of pollen from Cheno-ams and Opuntia (prickly pear cactus) and the presence of one Aparcaene type starch granule, relatively small quantities of groundstone, bone, and debitage, and lack of distinctive macrofossil materials in Dutch John basins do not allow a determination as to the resource's processing in them. The inference they were used for roasting roots and tubers is based largely on the availability of biscuitroot at Dutch John slab-lined basin sites, and on Wyoming data from Morgan (Thompson and Pastor 1993, Smith and McNees 1991, 1999). The idea these basins were used to process cactus pads or fruit is based on availability of cactus at Dutch John, and on presence of low quantities of Opuntia pollen, which was also present in similar quantities in Hearth 2 at 42Da364 and in Structure 1, Pit 1 at 42Da490.

The biscuitroots (Cymopterus and Lomatium), Sego lily (Calcitormus) roots, and wild onions (Allium sp.) are easily available only in the spring. At Dutch John, Lomatium and Sego lily are typically obvious in April and May (Goodrich 1999, personal communication). However, patches of Sego lily were noted after the middle of June in 1999, a year with unusually cool, extended spring weather. If these vegetation products were targeted, season of use was probably spring. Prickly pear cactus pads are readily available throughout the year, and thus may have been especially important during the late winter and very early in the spring when other resources were limited.

Two of the four morphologically atypical slab-lined basins at Dutch John date 1000-2000 years later than the typical basins. A third atypical basin of the four may also date this late, based on similarity to bedrock Uinta Fremont features in the Uinta Basin. This suggests that, whatever the reasons for the differences, slab-lined basin morphology may be a temporal or cultural correlate.

The extended intervals between basin reuses as suggested by Smith and McNees and the data from Dutch John do not suggest strategies involving annual reuse, or reuse at intervals based on resting the resource after intensive harvesting. Intervals of decades to hundreds of years between basin reuse or building of additional basins suggest only occasional, sporadic visits, either when particular types of resources were especially plentiful at basin sites, or when conditions were good in comparison to those in more intensively exploited areas. The additional effort required to construct slab-lined basins may have been motivated either by the desirability of a particular type of cooking process (slow cooking with minimal fuel expenditure and moisture loss), or the nature of the process (cooking while unattended).

Summary

The unusual number of slab-lined basins in a relatively small area at Dutch John permitted comparison of morphology, identification of a temporal range, and inferences about the purpose and use of these features. All slab-lined basins at Dutch John were constructed of tabular Uinta quartzite, the predominant construction stone available within the project area.

Typical Dutch John basins compared well with Wyoming basins as to assignment to the Archaic period, diameter, size and volume range, lack of associated cultural materials, and probable use to process roots and tubers. Typical Dutch John basins differed from Wyoming basins in being fully lined including the bottom, in relatively low oxidation of the lining, in lack of obvious reuse, and in dating to 4100-3100 BP, later than the majority of the Wyoming basins. Typical Dutch John slab-lined basins may have temporally preceded the atypical basins, suggesting the possibility that some morphological aspects were temporal or cultural variables. Basin depth, however, appeared determined by depth of workable soils.

Dates obtained from Dutch John basins, along with lack of evidence for regular reuse, suggest these features were not constructed primarily with regular reuse in mind.
It may be most useful to think of slab-lined basins as indicative a particular cooking process, slow, low temperature cooking with conservation of moisture and a minimum expenditure of fuel and tending time, rather than as associated with a particular resource or season of use.

A feature of slab-lined basin cooking not discussed by Thompson and Pastor (1995) or Smith and McNees (1999) is that cooking can proceed without tending, and with very low likelihood of disturbance by animals or weather factors. Thus, other subsistence activities, including foraging or hunting in the general area, can proceed simultaneously and without risk. Benefits would be greatest for people employing high mobility strategies, which may explain the Archaic temporal association and lack of associated features.

Chapter 8
Prehistoric Structures
Byron Loosle

Prehistoric Structures
Structures from three different prehistoric periods were identified during the Dutch John mitigation. Early Archaic structures were found at 42Da690. At 42Da684 early Fremont structure remains were recovered, and at 42Da614 and 685 late Fremont structures were excavated. The sites with structures show evidence of multiple activities unlike most sites within the exchange area (i.e. slab-lined basin sites, storage cists, hunting blinds, or hearths) where limited activities are evident. This suggests sites with structures were occupied longer and perhaps by more individuals than other sites within the project area.

Early Archaic

The first structures in Dutch John were constructed at 42Da690. This site was reoccupied several times over perhaps 1000 years of the Early Archaic period. Three structures were identified during the excavations. Two activity areas and numerous pits were also found and may suggest other structures existed at the site. Their remains may have been ephemeral or subsequent prehistoric use may have obliterated definitive evidence of their existence.

Structure 1 was an oval area, 2.9 by 2.4 m in size. The shallow basin shaped floor was probably covered by a light framework of wattle. Several pieces of groundstone, hammerstones, faunal bone, debitage and lithic tools were found inside this structure. Limited evidence of economic floral species was recovered, but plant processing is suspected as an important activity in the structure. Several flat stones were placed around a central pit (Pl. 1). Two of these slabs had evident saw cuts and were probably used as metates. The central pit appears to have been a roasting pit and not a hearth, as the bottom and sides were not oxidized. A variety of material was recovered from the pit, suggesting it may have been filled with trash at the end of its usefulness. A date of 5830±50 BP obtained from charcoal in Pit 1 was the latest date from the site.

Structure 2 was the most complex feature at the site. It was kidney shaped with one interior hearth and four pits. The structure was 4.3 m in size and 35 to 50 cm in depth. As with the other structures at the site, no evidence of postmolds or a substantial superstructure was encountered. The depression was probably covered by a light brush framework. Numerous artifacts were found in the structure fill, including faunal bone, groundstone, debitage and chipped stone tools. A date of 6000±50 BP was obtained from the hearth.

Structure 3 was on the eastern edge of the site. This was a circular shaped area 2.3 by 2.4 m in size. The western edge of the structure was found at modern ground level, but the eastern edge was 30 cm below surfice. It appears this eastern edge may have been dug into the original ground surface to create a level floor for the structure. A deep hearth was located in the southeastern portion of this structure. Less material culture was found in this area, but significant bone, some groundstone and two projectile points were found in the structure fill.

In summary, considerable faunal bone and groundstone were recovered from the Early Archaic occupations at Dutch John, unlike Late Archaic sites containing slab-lined basins. Considerable bone was also associated with the structures at 42Da690 and nearly 70% of this bone came from medium to large mammals. There was a clear preference for artiodactyls by the site occupants. Bone fusion data suggest a midsummer to fall occupation at the site (Chapter 6). It is assumed that plant processing was an important activity at the site, but eight flotation samples failed to reveal clear evidence of seed processing. Twelve charred juniper seeds or seed fragments were found in three locations. Although this is a larger quantity than recovered from any other site in the project, it is still too small a number support a clear reference for economic use of juniper seeds. A pollen sample from Structure 1 suggests Ceno-ams and Osmantia may have been processed, and nondiagnostic starch granules were also recovered. Berry, plant greens, cactus and tuber processing may have been more important than seed processing at this site.
Spangler (1995:360) has observed that "strained Early Archaic deposits are rare in the Uinta Basin." As a result, no comparable structures or collections have been recovered to permit comparison of 42Da690 with the Uinta Basin to the south.

However, in 1993, 1994, 1995, 1996, 2000, and 2001, Larson and Thompson (1997:361) report the discovery of coursed stone walls at 42Da690. Thompson and Pastor (1995:40) propose a starting date of 6500 BP for the Opal Phase in southwestern Wyoming. Although a date of 6870±70 BP was obtained from Test Trench 1, nearly all of the recovered cultural material at 42Da690 can be placed between 6310-5830 BP within Thompson and Pastor’s Opal Phase. The Opal phase lithic assemblage is characterized by large side and corner-notch points and the faunal assemblage is dominated by small mammals (Thompson and Pastor 1995:40). "Howseport appears during the Opal phase of the Early Archaic period" (Thompson & Pastor 1995:40). Although Thompson and Pastor (1995:40, 94) list several characteristics of Opal phase houses and Archaic dwellings, Larson (1997:353-360) provides a more comprehensive and detailed discussion of Wyoming dwellings during this period. Her list of characteristics includes the following characteristics: 1) No structures were identified on the surface, only during construction of a pipeline or due to other ground disturbance. 2) Structures contained few post hole impressions. 3) Each site averaged 1 or 2 house pits and 5 interior features (but Larson believes this is a low estimate) 4) Structures were more common in the Wyoming Basin, especially in the foothills surrounding the basin. 5) Structures were 2 to 5 m in diameter, most were between 2 and 4 m in diameter. 6) Flows were 15 years or less in duration, many structures were described as being shallow basin-like construction. 7) Structures were round to oval in shape, none were rectangular. 8) Floors were excavated from eluvial deposited sand. 9) Structures were near (within 250 m of) permanent water. 10) Structures were near resource patches. 11) Structures were located in sagebrush or sagebrush/saltbrush communities. 12) The majority of structures dated between 6000-4000 BP. 13) Occupations predominantly utilized local chipped stone material. 14) The faunal assemblage consisted of highly fragmented bone, predominately of either small mammal or of all size classes. 15) Groundstone was common, and clearly associated with chert debris remains at sites.

From this summary it should be clear that the structures at 42Da690 are very similar to those in the Wyoming Basin and represent a common pattern. There are a few interesting differences. Structural remains at 42Da690 were visible on the surface. Abundant groundstone, debrisage and soil staining from the structures was visible before excavation. This is probably due to the relatively stable depositional setting in Dutch John. The site is in dense pinyon-juniper woodland rather than sagebrush, but Larson admits some houses have been found in a juniper setting. Non-local chipped stone predominates at 42Da690. This is especially surprising because the site is just below 42Da625 (the quarry for Dutch John chert) and Da624 (a quarry for Dutch John) are close to Dutch John sites at similar distance from these quarries (42De885 and 690) have higher rates of local toolstone use (see Chapter 6), but also date much later. This means the occupants of 42Da690 were not as familiar with the area, hence not aware of the source, more particular about the material they worked, or not as willing to experiment with new materials? Larson (1997:361) states that at only one Wyoming site does large mammal bone predominate the faunal assemblage. At 42Da690 there is a clear preference for medium to large mammals, not small mammals as is characteristic of the Opal phase (Thompson and Pastor 1995:40) and Wyoming house pits. It seems what this may mean in the larger context.

Larson (1997:361) shows a strong correlation between presence of groundstone and chert debris at house pits at 42Da690. 42Da690 has abundant groundstone, much more than appears typical for Opal phase and house pit sites. There is limited evidence of seed processing at the site, the nine charred juniper seed fragments found in Pit 5 of Structure 2 being the best sign. Instead of seed processing, we feel there was more emphasis on soft plant parts such as berries, greens, nuxleus and chips at Dutch John. Larson (1997:361) dismisses most considerations of arson of occupation because authors tend to rely on the presence of seeds, which she argues is problematic. At 42Da690 we relied on bone fusion data in suggesting an occupation of midsummer to fall. This would also have been a peak time for many of the plant resources we suspect were being used.

The occupation at 42Da690 falls near the early end of Larson’s (1997:Figure 6) range for house pit use. Her graph shows a peak after 5000 BP. In fact, the averaged dates for 42Da690 fall into a gap in the Larson data. Larson (1997:364) argues for some significant changes around 4000 BP. The limited data from Dutch John tends to support this argument, but we feel additional factors like climate and mobility played a role in this change.

Larson argues that the house pits of the Archaic period do not indicate reduced mobility for the inhabitants, as is often suggested, but changes in storage practices. "Rather, after 4000 years ago changes in the form and nature of storage technology allowed for easier and better utilization of household spaces" (Larson 1997:361). We see significant changes in basketry and possibly meat drying led to mobile storage practices. Adoption of basketry helped individuals carry more supplies and drying helped preserve meat for storage and reduced considerably its weight so more daily rations could be carried. Permanent storage pits in the house pits had been critical in the earlier time period, but dwelling constructions changed as mobile storage practices were adopted. Societies tend to be conservative, so Larson’s ideas beg the question, what developments precipitated the change in technology and adoption of new strategies? What had changed?

The Dutch John data does not appear to support Larson’s hypothesis. First, there is limited storage potential at 42Da690. The available pits would not have stored adequate foodstuffs to last a small family for very long. In fact, 42Da690 has a much smaller number of pits than seems typical for this period. Larson also seems to be suggesting that this storage was especially important during the winter and other lean times. There is no evidence to indicate that 42Da690 was occupied during the winter. Storage may not have been important at this site. The types of plant resources we suspect they were using would also not store as well as seeds or other resources.

Second, the Dutch John data suggests mobility may have instead been an important part of the changes that occurred much later, around 4000 BP. There is an occupational hiatus of nearly 1800 years (5300-4110 BP) at Dutch John. We then see the introduction of a new feature, the slab-lined basin, at 4110 BP. The period after 4000 BP at Dutch John is dominated by slab-lined basin sites with sparse cultural remains representing a particular focused activity. This pattern appears to be typical of data mobile hunter-gatherer groups, much more so than Dutch John. The cultural association with slab-lined basins does not show changes in technology. Slab-lined basins had been constructed in Wyoming for hundreds of years prior to their introduction at Dutch John (Chapter 7). This tends to argue for a change in the mobility pattern or a change in the climate which encouraged individuals to visit an area not previously utilized.

Larson (1997:364) dismisses climatic shifts as an explanation for the changes around 4000 BP. The climatic data from Dutch John (Chapter 5) would support this notion. There is little evidence of a significant climatic shift between 5800 and 4110 BP at Dutch John. However, Dutch John appears to have been buffered from most dramatic climatic changes and this may have made the area especially attractive during particular periods of time when climatic shifts were more noticeable in other areas.

We agree that "some alteration in the organization of society in the area" (Larson 1997:364) happened around 4000 BP. However, this apparent phenomenon needs to be studied in its "differential peripheral areas like Dutch John to understand the entire regional pattern. Development of new technologies as Larson suggests is probably only one aspect of a complex response to possible changing social, demographic and/or climatic conditions.

Mobility does appear to be an important consideration in the Archaic occupations in Dutch John. We suspect environmental conditions in Dutch John around 6000 BP made it a favorable location for seasonal residences shortly after pit house architecture was adopted by the residents of the Wyoming Basin. We suspect these stays lasted a number of days to a few weeks, during which time a variety of resources were exploited. An environmental conditions moderated in the Wyoming Basin, Dutch John became less desirable and was abandoned for a time. Either resources were redundant and available elsewhere or accessibility became important as core resource areas moved further from this border area. 4000 BP social or climatic conditions changed so that highly mobile groups began visiting Dutch John again. These visits appear to be very short, only a day or two, to exploit a limited range of plant resources. Did climatic changes in the Wyoming Basin make resources in Dutch John more important or did the technological changes proposed by Larson allow greater mobility and access to Dutch John at this time?

Early Fremont

After an apparent hiatus of 4000 years the construction of dwellings resumed at Dutch John around 1800 BP. All of these structures were uncovered at 42Da564. Structure 1 was an oval shaped, shallow basin measuring 3.9 by 4.2 m. Numerous artifacts including faunal bone, debrisage, groundstone and chipped stone tools were recovered from the fill. A central hearth and a sub-floor flake core was found inside the structure. Dates of 1760±50 BP and 1740±50 BP were obtained from the hearth and one of the pits. Very limited floral remains were found in the pollen and flotation samples from this structure.

Structure 2 was a roughly circular structure, 2.4 by 2.7 meters in size. This shallow basin shaped depression may have been covered by a fairly substantial superstructure. Two burned log fragments 20 to 25 cm in diameter were found in the northwest quadrant. Limited material culture remains were found in the structure fill and include Rose Spring and Pamo projectile
points, 4 bifaces, a mano, and some faunal bone. No date was obtained for this dwelling, but the narrow range of dates from the site and the Rose Spring projectile point suggest that a date between 1800 and 1350 BP would not be unexpected.

Structure 3 was a steep walled housepit, 20 cm in depth. The depression was circular in shape and approximately 2.6 by 2 m in size. Evidence of a radial brush framework was found just outside the southeastern edge of the depression. Two bifaces, debitage, and most of the site's faunal bone were recovered from within this structure. No sub-floor pits nor hearth were found in the excavated portion of the structure. A date of 1710±60 BP was obtained from Structure 3 fill. Sparse floral remains were recovered from the flotation sample and included charcoal from Pinas and Juniperus, and wood.

Larson (1997:360) notes declining use of housepits in Wyoming by this period. The structure dates from 42Da364 would again fall in a gap toward the end of her sequence (Larson 1997:Figure 6). The structures at 42Da364 are similar to housepits in Late Prehistoric periods. As noted in Chapter 9 there is a dramatic increase in sites from the area after 1800 BP, probably representing an increase in population.

Tucker (1986:291) proposes a Cliff Creek Fremont phase to explain the aceramic occupation he uncovered at 42Un1476. He characterized the occupation (at AD 360 to 600) as having shallow, circular or oval dwellings with an average size of 3.5 by 2.5 m. These structures were made of shallow floor pits, and central support posts. Shallow excavations for large manos, and sandstone pendants were common. Several other early shallow housepits or depressions have been reported from the Uinta Basin (Spengler 1995:404-406). Tucker (1986:100) identified a possible shallow basin structure at 42Da393 in Browns Park dating to around 1700 BP. McKibbin (1992:196) reported a shallow, elliptical depression 5 to 5.5 m in diameter and 35 to 45 cm deep at the same site. Spengler (1995:407) rejects this phase designation and Fremont association, but subsequent investigations lend credence to an early Fremont designation for these sites.

However, the best evidence of an early Fremont phase comes from Steinaker Gap 42Un2004 in the Uinta Basin (Talbot and Richens 1996). A shallow (no more than 10 cm deep) oval-shaped basin 7.4 by 5.2 meters in size was excavated. The depression contained several sub-floor pits. Talbot (1996:81) dates the occupation of the structure to AD 250 to 300. Chrons, cattail and maize were found in the structure. This site is also important because it contained evidence of husbandry that are assumed to have been associated with maize horticulture. In addition, stable carbon isotope analysis of dental associated with Maize was additionally believed that the Uinta Fremont phase ended 200 to 300 years earlier than other Fremont phases to the south and west (Marwit 1986:169). Recent research has yielded dates that seem to indicate a wider temporal range. Many dates are later than the assumed terminus of the Uinta Fremont (Spengler 1995:1105-1150:4). The likely age range is suggested as 1250-1350 AD. It is suggestive that the depression used during this early Fremont phase was aceramic, and evidence of earlier occupation (Talbot and Richens 1996). This is in agreement with a statement made in the previous chapter in this study. It is assumed that evidence of aceramic occupation is suggested rather than the presence of some degree of time.

The Uinta Fremont territory was originally held to be the Uinta Basin proper (Marwit 1970:141). Excavated sites attributed to the Uinta Fremont occur from near Duchesne County, the Bear River National Monument (Brettreite 1970) on the east. Schroeder and Hogan (1975) report that the Cliff Creek (Turner-Look and Nine Mile Canyon sites) belongs within the Uinta Fremont. Evidence of Fremont material culture has also been found along the Green River into Wyoming (C. S. Smith 1992; Wilson and Loochee 1996).

Marwit (1986:169) argued that Fremont occupation in the Uinta Basin "was never very intensive" and that "most of the known sites are small hamlets or rancherias with no more than five or so shallow circular pit houses occupied at any time; cultural deposits are thin and suggest rather short, probably seasonal occupations". While this statement is generally true, it is based on limited observations. Some areas on Ashley/Dry Fork, Brush Creek, and near Arcadia show much more intensive occupation (Loosle 1999).

The Uinta Fremont have been variously dated to AD 650-900 (Marwit 1970:141, 100:1150:4) (Turenadle and Hill 1990; Turenadle 1993) and all possible ranges in between. It was originally believed that the Uinta Fremont phase ended 200 to 300 years earlier than other Fremont phases to the south and west (Marwit 1986:169). Recent research has yielded dates that seem to indicate a wider temporal range. Many dates are later than the assumed terminus of the Uinta Fremont (Spengler 1995:1105-1150:4). It is suggested that the depression used during this early Fremont phase was aceramic, and evidence of earlier occupation (Talbot and Richens 1996). This is in agreement with a statement made in the previous chapter in this study. It is assumed that evidence of aceramic occupation is suggested rather than the presence of some degree of time.

Given the apparent variability in Fremont adaptive strategies, it is not surprising that the Uinta Fremont did not prefer one type of structure. Pit houses, adobe and masonry habitations of varying floor plans were all built. Bunch structures of varying floor plans were also quite common. These different structure types probably represent different levels of permanence, and there are several types of structure types have been identified. I am indebted to Talbot (1999, personal communication) whose ideas are similar to patterns noted by Thompson and Pastor (1995:92-94).

Brush structures or wickups are temporary surface structures, probably representing short-term seasonal logisitics. Although these are often constructed over a shallow basin, there is little evidence of formal excavation. These basins probably developed during occupation as the floor was compacted through use and periodic cleaning. In some instances a level surface may have been created, such as 42Da791 where stones were moved to create a level area and form a ring. The ring may also have functioned as a support for the superstructure. In only two instances at this site this was bedrock removed to create a formal pit. The superstructural materials of these temporary dwellings can be varied in size (see Kelly and Fowler 1986:374 for an example of the size range of material used in construction), but generally small light weight materials are used.

Pithouses or house pits are formally excavated pits over which a wood structure was constructed. Thompson and Pastor (1995:92-93) note two types, but do not appear to be comfortable referring to one as a winter structure and the other as summer. Talbot (1999, personal communication) lists these two as seasonal residences and multiresidential uses. Multiresidential uses are generally rare, but were quite extensive in the Uinta Basin.
Ceramic quality is one of the material culture traits Sims (1986:206) suggests to help distinguish which strategy was being followed. In southwestern Wyoming a wide range of tempering materials and ceramic quality were noted in "Freemont" ceramics (C. S. Smith 1992). This fits the "expedient approach to ceramic mar-factories" (Simms 1986:206) predicts for hunter-gatherer sites in Strategy 3. It would be surprising to find Plains hunter-gatherers and Uinta Basin horticulturists interacting along the Green River in southwestern Wyoming. The pasted pottery at 42Da685 probably fits the pattern of what was predicted for Strategy 1, where pottery of questionable quality is found in prehistoric villages and is economic activities. We assume that a painted vessel, which is unusual for the Uinta variant, was a more important piece. However, since this variant has not been found at residential sites its occurrence and importance is not clear. It could have even been a prestige piece which had been exchanged or was intended for trade.

Length of occupation is another important consideration. Most of these sites were revisited several times, which argues against them being used as a means of overcoming temporary shortages, an important aspect of Strategy 2.

The revisits to 42T540 and 42U1641 may represent the same family and do not preclude adjustments for temporary shortages as necessitated by Strategy 2. 42Da791 appears to have been visited for nearly 800 years and this seems to suggest Strategy 1, where horticulturists could return to an area of abundant and predictable resources. We have recorded sites of number of Fremont era sites in this area. These sites are similar to Summit Springs (42Da545), located farther to the west near Sheep Creek Canyon (Loosle et al. 1993). This hunting camp was occupied for at least 4000 years with an apparent slight increase in use during the Fremont and Late Prehistoric periods. In contrast, Dutch John structures stand out as single occupation sites.

The use of Dutch John brush structures for single occupations is interesting. Forest Service surveys have found relatively limited Fremont material on the east side of the Green River at Dutch John, but abundant evidence on the west side near Greenleaf (left side of Plate 1.1), especially dating to after AD 600. The Dutch John sites appear to represent a pattern expected from an effort to overcome a temporary situation or unique event. Why were sites west of the Green River visited for nearly 1000 years by Fremont people, but those on the east side apparently only once? Perhaps a period of cold weather or wet period had moved the deer populations from their traditional range on the west side of the river to a slightly lower elevation at Dutch John. Perhaps a drought or cold winter had decimated the herds traditionally hunted. These herds, or other seasonal disturbance may have created a new situation where herds were pushed into a new area or increased in size there. A drought or severe winter may have depleted supplies so a hunting foray had to be conducted earlier or later in the year than traditionally practiced while the herds were at a lower elevation. Finally, perhaps increasing population in the Uinta Basin at this time (Talbot and Richens 1999:17) created the need for additional resources. The Fremont hunting camps at Dutch John do not seem to represent an unusual activity, but instead a different setting.

Talbot and Richens (1999:119-121) argue that farming was not easily abandoned. Economic and social constraints generally precluded total abandonment of horticulture until it became completely untenable for several years. Initial attempts to overcome shortfalls created by increasing populations or crop shortfalls caused by drought or disease probably consisted of moving to new areas or intensified use of some resources. Intensification of agricultural production could consist of development of irrigation systems or new strains of maize. Except for 42MD742, there is no evidence for broad spectrum resource use at these brush structure sites. Instead, it appears that the inhabitants went to these sites to collect primarily one resource. Fremont groups always relied on wild resources to some degree and there is no clear evidence for periodic intensified use of these resources to overcome temporary shortages. In fact, the data from 42Da791 may suggest resiliency or stability over a long period of time.

I have argued (Loosle 1997) the Uinta Basin Fremont practiced an embedded strategy, similar to some Plains groups (e.g. Pawnee and Great Bend aspect, as described in Loosle 1991), in which they went to the Uinta Mountains to hunt mountain sheep as a part of forays in collecting for resources near lower elevations. This hunting would have occurred during the summer months because the High Uintas are only accessible from mid to late June into September. The Dutch John sites may represent individuals making this trip.

Except for Topaz Slough (42MD742) and Merkley Butte (42Un1816), the Fremont brush structures discussed above appear to be logistical sites where individuals went to exploit specific resources. In most cases this was wild plants (usually Chenopods). However at Dutch John they were hunting large mammals, primarily deer. Even with the consideration of additional structures from other sites, this summary does not resolve the questions about Fremont adaptive strategies originally put forward by Simms (1986:206). It has shown that the construction of brush structures occurred in a variety of conditions and situations. When temporary structures in or near residential sites the Uinta Basin are considered in the larger picture of Fremont adaptive strategies, the diversity and complexity of Fremont architecture and site types is expanded even more. As Simms (1986:213) warned, we should not be surprised nor disheartened by this development.

Summary

Temporary dwellings constructed in pits were used during Early Archaiic (42Da690) and Early Fremont periods (42Da364) at Dutch John. Surface structures were used by the Late Fremont. Evidence of superstructures was clearly noted at 42Da364 and 614. It is not clear if these findings are a function of preservation, in which larger material was used in their construction or preserved through burning. The Archaic and Early Fremont structures often have interior pits, but only one was found in the late Fremont dwellings. All the dwellings excavated at Dutch John were probably seasonal residences utilized for a few days to weeks. The occupants appear to be spending more time in the area than groups from the late Archaic and late Prehistoric periods. These are not single focused areas, but probably represent family groups conducting a range of activities.

Although the construction methods are similar for the two earlier periods, the abundant material culture and emphasis on medium sized artifacts during the Early Archaic is most similar to the remains found in the Late Fremont structure at 42Da614. The limited material culture in Early Fremont dwellings (42Da364) may suggest that the occupants spent less time in the area than Late Fremont visitors. It is not clear why the Early Fremont appear to have constructed more substantial superstructures, but the assumption is that this required more effort of a different type. There is not a ready explanation apparent in the findings for the change in construction style during the Fremont period from pitouse to surface brush structures at Dutch John. A similar pattern was noted at 42Da791 where the earliest structures were pitouses excavated into the bedrock and later structures all appear to be surface dwellings (Atkinson 1999). Spangler (1995:482) has noted increasing architectural variability for the Uinta Fremont after AD 700. This may represent a shift from a single multipurpose dwelling (pitouse) to new structural types with specialized functions like storage, work areas, temporary camps, summer sleeping areas etc.

Changes in use patterns are very dramatic and sudden at Dutch John. Although this may be a reflection of limited data, there appear to be significant differences in mobility and resource exploitation through time. Early structure use in Dutch John tends to peak earlier and later than in the Wyoming Basin. Conversely, when house pit construction in the Wyoming Basin reaches a high point after 500 BP, Dutch John appears abandoned. However, dwelling construction at Dutch John during the Fremont period coincides with maximum site density in both Wyoming and the Uinta Basin (Chapter 9), suggesting population pressure may play a role in the increased use of the area. As a cultural border area between the Plains and Great Basin and as a mid-elevation area between physiographic provinces, Dutch John may have been visited most extensively during extremes of climatic and population pressure on population centers to the north (Wyoming Basin) and south (Uinta Basin/Great Basin).
Chapter 9

DUTCH JOHN THROUGH TIME: IMPLICATIONS FOR CULTURE HISTORY

Clay Johnson and Byron Loosle

Introduction

Dutch John is located in a border area between the Middle Rocky Mountain, Great Basin, and Colorado Plateau physiographic provinces. The area also appears to have been peripheral to the cultural centers of the Wyoming Basin and northeastern Great Basin through time. As a cultural and climatic border, Dutch John may aid in understanding subsistence strategies and cultural interactions of the Medicine Basin and Great Basin groups, respectively. The local microlithic, technology and elevation may be the cause of apparent differences in the timing of cultural adaptations at Dutch John as compared to the north and south of the area. As a peripheral area, Dutch John may have been exploited primarily by people for whom conditions were less than ideal elsewhere.

Paleoindian Period

Extensive research provides considerable knowledge about this time period in Wyoming. Fison (1992) observed a difference in life-styles and subsistence patterns between the Plains and Mountain/foothills Paleoindian groups. Plains groups used imported materials that were high in quality to make the necessary tools. Mountain/foothills groups used local materials and often had much more diversity in the tools produced. The camps and method of food storage differed greatly between the groups. Plains Paleoindian groups stored food (primarily meat) in frozen meat caches. Mountain/foothills Paleoindian groups camped and stored food (primarily plants) in caves and rockshelters. In the Wyoming Basin, the Paleoindian period as a subsistence adaptation is now considered to have ended around 8500 BP in southwestern Wyoming (Thompson and Pastor 1995:24-28).

There are no Dutch John sites dating to this period. The local microlithic probably remained cold and wet throughout this period, with subalpine or montane conditions prevailing. While soils probably began forming during this period, they would have been thin and poor. Flora would have been limited to high altitude cool tolerant species capable of growing on poor soils, with little floral diversity. Conditions mitigated against economic quantities of megafauna, which were much more readily available on the Plains and in the Wyoming and Uinta Basins to the north and south of the Uinta Mountains. While Paleoindians may have made forays into the area, little indication of such presence was discovered at Dutch John, either in open sites or in area caves and rockshelters. The lanceolate (possibly Midland) point found at 42Da990 and the possible Medicine Lodge Creek point at 42Da167 constitute the only physical evidence suggestive of such forays.

Early Archaic Period

Spangler (1995:841-843) assigns dates of around 8000-5000 BP for this period for the Uinta Basin and northern Colorado Plateau. His use of rockshelters as characteristics of the period, and a possible cultural hiatus from 6000-5000 BP. The Wyoming archaeological behavioral assemblage for this period, the Great Divide and Opal phases (Thompson and Pastor 1995:28-46), is thought to reflect a relatively sparse material culture. It includes use of large side-notch and stemmed points, the "Alithermal knife", targeting of small mammal faunal resources, and some use of groundstone. In Wyoming, the Great Divide phase (8500-6500 BP) and the following Opal Phase (5000-4300 BP) are not strongly associated with use of groundstone, although footshell sites during the Opal phase all have some groundstone present. Slab-lined basins appear in Wyoming around 6500 BP, and are most common for the succeeding Opal phase of the Early Archaic.

Maximum Alithermal aridity in the Intermountain West is believed to have occurred between 7200-6000 BP, but Dutch John appears to have remained relatively cool and wet, with a considerably larger riparian area than today (Chapter 5). Aridity in the Wyoming and eastern Great Basin may have resulted in increased exploitation of footshl and north slope areas like Dutch John. Aridity may also have resulted in considerably lower production of grasses and forbs at low altitudes, resulting in higher elevation game winter ranges.

Two Dutch John features dated to the Great Divide phase. The Dutch John archaeological record begins at 7120 BP with an open air hearth and activity area at 42Da599. A hearth or pit in Test Trench 1 at 42Da600 dating to 6470 BP contained charcoal, limited amounts of debitage, bone fragments, and a pecking stone. Neither feature contributed to understanding of this phase.

Occupations during the early Opal phase (6310-5830 BP) take the form of camps with temporary (seasonal) brush structures. There is no evidence for use of the Dutch John rockshelters during this period. At least three temporary structures of brush or bark were constructed in shallow depressions at 42Da690. An activity area adjacent to Structure 1 dated to 6310 BP, and an undated activity area was located between Structures 1 and 2. Structure 2 (6000 BP) was constructed over a depression 55-50 cm in depth and probably qualifies as a housepit. One end of Structure 3 (ca. 6310 BP) had been dug approximately 40 cm into the soil to form a level floor. Structure 1 (5830 BP) contained a central pit. Structure 2 contained a hearth and at least 2 pits; Structure 3 contained a central hearth. Floors in all three structures had been compacted by use. Structure 1 had direct evidence of a superstructure of conifer wood, while excavation of depressions, internal features and relatively well defined floors of soil compacted by repeated use suggested superstructures for the other two structures. Macrofossil samples from this period contained conifer wood and charcoal and pine charcoal.

Groundstone is ubiquitous at Wyoming Opal phase basalt margin and foothill sites, and the majority of slab-lined basins in Wyoming date to this phase (Thompson and Pastor 1995:42-46). Dutch John groundstone data is in accord with this. Incidence of groundstone was relatively high during this period, and included basalt for mortuary and construction purposes. The presence of these materials is suggestive of a variety of non-faunal resources that probably included small roots or tubers, berries, leaves and ripening (but not dry) seeds. However, recovery of 5 basin metates or fragments suggests dry or hard seeds could also have been important. Cheno-an pollen recovered from a hearth inside Structure 3 suggests possible use of this resource. Gapecta pollen recovered from Structure 1 Pit 1 suggests possible exploitation of prickly pear cactus.

Wyoming Opal phase occupations show a predominance of squirrels to rabbit sized game represented in the faunal assemblage, followed by antelope-sized deer game, with use of large side-notch points (Thompson and Pastor 1995:40). In contrast, Dutch John faunal data (Chapter 5) indicates considerable emphasis on hunting of medium to large game during this time. Sixty percent (490 of 816 pieces) of bone from 42Da690 was classified as medium to large (megafaunal), but an additional 42 pieces were identified to more specific taxa within this size range. Thus, 65% of the bone from 42Da690 was from porcupine or big horn sheep to deer sized mammals. Only nineteen percent of the assemblage was from mammals, suggesting that hunting emphasis was on artiodactyls. The faunal assemblage for 42Da690 suggests an emphasis on medium to large game (antelope, big horn sheep, deer sized), with rabbits as an additional, readily available resource, rather than targeting of small mammals. Large side-notch points were dated to 42Da990.

Incomplete bone fusion indicative of juvenile animals was present in 20 bone fragments from 42Da690. In addition to 4 pieces of probable rabbit bone, 1 piece was classified as medium mammal, 8 pieces as medium artiodactyl, 1 piece as deer, 3 pieces as large mammal (antelope, deer, or big horn sheep sized), and 3 pieces as porcupine. The natural history of these mammals (Geofffeld 1988) suggests seasonal occupation at this site may have occurred some time between summer and late fall.

Opal phase Early Archaic occupations at Dutch John were seasonal, using lightly built structures, and dated between 6310-5800 BP. Ample groundstone (32 pieces including two metate types) suggests processing of a range of plant resources, while the faunal record indicates some preoccupation with hunting of medium to large game. Presence of local lithic materials at the expense of Tiger chert (Chapter 6) suggests somewhat longer visits than during the Late Archaic period. No "Alithermal knives" were noted in Dutch John, although large side-notch points are common. Sheltering structures are present, as Thompson and Pastor note for the Opal phase. However, slab-lined basins common in Opal phase Wyoming are absent. Spangler notes Uinta Basins occupations for the period 8000-5000 BP as "spare and sporadic" (Spangler 1993:843) and as using rockshelters, while Dutch John shows repeated occupation during much of this period, but no rockshelter use.

In both pattern of occupation and material culture, Dutch John seems more compatible with southwestern Wyoming occupations as described by Thompson and Pastor (1995:28-46) than with Uinta Basins occupations as compiled by Spangler. However, no Dutch John sites date to between 5800-4300 BP, Metcalfe's (1987) Green River phase and the bulk of Thompson and Pastor's (1995) Opal phase. The Opal phase in Wyoming is primarily associated with construction and use of slab-lined basins, while Dutch John slab-lined basins appear in the Late Archaic period, after 4200 BP.

Dutch John occupations during the Early Archaic were located on terraces or slopes above Dutch John Flat. Occupants hunted medium to large game, and utilized a range of other resources including rabbits and plant resources probably ranging
from green to berries associates with a relatively large riparian area below. Dutch John occupations for this period probably represent part of a pattern of seasonal rounds centered north of the area. Generally arid conditions in the region may have resulted in winter occupation of areas somewhat more open, and even more northerly or slightly higher in elevation than Dutch John.

Late Archaic Period

4300-2800 BP. Spangler (1995:843-850) proposes a tripartite division for the Uinta Basin Archaic, with Middle Archaic dates of 5000-2500 BP. Thus, Uinta Basin radiocarbon midpoint dates between 4320-2850 BP are Middle Archaic. Middle Archaic peoples of the Uinta Basin were mobile foragers who "were primarily hunters and secondarily gatherers" (Spangler 1995:392) and utilized rockshelters. Slab-lined basins are not a common feature of Uinta Basin Archaic sites.

Thompson and Pastor (1995:28) propose two major divisions of the Wyoming Archaic period: Early and Late Archaic. The Wyoming Early Archaic includes the Great Divide and Opal phases discussed above. The Late Archaic includes the Pine Spring and Deadman Wash phases, beginning with the Pine Spring phase dating to 4300-2800 BP.

Thompson and Pastor (1995:47-50) define the Pine Spring phase by the beginning of the Neoglacial period, an increase in number of sites, a change to stemmed, basal-terminated and medium corner-notch projectile points, and a greater diversity of hunting artifacts as suggested by faunal remains. Little change in subsistence is apparent early in the period. Regional climate during this period is believed to have trended slowly toward a warmer, probably cooler regime. Thompson and Pastor (1995:50) note that this phase is poorly understood, especially with respect to floodplain or high altitude settings.

As in the Early Archaic period, the timing and general nature of Late Archaic Dutch John occupations seem more comparable to the Wyoming Pine Springs and Deadman Wash phases than to the Uinta Basin Middle Archaic as described by Spangler. As with the Early Archaic, however, there are some notable discrapancies.

Dutch John climate seems to have been somewhat warmer and drier than before, with riparian habitat on Dutch John Flat largely replaced by sagebrush grassland (Chapter 5). The 4100-3100 BP period at Dutch John is characterized entirely by slab-lined basin sites. Slab-lined basins were probably used to process plant roots and tubers and cactus pads, and these resources would have increased as riparian areas at Dutch John dried out. The most likely season of occupation was late winter through spring (Chapter 6).

Although closely comparable to Wyoming slab-lined basins in many ways, these features initially appear at Dutch John 1000-2000 years later than in Wyoming. All morphologically typical Dutch John slab-lined basins apparently date to the 4100-3100 BP period. Five basins were dated to the Pine Spring phase (4300-2800 BP) at three Dutch John sites. Radiocarbon dates from two of the four slab-lined basins at 42D693 were 4100 and 4110 BP, the earliest slab-lined basin dates at Dutch John. Three slab-lined basins were excavated at 42D617, two of which were dated to 3000 BP and 3130 BP. One of two slab-lined basins at 42D600 was dated to 3300 BP. In all, seventeen of the twenty slab-lined basins at Dutch John are inferred to date to this period.

Limited evidence of groundstone, typically in the form of single hand manos, appears with Dutch John slab-lined basins. The paucity of associated lithics and faunal remains complicates interpretation. Non-local materials (Tiger chert and Sheep Creek quartzite) are rare during this period, while local materials essentially vanish, consistent with a high degree of mobility and short extent of visit. Sheep Creek quartzite use peaks at higher than Tiger chert around 3300 BP, suggesting the pattern of seasonal rounds extended more to the west than during the Early Archaic (Chapter 6:Figure 6.2 and 6.3). However, this analysis is based on very small sample sizes for the 4100-3100 BP period. The Dutch John occupation dates of 4100, 3500 and 3130 BP are not at peaks for site density in the Wyoming database, basin, and/or basin margins (Thompson and Pastor 1995: Figures 12-14). Uinta Basin site density records for this period are not at peak Wyoming or Dutch John densities, although Uinta Basin dates do compare somewhat favorably with Brown Park dates (McKibbin 1992; Figures 122 and 124).

The Pine Spring phase (4300-2800 BP) in Wyoming is associated with a trend toward more mesic conditions, and increased hunting of large game animals (Spangler and Pastor 1995:47). Dutch John slab-lined basins may represent seasonal occupations targeting fleshly plant pads, roots, and tubers in late winter or spring, when game animals were a lower value resource than during earlier seasons (Speth 1983). People utilizing the Dutch John area during this period appear to have been highly mobile, with a core area to the north, but with somewhat more exploitation of areas to the west of Dutch John, as suggested by the predominance of Sheep Creek quartzite bladelets. Again, regardless of discrepancies, these sites appear more comparable to Wyoming Basin than to Uinta Basin occupations.

2400-1800 BP. In the Uinta Basin to the south, Spangler’s Late Archaic period (2500-1500 BP) is characterized by increased use of resources, and adoption of new technologies. In Wyoming, the Deadman Wash phase (2000-1300 BP) begins as Neoglacial conditions peak, resulting in a somewhat cooler, wetter climate (Armitage et al. 1982:188). The Wyoming Basin experienced increased targeting of large mammals and an increasing reliance on plant seeds (Thompson and Pastor 1995:51-53). Rate of increase in Wyoming site date density is reduced during this phase.

Dutch John occupations during 2000 and 1800 BP all occur in two rockshelters. Neither rockshelter yielded clear evidence of use before this period. Paleoclimatic data for Dutch John is interpreted (Chapter Five) as indicating a very wet period extending from 3000 BP to at least 1800 BP, warming after around 2000 BP. At 42D693 a slab-lined basin in the rock shelter dated 2040 BP, and Hearth 1 dated 1820 BP. Cultural fill in the slab-lined basin included highly fragmented bone that was predominantly large mammal, although these basins typically are presumed to have been used to process roots or tubers. At 42D6002, Hearth 1 dated 2600 BP, and Hearth 2 dated 1980 BP. The hearths contained highly fragmented large to small mammal bone including fish (probably squawfish), cottontail and mountain sheep.

Frequency of rabbit and deer sized animal bone is approximately equal at around 2300 BP. By around 1800 BP, frequency of rabbit bone decreases, while bone of deer sized animals increases, bone from very large (elk-bison sized) animals appears in the record, suggesting increased targeting of large mammals as suggested for the Uinta Basin. The site appears somewhat lower than during the Early Archaic, or during the Fremont period. Bone quality recovered from Dutch John sites during this period is dramatically higher than during the Late Archaic. Groundstone frequency decreases during this period, arguing against increased utilization of plants, and there is no apparent introduction of new technology. As with earlier periods, the Dutch John data seem more comparable with Wyoming than with Uinta Basin cultural chronology.

Although there is no apparent change in technology during this period, the pattern of toolstone procurement changes drastically (Chapter 6: Figures 6.2 and 6.3). Use of material from both local toolstone sources (Uinta quartzite and Dutch John chert) increases at the expense of both non-local materials (Tiger chert and Sheep Creek quartzite), so that by around 1840 BP, use of local toolstone materials is equal to use of non-local materials. This suggests mobility became more restricted during this period, so that a more local focus and extended length of each occupational episode, perhaps in part due to climate changes during this period.

Quercus gambelii (scrub oak or oak brush) appears briefly near the end of this period at Dutch John, and between 3000-1500 BP at a number of sites from Wyoming through the Uinta Basin where oak does not occur today. Oak acorns were heavily utilized by some prehistoric groups, yet there is no sign of acorn use at sites in this region. Presence of oak in the record is usually limited to sites near these sources. A brief oak presence in an acorn-dominated assemblage may suggest an attempt to experiment with and adopt acorns as a food source, or inhabitants may have focused on more familiar resources which may have been more abundant during relatively moist periods with longer growing seasons.

Condition and location of Dutch John sites, and changes in the assemblage during the Neoglacial period that peaked around this time may be further evidence for a "shifting, globally synchronous climatic change" which Bradley identifies as occurring 2760-2510 BP and obvious "in both palynological and archaeological data as a period of major environmental and cultural change, the cause of which is not known." (Bradley 1985:15)

Dutch John occupations during the 2800-1500 BP period appear to have had a local focus with restricted mobility, and show no clear influence from, or connection, with cultural core areas to the north or the south. At Dutch John, climate change seems implicated. This suggests that the change in site date density noted by Thompson and Pastor (1995:51-53) for this period in Wyoming might be due in part to a climate-related change in mobility.

Dutch John data support a increased targeting of large mammals during this period, but fail to support increasing reliance on seeds for Wyoming sites, or increasing use of floral resources and adoption of new technologies, as argued for Uinta Basin sites. Occupations of this period seem more local, less mobile, and show no clear influence from either the north or the south. There is a clear increase in site date density at Dutch John after approximately 2100 BP. Dutch John radiocarbon dates for the period 2720-2400 BP occur at approximately 400 year intervals (with several gaps in the occupational record). Radiocarbon dates for the period 2040-1600 BP occur at approximately 100 year intervals. Data from the northeastern Great Basin

Late Prehistoric Period

The Fremont period 1800-1000 BP. In the Uinta Basin, Spangler (1995:399-447) labels as Late Archaic the period from ca. 2500-1500 BP. According to Spangler, subsistence behavior changed little during the first half of the period. Formatve period trains were intro-
duced during the last half of the period, eventually reaching their finished form around 1500 BP, which marks the beginning of the Formative Period. This view does not seem especially compatible with the archaeological record at Dutch John for the 2600-2040 BP period, or the dramatic changes evident just after 1800 BP. A more useful comparison can be made with the Late Prehistoric in the Wyoming Basin chronology (Thompson and Pastor 1995:53-61). Thompson and Pastor divide this period into two phases, the Uinha phase (circa 1800-650 BP) and the Firehole phase (650-250 BP).

The Uinha phase in southwestern Wyoming is defined by a dramatic increase in sites, florescence of technological innovation and material culture, including the introduction of the bow and arrow, changes in subsistence behaviors indicative of influence from other areas of the South of the Uinha Mountains. Characteristic of the Uinha phase (as with Formative Period Fre-

The Fremont period began around 1500 BP, and the appearance of ceramics later in the period. Uinha phase characteristics include an increased emphasis on hunting, increased use of seeds, and the appearance of cultigens (primarily corn). Corn often occurs in archaeological assemblages from the area where prehistoric cultivation would probably have been possible, and is assumed to reflect contact and trade between farmers and foraging groups (Thompson and Pastor 1995:57-58) or usage by members of sedentary farming groups during foraging excursions.

Site data density at Dutch John increases dramatically after 1800 BP. Components at seven Dutch John sites were dated to between 1765-1060 BP. Changes in material culture and shelter choice are as dramatic as the site density increase. One pit in the 42Da685 shelter dated to 1800 BP, and an unlocated square slab cist at 42Da620 probably was constructed during this period. However, it is apparent that site occupations rapidly switch from the rockshelter utilization of the previous period to open air and brush structure components at the beginning of this period, suggesting an amelioration of whatever climatic factors were responsible for rockshelter exploitation. Occupations typically utilize brush structures, and excavated sites typically contain large quantities of fire-cracked rock, lithic debitage and tools, hammerstones, and stone
eroded. Two Dutch John brush structures dated to 1770 BP (42Da665 and 1070 BP (42Da614) contained Rose Spring points and Fremont ceramics. Further Fremont indicators are corn macrofossils at 42Da665, and a bone Fremont gaming piece at 42Da614. Bone was recovered in quantities equivalent to those from Early Archaic brush structures. Bone of rabbit sized mammals was drastically decreased. At 1170 BP, bone of antelope, bighorn sheep, or deer sized mammals increased dramatically, and elk-bison sized bone increased somewhat, at the expense of rabbit sized mammal bone. At 1070 BP, bone of

rabbit sized mammals suffers a further reduction, and bone of medium sized mammals is slightly reduced, in favor of bone from elk-bison sized mammals (Chapter 6: Figure 6.1).

Structures at both 42Da685 and 42Da614 appear to be the remains of Uinta Fremont seasonal brush structure occupations throughout the Late Prehistoric. The presence of hunting game to very large game, with the focus on very large ( elk-bison sized) game increasing over the period represented. However, there are some rather dramatic material culture differences between these two sites.

At the earlier structure 42Da685, 1170 BP) bone and debitage were both present in relatively high quantities, as were fire cracked rock, a hammerstone and three pecking stones. A small quantity of squawfish and sucker family fish bone was recovered from this structure. No groundstones (masses or metates) was recovered from this site, although a corn kernel and cupules were present in two interior features. No corn pollen was recovered at Dutch John and it is unlikely that corn could have been grown there, due to a short frost-free season that is (today) nearly three weeks shorter than that of lower altitude areas. corn was grown prehistorically. Corn caches and other evidence from areas surrounding Dutch John suggest corn may have been grown sparsely in small quantities in the flood plain of the Green River. Corn preserves best if left on the cob, but presumably is most easily transported as nontis if removed from the cob. The presence of corn cupules in two features suggests corn chert, and perhaps relatively short distance travel. At least two ceramic vessels with a fired on pattern were present. Local toolstone, primarily Dutch John chert, increased dramatically at the expense of Tiger chert. Much of the lithic and bone material at 42Da685 was around the perimeter on the outside of the site, and the site was approximately 2.5 m in diameter. Superstructural evidence consisted of clay pediments that may have served to help anchor structure walls, and two possible post molds in the west side of the structure.

In contrast, the structure at 42Da614 (1070 BP) contained groundstone including evidence of two trough metates. This structure was also larger (approximately 3.5 m in diameter) with a more massive superstructure, and contained lesser amounts of debitage. Although no corn macrofossils were recovered from this structure, the trough metates suggest grinding of hard seed products such as corn kernels (Adams 1999). Ceramics from this site were typical of the Uinha Fremont. Essentially all material culture at this site was recovered from within the structure perimeter. Unfused bone of an elk sized mammal was present at 42Da614. Non-local Tiger chert toolstone increased at the expense of all other materials, suggesting an increase in either trade or travel to the north, and reduced utilization of toolstone sources to the west.

Although both sites appear to represent Fremont hunting camps, less massive superstructure and amount of ceramic material recovered from around the outside of the structure at 42Da685 suggest the season of occupation may have been somewhat warmer than at 42Da614. The 42Da685 occupation may have been in mid to late summer, the 42Da614 occupation in mid to late fall.

Ceramics and corn from occupations during the 1200-1070 BP period indicate strong Fremont farming influence. Corn probably could not have been grown or moved without irrigation, and this period, and ceramic evidence supports the idea that this period is characterized by increased distance of transport from point of manufacture. Both corn cultivation and manufacture of high quality ceramics are typically associated with a greater degree of sedentary habitation than is apparent at Dutch John sites. However, analy-

sis of the ceramics from these occupations (Hill, Appendix Three) suggests the possibility that the site, or at least the vessel, was derived from geologic formations on or just north of Dutch John Flat. The ceramics may have been produced at Dutch John. The presence of Rose Spring points as one of the production factors for both the kernels and cupules. Transport of corn for consumption during a seasonal hunting trip would most economically be achieved by carrying corn kernels rather than corn on the cob. For hunting trips over short distances from the corn source, however, this is unlikely to be a factor. Corn for trade purposes might conceivably be left on the cob, increasing the physical size and thus apparent value of the trade package.Corn could be and apparently was, grown within the canyon of the Green River a few kilometers from Dutch John, as indicated by a number of samples from within the Dutch John area. Excavations at the Hayes site, in the canyon of the Green River 3 km south of Dutch John, con-
named considerable stored corn dating to this period (Loosle 1999). Additionally indicative of connections with Fremont farming populations is a "Uahi" metate recovered from the surface of a Fremont context at 42Da264. A slab-lined basin at 42Da666 dated to 1000 BP. This is much later than the typical Pine Spring phase dates for slab-lined basins at Dutch John. A Rose Spring projectile point was recovered at the site. Typical Fremont and basins at Dutch John date between 4200-3100 BP and are believed indicative of a seasonal foraging strategy involving roaming of roots and tubers. As the final feature at Dutch John dating to the Fremont period, the slab-lined basin at 42Da666 suggests a possible return to a mobile seasonal foraging strategy more typical of the Fremont period.

Dutch John sites from this period seem in many ways typical of warm season transitory use sites in the Late Prehistoric both in Wyoming and the Uinha Basin. Site data density increases dramatically. Rose Spring projectile points and increased presence of groundstone at the beginning of the period are typical of both Uinha Basin and southwestern Wyoming, as in the
appearance of bone gaming pieces, corn, and ceramics during the period. There is an apparent shift toward larger game as the period progresses, but a broad range of fauna are exploited, including fish endemic to the Green River (Catostomidae or sucker, and Cyprinidae, probably squawfish, at 42Da602 and 685.) The primary influence seems to be from the Uinta Fremont core area to the south. The temporal and material nature of Archaic Dutch John occupations seem more indicative of exploitation from the north by relatively mobile groups. In contrast, the temporal and material patterning at Dutch John during the Fremont period suggests fall use by sedentary farmers from the immediate area, with strong connections to populations in the Uinta Basin to the south. However, the evidence also suggests occurrence of changes in mobility and subsistence focus within the Fremont period. What might be the causes of this variability?

Uinta Fremont Plasticity and Climate

Discussion. It is beyond the scope of this document to restate the history of Fremont archaeology. Over the last two decades, explanations for the extreme variability in Fremont sites (D. B. Madsen 1989; Simms 1986) have favored Fremont behavioral plasticity (Simms 1990; Madsen and Simms 1998) including individuals switching between farming and foraging, and complex interactions between farming and foraging populations. To some degree the farmer-forager division conditions a perception that people were one or the other, at least at any given time. In this context, it is important to remember that rural Anglo and Native American families even today (and much more commonly before the increasing urbanization of America after mid century) exploit a wide variety of wild resources, including plant greens, nuts and berries, deer, rabbits, birds and fish. Farmers with small plots or poor land tend to rely most on these resources.

Many aspects of Fremont culture remain vexing, in part due to extreme variability in Fremont sites, the lack of large, well preserved, stratified sites spanning the Fremont occupational period, and lack of large sites from the first half of the Fremont period. Students of the Uinta Fremont in particular have faced a number of problems. Among these are the early appearance of morphologically distinctive corn in the Uinta Basin, the ubiquity of “corn for most of the Fremont period in this relatively extreme environment, a lack of major features associated with storing or processing of corn, and a paucity of sedentary sites, especially during the first half of the period. Additionally problematic are frequent Fremont sites with no evidence of horticulture, or with emphasis on hunting, or on foraging, appearance of Fremont-like sites and cultural materials well north and east of the core Uinta Fremont area and where horticulture was probably impossible, and apparent disappearance of the Uinta Basin Fremont culture shortly after 1000 years ago. In recent years these difficulties have been compounded by earlier corn dates (Truesdale 1993; Talbot and Richens 1996), evidence suggesting early irrigation of crops and relatively high levels of dependence on corn (Talbot and Richens 1996), discovery of additional Fremont cultural variables (for instance, the Dutch John Gray ware discussed in this report), and expansion of the Uinta Fremont period from a span of approximately 400 years to in excess of 1000 years. If farming was not an effective strategy, why is there widespread evidence of corn and squash farming in northeastern Utah over a thousand year period? Conversely, if farming was an effective strategy, why is there not more evidence of sedentism, storage, and villages in northeastern Utah during this period?

Based on informal experiments in the Uinta Basin beginning in 1996 (C. Johnson 1997) successful prehistoric corn cultivation in northeastern Utah probably required a considerable investment of critically timed effort over much of the growing and harvest season. Northeastern Utah is the northern extreme of feasibility for early corn varieties due to short, relatively cool growing season, aridity, poor soils, and potential for summer frosts, all factors that worsen to the north. To mature non-hybrid corn varieties in this area, the planting area must be prepared and planted shortly before the last frost, around the second week of May. Considerable attention to weeding, watering, and prevention of predation on young plants are required through at least early August. Considerably less effort is needed during August and early September, although predation must be prevented and occasional watering is necessary. Mature corn typically is ready for harvest around the middle of September, approximately the time of the first fall freeze.

Dutch John paleoclimatic data suggests that for the relatively extreme climate of northeastern Utah in particular, consideration of behavioral dynamics (Talbot and Richens 1999: 97-135) in terms of climate change may be a useful exercise.

The Dutch John paleoclimatic record suggests wet, probably cold conditions after 2600 BP, changing to wet mild conditions beginning around 2000 BP that continued until around 1700 BP. Dutch John sites for the 2600-1800 BP period support an inference of less mobility, and relatively lush environment. This may have contributed to the widely noted increase in regional populations at the end of the Archaic period. After at least one extended drought around 1600 BP, conditions at Dutch John seem to have trended (with some fluctuation) toward less mild, cooler, and drier with increasingly frequent drought periods, especially between 1000-700 BP. (Chapter 5).
Introduction of corn and squash cropping to the arid, northern, and relatively high-altitude extreme of northeastern Utah may only have been feasible during the brief period around 2000 BP when conditions at Dutch John seem to have concurrently been abnormally wet and relatively mild. If these conditions were locally widespread, rather than resulting in large areas conducive to farming, highly variable local topography is more likely to have resulted in a large number of small areas where microclimates were particularly suitable.

Under these conditions, development of corn and squash in northeastern Utah would have been extensive (widespread and low density, at small, scattered plots) rather than intensive. Development of the unique and ubiquitous Uinta Fremont corn variant would have occurred during this period. Archaeological evidence of this extensive farming strategy, and of the Uinta Fremont corn variant would thus be sparse, scattered, and not necessarily in the same locations as later, larger, more visible Fremont sites. The early farming component at Steenrod Reservoir (Tabb and Richens 1996) is consistent with this view. Under these conditions, farming success would have been increasingly consistent as corn and squash were selectively adapted to local conditions.

Given small, scattered farmsteads, small plot size would have been both allowed and required continued exploitation of native flora and fauna. This exploitation is likely to have involved primarily use of resources close to, or attracted by, the farm plot. However, short-term logistics would be possible throughout the year in the life of a farming community.

Dutch John data suggests a drying trend after 2000 BP, with a drought of perhaps ten years duration occurring around 1600 BP. The period from 1800-600 BP is in general believed to be one of increased effective moisture in the Uinta Basin. However, Newman (1996:139) suggests warmer, wetter conditions early in the period, followed by a slow drying trend, and a period of ground disturbance and relative dryness from 1600-1500 BP. Irrigation development quickly early in the Uinta Basin (Tabb and Richens 1996), and may have been routinely employed in the form of very small, simple ditches or catchments to assure successful crops after 1800 BP. Droughts and less dependable growing seasons however, cannot be dealt with so easily. One, or even several droughts lasting a decade or less, such as the one suggested by macrofossil evidence at Dutch John for around 1500 BP, could not be as visible as in the Uinta Basin data, due to the lack of dendrochronological information for this area. However, a decade of drought is half a generation in the life of a farming community.

Human cultures through time have tended to be conservative. We suspect people would strongly resist abandoning an increasingly sedentary adaptation based on two hundred years or more of relatively consistent and successful farming. It seems likely that under the pressures of drying conditions and less dependable growing seasons, northeastern Utah farmers adopted an intensive farming strategy involving sites clustered around more dependable water sources or more favorable microclimates, and thus more visible in the record. Tabb and Richens (1999) note a 1500 BP low point in Uinta Basin dated sites, preceded by peaks around 1700-1600 BP and followed by dramatic peaks around 1530-1100 BP. This low point may mark the period of change from an extensive to an intensive strategy on farming, with people staying longer at a single site, reoccupying former sites, and moving to large plots with more dependable water and microclimates as extended or warmer growing seasons. Dutch John sites from around this period date 1660-1330 BP, and are all open air hearths or pits, suggesting somewhat more mobility during this period.

As a by-product of intensification, surplus population due to reduced mobility and climatic environmental conditions would require expansion into even more marginal microclimates and smaller favored areas, as along river corridors. In an ultimately doomed struggle to maintain a farming lifestyle, it seems likely some Uinta Fremont moved northward along the Green River Canyon, farming small plots of river bottom where conditions seemed suitable. Uinta Phase sites occupied northward into Red Canyon and may have faced little or no opposition.

The current pacity of sedentary settlement features in the Green River Canyon itself probably is a reflection of local geomorphology. Before it was dammed in the 1960s, the Green River experienced seasonal flooding and large periods of floodplain exposure. When the reservoir is behind water, it is filled with expected rapid deposition on areas at the base of floodplains probably have removed or deeply buried sites of any prehistoric occupation. Steenrod Reservoir apparently was no exception (Day and Dibble 1983:3-4) of a majority of Fremont sites to be seasonal use of the floodplain; they also found a number of sites with Fremont ceramics on juniper covered soils. Ceramics are indicative of Fremont populations after around 1300 BP (R.E. Madsen 1977), supporting Fremont presence relatively late in Fremont times. The Haynes site discussed above is a rockshelter above the flood plain in Red Canyon with relatively large amounts of corn dating between 1200-1000 BP.

Dutch John brush structures dating between 1200-1070 BP probably represent late summer or fall logistical hunting camps. The petroglyph analysis raises the possibility that an additional activity during these trips may have been ceramic manufacturing. Fish bone, corn, and limestone temper used in some of the ceramics suggest these groups were based in the canyon of the Green River near Dutch John.

Within the canyon of the Green River near Dutch John, a few small plots of river bottom perhaps one half to one acre (2000-4000 m²) in extent, sufficient for a family group (Schoeder 1999:49-51) could easily be watered from the river, or by minor diversion of a number of small streams and side streams. For approximately one month in August-early September and again in October, Fremont family groups farming in the canyon of the Green River would have sufficient time for most family members to leave the crop for an extended time, traveling to higher altitudes to hunt and to gather plant resources that matured later there than in the canyon bottom. Although a relatively steep climb of approximately 300 m (1000 ft) is required, only a few kilometers of distance and less than a day's travel is involved. Under these conditions, the majority of a mixed fanner family group might be expected to carry ceramics and stored or fresh corn, build a temporary structure and live for a month or even a few days to a few weeks, and return to the canyon bottom without penalty in the form of crop loss. These groups might be expected to bring a fish or two from the river as along as provisions. Short distance of travel from residential sites in the Green River Canyon to Dutch John would allow transportation in both directions of relatively fragile, perishable, or heavy items.

Under the conditions outlined above, Uinta Fremont population may have been relatively stable over the 1800-1000 BP period. After about 1100 BP, Uinta Fremont farmers disappeared permanently, a family at a time, in increasingly remote or smaller areas. A few Uinta Fremont groups may, by moving considerable distances east or south of the Uinta Basin, have prolonged their farming-based pattern for several hundred more years.

Considerable evidence of high altitude summer use along the top of the Uinta Mountains (typically in the form of brief camps, some of which have Fremont ceramics) has been found in recent years (Wilson and Loosle 1996, Malmstrom 1997). Summer use of high altitudes was probably limited by weather and snowpack to July through early September. We assume high altitude Fremont activities typically occurred in either late summer or fall, when they did not conflict with successful crop production. As a side benefit, game animals were in peak condition at this time. This does not preclude extensive high altitude logistical trips by Fremont group members not essential to crop care due to cooperative arrangements or to uncontrollable loss of crops.

Summary. Under the broad interpretive framework outlined here, the Fremont period in northeastern Utah is seen not as a long period of plant development in farming, but rather a relatively short period of limited correlates with a relatively favorable environment, followed by retrenchment and a long, ultimately unsuccessful struggle to maintain a farming way of life in a deteriorating environmental situation. Under the conditions suspected, failure would tend to be manifested on an individual or family level, rather than as abrupt dropouts. Given the topography of northeastern Utah, flora and fauna nondomesticates have always represented a considerable proportion of the resources the area can be made to provide. An unreasonable frost in July or August would have forced the most dedicated prehistoric Uinta Basin farmers to desert for long winters. The apparent absence of Fremont remains on northwestern Wyoming ridge, may represent the cultural group effort to persist on foraging until the following summer. Much of the apparent Uinta Fremont environmental variability and the presence of Fremont artifacts at relatively high altitudes to hunt forage, were probably determined by factors associated with agricultural activities, to disperse failure of an annual crop at a family level, or to regional drought episodes.

Due to a conjunction of limiting factors in latitude and topography, the Uinta Basin is at the intermontane Region limit of corn-corn maize-corn culture. Corn appears in the archaeological assemblage from Dutch John and from further north in Wyoming. Under warmer conditions it may have been possible to grow corn and squash somewhat further north than would be possible today. The long growing seasons would have first allowed agriculture at the most northerly latitudes. If corn and squash were cultivated at and north of Dutch John, patterns of corn dates from Wyoming and extreme northeastern Utah during the Fremont era may show corn appearing earlier in the north than in the Uinta Basin. If trade was the primary agent of corn distribution, corn dates for the Uinta Basin should begin earlier than those for the Wyoming area, but late dates for both areas would be similar. If dispersal of Fremont farmers under deteriorating conditions was the agent, corn dates and more typical Fremont assemblages in Wyoming should post date 1500 BP, and be associated primarily with slow dispersal of late farming populations.

If the interpretive framework outlined above is valid, future research should support late summer or early fall use of Dutch John and similar areas north of the Uinta Basin, increasing after around 1500 BP, by Fremont peoples with some ceramics.
and corn. There should be artifactual relationships between canyon bottom and higher altitude sites, and lower altitude water habitats somewhere in the immediate area associated with storage facilities for corn from the river bottoms. The Wyoming archaeological assemblage for sites with corn should resemble the northeastern Utah Fremont assemblage more closely than more typical southwestern Wyoming assemblages for the period.

Post-Fremont period

1000-250 BP, Deteriorating conditions led to abandonment of farming sometime between 1000-700 BP in northeastern Utah. The number of dated sites in Wyoming declines precipitously after 1100 BP (Thompson and Pastor 1995: Figures 12-14).

The Firehole phase in Wyoming (Thompson and Pastor 1995:59-63) dates 650-250 BP and is defined partly by a drastic reduction in site density that is “possibly associated with a deterioration in environmental conditions, or a change in subsistence practices” (Thompson and Pastor 1995:59). This temporal period also includes most of the “Little Ice Age” dating circa 600-100 BP. Rose Spring points replaced by Desert Side-notched points, steatite pipes and vessels become relatively common. Ceramics are present in reduced quantity, but differ in materially, morphologically and technologically from those of the Fremont era (Intermountain ware).

There are no dated Dutch John sites between 1070 BP and 690 BP, approximately the end of the Uinta phase in Wyoming (Thompson and Pastor 1995) and time of the Agriculturalist-Forager transition in the Uinta Basin (Truesdale 1993).

One feature excavated at Dutch John (a hearth at 42DA2599) yielded dates of 690 and 640 BP, the beginning Firehole phase in Wyoming. This hearth was a compact concentration of charcoal approximately 50 cm in diameter and 15 cm in depth. No pollen, macrofossils, or other cultural materials were associated with this feature.

Although further excavation or further dating and analysis of materials already recovered might reveal more information about the period from 1070-250 BP, it seems likely that the Dutch John area experienced relatively little occupation after 1000 BP. The presence of Desert Side-notched and Intermountain Brown ware ceramic sherds in surface collections from 42DA1364 as well as recovery of a Desert Side-notched point from inside the rockshelter at 42DA696 suggest some use of the area during this period, but these occupations appear to have been transitory, perhaps indicative only of use of the area as a travel corridor. An erosional regime during this period might have resulted in lack of site preservation, and such a regime is at least suggested by the Southwestern-wide droughts after 1000 BP (Talbot and Richens 1995:51-61). However, relatively good preservation of shallowly buried Dutch John sites dating from 7120-1060 BP argues against widespread or long term erosion in the area.

Summary

The voluminous body of radiocarbon, floral, faunal, lithic, ceramic, and structural data for more than 7000 years of occupation in a limited area offers an opportunity to examine existing questions on subsistence and chronology, and poses a number of new questions regarding ceramics, corn, paleoclimatic, temporary structures and slab-lined basins.

Figure 9.1 at the end of this chapter compares Dutch John radiocarbon site data and dates for use of selected features with selected cultural phase sequences for the Uinta Basin and southwestern Wyoming. The chart uses the conventional 14C age with one sigma brackets to define each date. Caves of less than twenty years between bracketed dates are ignored. The first four columns from the left display dates for slab-lined basins, rockshelter occupation, and cultural features and prehistoric construction at Dutch John sites. The four columns on the right compare Dutch John cultural phases as suggested by changes in selected feature use and/or other material culture with Wyoming phases schemes by Meczalkif (1987) and Thompson and Pastor (1995:28) and with Uinta Basin cultural phases as compiled by Spangler (1995).

Dutch John occupation appears to have always been confined to warm season (spring through fall) short term foraging visits. No winter season or permanent prehistoric structures have been identified. Although Fremont period structural depressions were of limited depth, Dutch John data offers some support for the bi-modal distribution of bison/core dates (6500-4500 BP and 1800-1200 BP) noted for Wyoming (Thompson and Pastor 1995:843). There is no evidence of acorn use although oak pollen appeared briefly in the area. As is typically the case at Uinta Fremont sites to the south in the Uinta Basin, there is no evidence of pinyon nuts as a focus for subsistence. Corn (possibly in the context of a travel ration for a hunting trip) does not appear until after 1200 BP. Although the sample is small, bones of Cypriptia (squawfish or chub) and Catostomus (sucker), both native to the nearby Green River, found in Fremont contexts on the project area suggest fish formed part of the diet after 2000 BP.

Occupations at Dutch John from 7100-2600 BP compare most closely to those of the Wyoming Basin margins, although with a difference in timing that may be attributable to a different tempo of environmental change in the Dutch John microclimate.

Principal activity of Early Archaic occupations was wide spectrum foraging with an emphasis on hunting, using seasonal structures as a base. Evidence from a series of seasonal occupations between 7120-5830 BP suggest the area climate was more favorable during at least the first half of the Altithermal than in the Wyoming Basin, and attracted foragers from the north.

Additional data is needed to understand the 5800-4100 BP period data gap at Dutch John. This hiatus may result from cultural or climatic factors, but additional dates from excavated features near Dutch John may close this apparent gap.

Archaic occupations after 4100 BP probably focused on resting of roots and tubers in the spring, as well as some hunting on an encounter basis. Slab-lined basin use here occurs considerably later than in Wyoming. No sheltering structures are noted for this period at Dutch John, and occupations seem to have been highly mobile.

Occupations from 2600-1800 BP used rockshelters. The pattern of concentrated rockshelter use for the period apparently has not been noted elsewhere. It may be peculiar to Dutch John and due to microclimatic factors, but future investigations should consider the possibility it might be more widespread. Sparse evidence suggests both plant processing and hunting occurred during this period. Occupation during this period seems to have been less mobile than in the following phase.

Occupations after 1800 BP are Fremont in appearance with brush structures and may reflect use of the area by Fremont farmers from the Green River corridor in the late summer and fall, when crops required less care. Early in the period the area apparently had more brushy cover, but drying conditions and drought apparently began shortly after 1700 BP, leading to reduced use of the area and possibly abandonment by around 1000 BP.

Use of the area after 1000 BP appears to have been relatively light and transitory.
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Appendix One

POLLEN ANALYSIS OF SAMPLES FROM THE DUTCH JOHN PROJECT AREA, ASHLEY NATIONAL FOREST, DAGGETT COUNTY, UTAH

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QUATERNARY SERVICES TECHNICAL REPORT SERIES
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INTRODUCTION

A total of 13 samples for pollen extraction and analysis, and 28 samples for flotation analysis were submitted to Quaternary Services. These samples were collected from excavations of 9 sites in conjunction with the Dutch John Privatization Project conducted by the U.S.F.S., Ashley National Forest. These sites are all located within Daggert County, in extreme northwestern Utah. While several of the sites are undated, the remainder range from an early occupation dated at 6870 ± 70 yr B.P. (42Da690) to between 1200 ± 60 yr B.P. (42Da614) and A.D. 600-1200 (42Da685). In June of 1999 a modern surface pollen sample from Dutch John Flat was submitted to Quaternary Services. Analysis of this sample is appended to this report as Report Numbers 99-019 under the heading: Modern Sample.

The present vegetation of the Dutch John Bench area is dominated by Artemisia tridentata (sagebrush) and Spha comata (needlegrass). Additional species including Poa secunda (Sandberg bluegrass), Koireria cristata (junegrass), and Gymnus sp. (prickly pear cactus) are also present. Pinus edulis (Piston) and Juniperus sp. (juniper) are encroaching across these communities.

The slopes adjacent to the sagebrush area are covered by Pinus edulis (Piston) and Juniperus sabinae (Utah Juniper). The understorey components in the younger, more open stands include Poa secunda (Sandberg bluegrass), Pauha tridentata (bitterbrush), Phrisa eocida (blood Phlox), and Oxyopodium hymenoides (Indian Ricegrass). On the northern slopes, a Cercocarpus sp. (mountain mahogany)/Eymaia speciosa (bunchgrass) community dominates with Artemisia sp., Crepis sp. (hawkbeard), Penstemon sp. (Penstemon), Phrisa longifolia (lambda leaf Phlox), Trifolium gomyacarpum (blosures clover), and Calochortus sp. (gillette). Pinus ponderosa (ponderosa pine), Pseudotsuga (ponderosa pine), Populus sp. (cottonwood), Salix sp. (willow), and Pinus virginiana (chokacherry) are also present in the local area.

METHODS AND MATERIALS

Pollen Extraction Methods

Chemical extraction of pollen samples was conducted at the Palynology Laboratory at Texas A&M University, using a procedure designed for semi-arid Southwestern sediments. The method, detailed below, specifically avoids use of such reagents as nitric acid and bleach, which have been demonstrated experimentally to be destructive to pollen grains (Holloway 1981).

From each pollen sample submitted, 25 grams (g) of soil were sub-sampled. Prior to chemical extraction, three tablets of concentrated Lycopodium spores (batch 307682, Department of Quaternary Geology, Lund, Sweden; 13,500 ± 500 marker grains per tablet) were added to each sub-sample. The addition of marker grains permits calculation of pollen concentration values and provides an indicator for accidental destruction of pollen during the laboratory procedure.

The samples were treated with 35 percent Hydrochloric Acid (HCl) overnight to remove carbonates and to release the Lycopodium spores from their matrix. After neutralizing the acid with distilled water, the samples were allowed to settle for a period of at least three hours before the supernatant liquid was removed. Additional distilled water was added to the supernatant, and the mixture was swirled and then allowed to settle for 5 seconds. The suspended test fraction was decanted through 150nm mesh screen into a second beaker. This procedure, repeated at least three times, removed light materials, including pollen grains, from the heavier fractions. The fine material was concentrated by centrifugation at 2,000 revolutions per minute (RPM).

The fine fraction was treated with concentrated Hydrofluoric Acid (HF) overnight to remove silicates. After completely neutralizing the acid with distilled water, the samples were treated with a solution of darvan, and sonicated in a Delta D-9 Sonicator for 30 seconds. The Darvan solution was removed by repeated washing with distilled water and centrifuged (2,000 RPM) until the supernatant liquid was clear and neutral. This procedure removed fine charcoal and other associated organic matter and effectively deaccelerated the sample.

The samples were dehydrated in glacial acetic acid in preparation for acetylation. Acetylation solution (acetic anhydride: concentrated sulfuric acid = 9:1 ratio) following Erdman (1960), was added to each sample. Centrifuge tubes containing the solution were heated in a boiling water bath for approximately 8 minutes and then cooled for an additional 8 minutes before the acetylation solution with glacial acetic acid followed by distilled water. Centrifugation at 2,000 RPM for 90 seconds dramatically reduced the size of the sample, yet from period analysis, the samples did not remove fossil palynomorphs.

Heavy density separation using zinc bromide (ZnBr2), with a specific gravity of 2.00, to remove much of the remaining detritus from the pollen. The light fraction was diluted with distilled water (1:10) and concentrated by centrifugation. The samples were washed repeatedly in distilled water until neutral. The residues were rinsed in a 1% solution of potassium hydroxide (KOH) for less than one minute which was effective in removing the majority of the unwanted alkaline soluble humates.

The material was rinsed in Ethanol (ETOH) stained with safranin-O, rinsed twice with ETOH, and transferred to 1-dram vials with Tertiary Butyl Alcohol (TBA). The samples were mixed with a small quantity of glycercine and allowed to stand overnight for evaporation of the TBA. The storage vials were capped and were returned to Ashley National Forest at the completion of the project.

A drop of the polliniferous residue was mounted on a microscope, a slide for examination under an 18 X 18 mm cover slip sealed with fingernail polish. The slide was examined using 200X or 1000X magnification under an ana-Jena Labolov 4 compound microscope. Occasionally, pollen grains were examined using either 400X or 1000X oil immersion to obtain a positive identification to either the family or genus level.

Abbreviated microscopy was performed on each sample in which either 20 percent of the slide (approximately four transects at 200X magnification) or a minimum of 50 marker grains were counted. If warranted, full counts were conducted by counting to a minimum of 200 fossil grains. Results of which method was used, the uncounted portion of each slide was conventionally scanned at a magnification of 100X for larger grains of cultivated plants such as ZEA mays and Cucurbita, two species of Cactas (Platyopora and Cyindropuntia), and other large pollen types such as members of the Malvaceae, or Nyctaginaceae families.

For those samples warranting full microscopy, a minimum of 200 pollen grains per sample were counted as suggested by Barkley (1934) which allows the analyst to inventory the most common taxa present in the sample. All taxa were counted completely, resulting in various numbers of grains counted beyond 200. Pollen taxa encountered on the uncounted portion of the slide during the low magnification scan are tabulated separately.

Total pollen concentration values were computed for all taxa. In addition, the percentage of indeterminate pollen was also computed. Statistically, pollen concentration values provide a more reliable estimate of species composition within the assemblage. Traditionally, results have been presented by relative frequencies (percentages) where the abundance of each taxon is expressed in relation to the total pollen sum (200+ grains) per sample. With this method, rare pollen types tend to constitute less than 1 percent of the total assemblage. Pollen concentration values, provide a more precise measurement of the abundance of even these rare types. The pollen data are reported here as pollen concentration values using the following formula:

$$PC = \frac{K^2}{S_L}$$

Where: PC = Pollen Concentration
K = Lycopodium spores counted
S_L = Fossil pollen counted
S = Sediment weight

The following example should clarify this approach. Taxon X may be represented by a total of 10 grains (1 percent) in a sample consisting of 1,000 grains, and by 100 grains (1 percent) in a second sample consisting of 10,000 grains. Taxon X is 1 percent of each sample, but the difference in actual occurrence of the taxon is obscured when pollen frequencies are used. The use of "pollen concentration values" are preferred because it accentuates the variability between samples in the occurrence of the taxon. The variability, therefore, is more readily interpretable when comparing cultural activity to noncultural distribution of the pollen rain.

Variability in pollen concentration values can also be attributed to deterioration of the grains through natural processes. In his study of sediment samples collected from a wetland, Haring (1981) developed the "1000 grains/g rule" to assess the degree of pollen destruction. This approach has been used by many palynologists working in other contexts as a guide to determine the degree of preservation of a pollen assemblage and, ultimately, in aid in the selection of samples to be examined in greater detail. According to Hall (1981), a pollen concentration value below 1000 grains/g indicates that forces of degradation may have severely altered the original assemblage. However, a pollen concentration value of fewer than 1000 grains/g can indicate the restriction of such natural pollen rain. Samples from pit structures or floors within enclosed rooms, for example, often yield pollen concentration values below 1000 grains/g.
Pollen degradation also modifies the pollen assemblage because pollen grains of different taxa degrade at variable rates (Holloway 1981, 1989). Some taxa are more resistant to deterioration than others and in some assemblages after other taxa have deteriorated completely. Many commonly occurring taxa degrade beyond recognition in a short time. For example, most (ca. 70 percent) Angiosperm pollen has either tricolpate (three furrows) or tricolpore (three furrows each with a single pore) type pollen. These pollen surfaces erode rather easily, once deteriorated, these grains tend to resemble each other and are not readily distinguishable. Other pollen types (e.g. Chenio-am) are so distinctive that they remain identifiable even when almost completely degraded.

Pollen grains were identified to the lowest taxonomic level whenever possible. The majority of those identifications conformed to existing levels of taxonomy for most. For example, Chenio-am is an artificial, pollen morphological category which includes pollen of the family Chenopodiaceae (goosefoot) and the genus Amaranthus (pigweed) which are indistinguishable from each other (Martin 1963). All members are wind pollinated (anemophiles) and produce very large quantities of pollen. In many sediment samples from the American Southwest, this taxon often dominates the assemblage.

Pollen of the Asteraceae (Sunflower) family was divided into four groups. The High-spin and Low-spin–type groups were identified on the basis of spine length. High-spin Asteraceae contains those grains with spine length greater than or equal to 2.5 m while the low spine group have spines less than 2.5 m in length (Bryant 1949; Martin 1963). Artemisia pollen is identifiable to the genus level because of its unique morphology of a double reniform in the mesocolpial (between furrows) region of the pollen grain. Pollen grains of the Liliiflorae are also distinguished by their fenestrate morphology. Grains of this type are restricted to the tribe Cibociceae which includes such genera as Pasturus (dandelion) and Lactuca (lettuce).

Pollen of the Poaceae (Grass) family are generally indistinguishable at below the family level, with the single exception of Zea mays, identifiable by its large size (ca 0.87) relatively large pore annulus, and the internal morphology of the exine. All members of the family contain a single pore, are spherical, and have simple wall architecture. Identification of non-sperm pollen is dependent on the presence of the single pore. Only complete or fragmented grains containing this pore were tabulated as members of the Poaceae.

Clumps of four or more pollen grains (anther fragments) were tabulated as single grains to avoid skewing the counts. Clumps of pollen grains (anther fragments) from archaeological contexts are interpreted as evidence for the presence of flowers at the sampling locale (Bohler 1981). This enables the analyst to infer possible human behavior.

Finally, pollen grains in the final stages of disintegration but retaining identifiable features, such as furrows, pores, complex wall structure, or a combination of these attributes, were assigned to the Indeterminate category. The potential exists to miss counting pollen grains without identifiable characteristics. For example, a grain that is so severely deteriorated that no distinguishing features exist, closely resembles many spores. Pollen grains and spores are similar both in size and are commonly confused in microscopy (e.g. mesocolpellites). So that spores are not counted as deteriorated pollen, only those grains containing identifiable pollen characteristics are assigned to the Indeterminate category. Thus, the Indeterminate category contains a minimum estimate of degradation for any assemblage. If the percentage of Indeterminate pollen is between 10 and 20 percent, relatively poor preservation of the assemblage is indicated, whereas Indeterminate in excess of 20 percent indicates severe deterioration to the assemblage.

In those samples where the total pollen concentration values are approximately at or below 1000 grains/g, and the percentage of Indeterminate pollen is 20 percent or greater, counting was terminated at the completion of the abbreviated microscopy phase. In some cases, the assemblage was so deteriorated that only a small number of taxa remained. Statistically, the concentration values may have exceeded 1000 grains/g. If the species diversity was low (generally these samples contained only one or two genera of the Asteraceae (Sunflower) family and Indeterminate category), counting was also terminated after abbreviated microscopy even if the pollen concentration values slightly exceeded 1000 grains/g.

**Floatation Methodology**

The entire sample submitted for analysis was treated using water separation. The initial volume of material was measured and recorded and then screened to remove the larger particles. The screened material was degassed separately but was not subject to water separation. The material passing through this screen was placed in a bucket for physical flotation. The light fraction was collected in fine mesh screen and air-dried. After drying completely, the material was placed in labelled zip-loc bags prior to analysis. The heavy fraction was examined for larger botanical pieces and artifacts and then was discarded as none of the samples contained additional materials or artifacts.

**Results**

For ease of comparison, Table A.1 contains a list of the scientific and common names of taxa used within this report. Table A.2 contains the provenience data and both the raw pollen counts and the calculated pollen concentration values. Table A.3 contains the results of the flotation analysis. The results of analysis for the archaeological samples are presented below by site and feature.

**Archaeological Samples**

Site 42Da364

Activity Area 2 Heath 2

FS 54 was a flotation sample from this hearth, which dated 1400 ± 50 yrs B.P. Pinus and conifer charcoal were present in addition to charred Pinus wood. A single charred Juniperus species was retrieved and over 85% of the assemblage was uncharred.

Activity Area 4 Pit 8

FS 133 was taken from the bottom of this undated processing pit feature. Pinus, Juniperus, and conifer charcoal were present in addition to unidentified charred fragments. More than 90% of the assemblage was uncharred.

**Site 42Da399**

Activity Area 2 Upper Level

FS 271 was taken from an activity area surface that dated 1620 ± 60 yrs B.P. The assemblage contained only charred charcoal and a single uncharred hardwood wood fragment. More than 99% of the material was uncharred.

**Site 42Da402**

Activity Area 1 Lower Level

FS 207 was identified as being taken from a feature but from a lower floor which dated to 7120 ± 40 yrs B.P. Conifer charcoal and fragments were present and more than 99% of the material was uncharred.

**Site 42Da402**

Heath 2

Two pollen samples were submitted from two features from this site. FS 16 was taken from Heath 2, a stained area above bedrock dating 1980 ± 40 yrs. BP. This sample contained 3383 grains total pollen concentration but also contained 22 percent Indeterminate pollen. Pinus (1153 grains/g) pollen was low with relatively high amounts of Juniperus (123 grains/g) and Quercus (62 grains/g) pollen. Pinus (156 grains/g) was high with very high amounts of Low-spin
Asteraceae (436 grains/g). Cheno-am pollen was low (779 grains/g) with high amounts of Artemisia (187 grains/g). Small amounts of Ericagnum and Cylindropuntia (31 grains/g) each were also present. Cyl. FS 36 was taken from an undated charcoal feature below a rock and contained 3134 grains/g total pollen concentration. This sample was dominated by 9 percent Indeterminate pollen. Pinus was moderate (1497 grains/g) with traces of Juniperus and Quercus pollen (18 grains/g each). Poaceae and High-spine Asteraceae (18 grains/g each) were low with low amounts of Cheno-am (72 grains/g) and high quantities of Low-spine Asteraceae (370 grains/g). A small amount of Lignumvitae (18 grains/g), Artemisia (35 grains/g) and Euphorbia (53 grains/g) were also present. (*Note: Due to insufficient documentation of context, data from this sample was not used in the report). *FS 15 was taken from the undated charcoal feature. The material consisted of more than 95% uncharred material. Only a few small charcoal fragments were present in addition to 2 uncharred Juniperus seeds. (Note: Due to insufficient documentation of context, data from this sample was not used in the report).

Site 42DaE90

Heath FS 3 was taken from a hearth dating 1530 ± 30 yrs. B.P. and contained only 245 grains/g total pollen concentration. This was based on a pollen sum of only 8 grains. Pinus (155 grains/g) was present in trace amounts only with a small amount of Poaceae (31 grains/g) and Cheno-am (61 grains/g). FS 1, a flotation sample, was also taken from this hearth dating 1530 ± 30 yrs. B.P. This sample contained the largest amount of material of any sample. Conifer charcoal dominated the assemblage but some pieces of hardwood charcoal were also present. These belonged to either Populus or Salix which are both members of the same family. A single charred fragment of a Juniperus seed was also present.

Site 42DaE14

Brush Structure Heath A total of 4 flotation samples were taken from this site which dated to 1200 ± 60 yrs. B.P. FS 54 was taken from the hearth. This sample contained only small amounts of charcoal fragments and 2 fragments of mineralized bone. The charcoal consisted of conifer types but no genital identification was possible. Brush Structure Flows Fill FS 53 was taken from just above the use floor. This sample contained conifer charcoal, uncharred Juniperus twigs, and a single charred Juniperus seed. A single large bone fragment was also recovered. FS 55 was taken from the structure fill and contained conifer charcoal, uncharred Juniperus twigs and a charred Juniperus seed fragment. FS 56 was taken from the general fill in the brush structure and also contained conifer charcoal, and Juniperus twigs and seeds. More than 95% of this sample was uncharred.

Site 42DaE17

Pin 2 FS 59 from undated Heath 2 contained 1201 grains/g total pollen concentration with 21 percent Indeterminate pollen. This was based on a pollen sum of only 43 grains. Pinus (279 grains/g) pollen was present in trace amounts with high amounts of Poaceae (112 grains/g) and moderate amounts of high (56 grains/g) and Low-spine (84 grains/g) Asteraceae. Cheno-am (419 grains/g) was very low. Heath 1 Two flotation samples were taken from this site. FS 48 was taken from Heath 1. This sample contained conifer charcoal and charred Pinus wood. The charcoal fragments were very small and the sample contained more than 90% uncharred material. Slab-lined basin 1 FS 65 was taken from just above the floor of a slab lined basin dating 3130 ± 70 yrs. B.P. This sample contained no charcoal material.

Site 42DaE79

Historic Lea-to FS 35 was taken from gray cultural fill in a collapsed lea-to dating 70 ± 30 yrs. BP. The sample contained 6192 grains/g total pollen concentrations values. Indeterminate pollen consisted 16 percent of the assemblage. Pinus (1051 grains/g) pollen was low with high amounts of Juniperus (177 grains/g) pollen. Poaceae (206 grains/g) was high along with Cheno-am (347 grains/g), high (147 grains/g) and Low-spine (256 grains/g) Asteraceae, and Artemisia (88 grains/g). FS 22 and 38 Two flotation samples were taken from this site. FS 32 was recovered from the structure fill and contained uncharred conifer and Pinus wood and an uncharred Juniperus twig. FS 38 was recovered from a roasting pit and contained conifer charcoal and both charred and uncharred Juniperus twigs.

Site 42DaE485

Brush Structure A total of 6 flotation samples were taken from this site. Brush Structure Heath FS 71 was taken from the hearth and contained conifer and Pinus charcoal. The sample was more than 95% uncharred. Five Zoo mays cups were present. Brush Structure Pit 1 FS 32 was taken from Pit 1 and contained conifer and Pinus charcoal. A charred kernel and 5 cups of Zooy mays were also present. Brush Structure Floor FS 51 was taken from floor fill in a brush structure dating 1165 ± 30 yrs. BP. Pinus (1334 grains/g) was low with low amounts of Juniperus (27 grains/g). Poaceae (27 grains/g) and Cheno-am (319 grains/g) were low with high amounts of Low-spine Asteraceae (80 grains/g) and Artemisia (53 grains/g). FS 31 was taken from the structure floor, and contained conifer charcoal. The sample was more than 99% uncharred. FS 1 was taken from just above the structure floor. This sample contained conifer and Pinus wood and charcoal and was more than 95% uncharred. FS 2 was taken from above the floor from this feature and contained conifer wood and charcoal in addition to a charred Juniperus seed. FS 45 was taken from the structure roof fall and contained charcoal fragments and uncharred charcoal wood. The assemblage was more than 95% uncharred.
The pollen assemblages from 8 sites (42Da602, 42Da609, 42Da617, 42Da679, 42Da685, 42Da690, 42Da693, and 42Da696) analyzed earlier (Holloway 1997b) contained generally low pollen concentration values, lows, and relatively high percentages of indeterminate pollen. This implies that the assemblages were severely deteriorated through natural weathering processes. With the exception of only a few samples, Pinus pollen was consistently very low. This is surprising given the dominance of Pinus within the nearby vegetational assemblage. Soils under pine forests are generally slightly acidic (pH 6.5-7.0) which is usually conducive to good pollen preservation. However, in this case, the lowered Pinus pollen concentration values are likely the product of weathering and do not imply a lack of arboreal cover. The consistently moderate to higher concentration values of Artemisia and both low and High-spine Asteraceae pollen are consistent with the present vegetation surrounding the sites.

One of the samples containing the lowest pollen concentration values was taken from a hearth feature (FS 90) from site 42Da690. This is not surprising given the sampling locale. The pollen assemblage contains background pollen taxa and is probably indicative of pollen deposition after the last firing of the hearth. Any pollen present during the utilization of the hearth was likely incinerated along with the fuel woods. In general, while hearth areas are excellent sources for macrobotanical data, they are generally only poor sources for palynological data because of the nature of their function.

The sample from feature 3 (FS 16) from site 42Da602 was the only one containing any evidence of potential economic taxa. Both Eriogonum and Cylindropuntia pollen were present in small amounts. While both taxa could have been present locally and thus are part of the natural pollen rain, alternatively, these could imply an economic function to the feature. These are based on only a single grain each and thus could have originated from either condition. Potentially, however, this may suggest an economic function.

Very little seed materials were present from these samples and the seeds recovered consisted of Juniperus sp. These could have been introduced accidentally by the use of seed-bearing fuel woods. Alternatively, the presence of multiple Juniperus sp. pollen from the lower elevation sites, might indicate that they were being collected and charred or parched prior to consumption. The inferred presence of a pinon-juniper plant community would indicate that these seeds were likely exploited as a common food source.

Finally, the presence of isolated corn cupules from two hearth features from 42Da685 indicates that corn was available during this later occupation (A.D. 600-1300). The presence of the cupules from hearth features suggests that the cob material may have been used as a supplemental fuel source. The cobs, after burning, may have broken apart leaving only the isolated corn cupules. There is no evidence to direct us to this interpretation. This is a directly suggestive cultural practice although it is certainly possible, and the cob may have only been traded into the area. Given the later date from this site, it is not surprising to recover evidence of this practice.

CONCLUSIONS

The flotation samples from the Dutch John Project reveal that there has been little change in the plant communities over time. The evidence strongly supports an interpretation of a pinon-juniper plant community present in the area prehistorically. Fuel woods were obtained from locally available taxa which were likely dominated by Pinus and or Juniperus. Fuel woods obtained from riparian habitats were also used but to a lesser extent.

Subistence was likely based on the exploitation of locally available materials such as Juniperus seeds. While no direct evidence was present, I suspect that Pinon seeds were also routinely gathered in season. These nuts are somewhat larger and thus less likely to be incorporated into the charcoal assemblage. There is also evidence of the utilization of Zia grapes, at least from the later occupation.

The pollen assemblages from the Dutch John Project Area were extremely weak. The assemblages did reflect, however, the same local vegetation present in the area today. This implies that there has been little change to the vegetational component over a considerable period of time, probably since the occupation of the Archaic component dated at 6870 yrs. BP. Virtually no economic pollen types were present from these sites with the exception of Site 42Da602. There is some indication, however, that feature 3 from 42Da602 may have been a storage feature although it is equally likely that the economic pollen types may have been deposited along with the natural pollen rain. The pollen samples from the slightly higher elevation sites also suggest that this hearth feature had a specific function for which hardwood charcoal was desired. Alternatively, the presence of the hardwood charcoal may simply reflect its availability.

 FS 2 also contained conifer and Pinus charcoal.

**CONCLUSIONS**

The flotation samples from the Dutch John Project reveal that there has been little change in the plant communities over time. The evidence strongly supports an interpretation of a pinon-juniper plant community present in the area prehistorically. Fuel woods were obtained from locally available taxa which were likely dominated by Pinus and or Juniperus. Fuel woods obtained from riparian habitats were also used but to a lesser extent.

Subistence was likely based on the exploitation of locally available materials such as Juniperus seeds. While no direct evidence was present, I suspect that Pinon seeds were also routinely gathered in season. These nuts are somewhat larger and thus less likely to be incorporated into the charcoal assemblage. There is also evidence of the utilization of Zia grapes, at least from the later occupation.

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RESULTS AND DISCUSSION

The pollen sample contained a very large quantity of pollen. A pollen sum of 623 grains was obtained with a calculated pollen concentration value of 22,938 grains/g. The results of the analysis are presented below in Table A.2.

The pollen assemblage was clearly dominated by Pinus. Both sub-genera of Pinus were present in the assemblage. Differences between the sub-genera are determined by the presence of distal vesculae (small wart-like protrusions) in the most likely present within the area. While limber pine is also present, Pinus pollen can only be differentiated into one of the two species. Identification is not possible.

Juniperus (110 grains/g) pollen was fairly high and not unexpected. Juniperus is a common constituent of Pion stands, as is Quercus (147 grains/g). Salix (willow) also was present in small amounts (74 grains/g). This tree likely is found along the wind-pollinated conifer taxon which is normally found at the higher elevations. It produces the smallest amount of pollen of proximity of high altitude coniferous forests. Picea (14 grains/g) was observed only in the low-magnification scan of the slide and is normally found in association with Abies.

Cheno-ar species in pollen is low (884 grains/g) with high amounts of Poaceae (295 grains/g) and both high (994 grains/g) and Lowo-

TABLE A.1. Index of scientific and common names of taxa.

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
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<tr>
<td>Artemisia tridentata (sagebrush)</td>
<td>Brittlebrush</td>
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<td>Sporobolus cryptandrus (needledrop)</td>
<td>Needledrop</td>
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<tr>
<td>Atriplex canescens (bitterbrush)</td>
<td>Bitterbrush</td>
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<tr>
<td>Cercocarpus montanus (mountain mahogany)</td>
<td>Mountain mahogany</td>
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<td>Croton spp. (spiny)</td>
<td>Spiny croton</td>
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<td>Ephedra viridis (sage)</td>
<td>Sage</td>
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<tr>
<td>Ephedra viridis (sage)</td>
<td>Sage</td>
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<tr>
<td>Olea europaea (olive)</td>
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<tr>
<td>Poaceae (grasses)</td>
<td>Grasses</td>
</tr>
<tr>
<td>Quercus species (oak)</td>
<td>Oaks</td>
</tr>
<tr>
<td>Salix spp. (willow)</td>
<td>Willows</td>
</tr>
<tr>
<td>Sclerocarya caucasea (cork oak)</td>
<td>Cork oak</td>
</tr>
<tr>
<td>U testim (willow)</td>
<td>Willow</td>
</tr>
<tr>
<td>Vicia sativa (field pea)</td>
<td>Field pea</td>
</tr>
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</table>

The enormous high pollen concentration values are generally expected within a conifer forested plant community. For example, Pinus ponderosa is produced in structures called strobili which are located in clusters of 7-10+ on the terminal branch ends. Each strobili produces in excess of 1 million pollen grains which are specifically adapted for wind pollination. Thus a pollen concentration value of 22,000 + grains/g is not unexpected.

Based on the comparison with the archaeological samples, I would suspect that the sample was taken from a more forested area than was present in the immediate area of the archaeological sites. Also, according to Ashley National Forest personnel, the sample was collected during the pollination period of Pinus. Both these factors would act to inflate the pollen concentration values. Since the archaeological samples had been subjected to years of weathering, this would also act to decrease the pollen concentration values, although Pinus pollen is generally more resistant to deterioration. Considering these factors, the archaeological assemblages compare very favorably to the surface pollen sample.
<table>
<thead>
<tr>
<th>MODERN POLLEN SAMPLE</th>
<th>Aster</th>
<th>Poaceae</th>
<th>Salix</th>
<th>Alnus</th>
<th>Pinus ponderosa</th>
<th>Juniperus</th>
<th>Quercus</th>
<th>Arctostaphylos</th>
<th>LS Asteraceae</th>
<th>Poaceae</th>
<th>Cylindrocarpus</th>
<th>Ephedra</th>
<th>Liguliflora</th>
<th>Eriogonum</th>
<th>Ulmus</th>
<th>Indeterminate</th>
<th>Sum</th>
<th>Total</th>
<th>% Indeterminate</th>
<th>Trans/Total Trans</th>
<th>Lycoosphylum Added</th>
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<td>72</td>
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<td>18</td>
<td>4</td>
<td>18</td>
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Table A1.2. Pollen count and concentration data.
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<th>Volume</th>
<th>Light</th>
<th>% Recovery</th>
<th>Channel</th>
<th>Wood</th>
<th>Seeds</th>
<th>Core</th>
<th>Bone</th>
<th>Context</th>
<th>Other</th>
<th>% Uncharred</th>
<th>Notes</th>
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<td>364</td>
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<td>uppd.1</td>
<td>Growth rings on pre very narrow</td>
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<td>CF, Pinus, conifer</td>
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<td>CF, lac, conifer</td>
<td>Juniperus flat frs UC-9</td>
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Table A1.3. Macrofloral data.
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MARTIN, P.S.  

Appendix Two

POLLEN ANALYSIS OF FEATURES AT SITES 42Da364, 42Da617, 42Da690,  
AND 42Da693 IN THE DUTCH JOHN PRIVATIZATION SURVEY, UINTA  
MOUNTAINS, UTAH

By  
Linda Scott Cummings  
Paleo Research Laboratories  
Golden, Colorado

Paleo Research Labs Technical Report 99-50

Prepared For  
U.S. Forest Service  
Ashley National Forest  
Vernal, Utah  
August 1999
INTRODUCTION

Fill from four features at different sites in the Dutch John Privatization Survey was examined to identify any potential that these features were used for biscuit Root. The features represent ethnobotanical context for the occupation of this site. The ethnoarchaeological background of these sites is discussed in the following paragraphs to provide some additional information for these possible uses during prehistoric.

Aphiticaceae (Panley Family)

Several members of the Aphiticaceae (panley or umbel) family are noted to have been used by groups in the Great Basin, including Cymopterus, Heracleum (cow parsnip), Lomatium (biscuitroot), Preronida (yampa), Spigot (water parsnip), and Sparsnoxosum (wild)seeded parsnip). The roots, stems, seeds, and leaves of these plants may be used for food, seasoning, and medicine. Roots most often were collected using digging sticks, then peeled and prepared for immediate consumption or dried for future use. Biscuitroot and yampa were especially important root plants that were gathered extensively in the spring. They are noted to be exploited by Native Americans in Oregon and Washington (Fowler 1986:69-71; Prody 1994:579; Shostroin 1940:548; Sweek 1976).

CHEO-ANS (Gonosfet Family and Pigweed)

Cheo-ans are a group of plants that include the Chenopodaceae family and the genus Amaranthus. Plants such as Che- noepidium (goosefoot), Amaranthus (salish), and Amaranthus were exploited for both their greens (cooked as potballots) and seeds. The seeds were ground and used to make a variety of mushes and cakes. The seeds are usually noted to have been parched. The greens are most tender in the spring when young, but may be used at any time. These herba- ceous plants may also have been used as a browsing vegetation layer when pit roasting other foods (Chamberlin 1994:366; Collar 1972:12-16; Gilmore 1977:27, 57, 71; Rogers 1980:43, 66; Spchmeier 1974). Chenopodium leaves are rich in vitamins C and were eaten to treat stomachaches and to prevent scurry. Leaf poultices were applied to burns, and a tea made from the whole plant was used to treat diarrhea.

Amaranthus leaves were an important source of iron. Amaranthus poultices were used to reduce swellings and to soothe ach- ing teeth. A leaf tea was used to stop bleeding, as well as to treat dysentery, ulcers, diarrhea, mouth sores, sore throats, and boils. Amaranthus greens (Angier 1986:33-35; Ford and Duke 1990:216; Harris 1982:58; Kromholt and Kromholt 1978:34-35, 56-67). Amaranthus leaves and young shoots have a salty taste and may be used as a seasoning. A poultice of the chewed plant was applied to bee, bee, and wasp sting swellings. A. ciliatus (four-winged saltbush) was used for stomach pain or as an emetic. Dried leaves were used as a snuff for nose trouble, and a poultice of the warm, pulivered root was applied to toothaches (Mooreman 1966:85-86; Winter 1972:75).

Quinta (Prickly Fear Cactus)

Quinta is prickly near, Indian fig occurs as shrubs or herbaceous perennial plants. Some species have flattened, fleshy joints which all produce edible fruit. The fruits can be eaten fresh in salad, chopped in omelettes and stews, pickled, and used for screw jacks and jellies. Fresh and stewed Quinta fruits have even been seen in New York markets (Medger 1966:61). The young stems or pads can be peeled and eaten raw, or prepared like green beans. Peeled stems also can be used as a dressing on wounds. The seeds can be eaten in soups, or dried, parched, and ground into a meal to be used in gruel or cakes. Cactus plants are found growing wild all over the United States on arid, rocky, or sandy soils. They are occasionally found growing east to New York and Massachusetts, and west to British Columbia and Washington (Harri ngton 1964:382- 384; Kavach 1979:6.1; Kivik 1975:66-52; Medger 1966:61; Munster 1987:317).

Pacaceae (Grass Family)

Members of the Pacaceae (grass family), particularly Oryzopsis (Indian ricegrass) and Sporobolus (dropped) are widely used as a food resource. Grass grasses were normally parched and ground into a meal to make various mushes and cakes (Harrington 1981). Young shoots and leaves may be cooked as greens (Rogers 1980:32-40). Grass also is reported to have been used as a floor covering (Chamberlin 1994:372). Grass seeds ripen from spring to fall, depending on the species, providing a long-term available resource.

DISCUSSION

Four archaeological sites in the Dutch John area of the Uinta Mountains within the Ashley National Forest are represented by fill from three basin features and a temporary structure. These sites lie within the pinyon-Juniper woodland, although some are located closer to the upper end of the woodland and include ponderosa pine, and others are situated near the transition with the sagebrush zone. Results of this analysis are discussed by site below.
42Da646b Structure 2
This prehistoric lithic scatter is located within a canyon at an elevation of 6320 ft in the piney-juniper woodlands. Ponderosa pine is noted in several areas and sagebrush is present at the lower end of the site. Sample FS 80 was collected from a cultural fill of a temporary structure attributed to the Early Archaic. The cultural fill reaches a maximum depth of 18 cm below the surface. Beneath this level is a compacted floor. A radiocarbon age of 5830 ± 50 BP is reported for this feature.

Sample FS 80 exhibits more Pinus pollen than any other sample from the Dutch John area, probably reflecting proximity to more pine. Conversely, fewer Artemisia pollen were noted in this sample, suggesting fewer weedy sagebrush on the ground. Presence of Quercus pollen reflects the presence of oak in the local woodland. Recovery of small quantities of Picea and Pseudotsuga pollen reflect longer distance transport of these pollen types from the spruce and fir woodlands of the Cascade Range. Small quantities of Salix were much smaller in this sample than in either of the features at 42Da364 and 42Da617. This difference might be a function of the fact that this sample was collected from cultural fill in a temporary structure rather than a pit. Small quantities of Low-spine, High-spine, and Liguliflorae-type Asclepiadaceae pollen indicate the presence of a variety of members of the composite family. This sample is the only one to record Sarcobatus and Cyperaceae pollen, reflecting grassweed and sedges. Two types of Euphorbia pollen are noted in this sample, indicating that at least two different species of Mormon tea grew in this general vicinity. The Opuntia pollen frequency recovered from this sample is nearly as large as that recovered at 42Da619 in a lined pit. Recovery of Opuntia pollen from the structure suggests that prickly pear cacti might have been processed inside the structure. The Poaceae pollen frequency was moderately small and might represent the local grass population. Recovery of a small quantity of Shepherdia argentea pollen reflects the presence of buffalo berry in the local vegetation and its availability for settlement. A few starchy grains were noted in the count and further scan of this sample using cross-polior illumination (angular with dot hilum, circular with hallow center, and circular starch with dot hilum). These starches are typical of those produced by grass seeds, but also can be found in roots such as buckwheat. The presence of regeneration of grass seeds or other resources such as buckwheat root in this area. No starch granules diagnostic of buckwheat root were recovered from this sample.

42Da649 This prehistoric open lithic scatter is located at an elevaon of 6490 ft on a terrace/bench in a piney-juniper woodland. The site included a dispersed lithic scatter, surface scatter, and extensive use of the site over a depth of 1400 ft. Sample FS 41 was collected from Level 2 (19 cm below the surface). This slab-lid feature exhibited three levels. Level 1 at the base contained three flakes and some carbon. Level 2 was a black, compact sandy soil, while level three produced some pine nuts and fire-cracked rock.

Sample FS 41 exhibits an elevated Pinus pollen frequency suggesting that this site also was located in an area where pines were more abundant. The Juniperus pollen frequency was fairly small, reflecting a large amount of low-growing juniper. A small quantity of Alium pollen was noted, indicating that maple or box elder was part of the local vegetation in a riparian zone. Recovery of a small quantity of Quercus pollen indicates that oak was part of the local woodland. Presence of a small quantity of Picea and Pseudotsuga pollen indicates the presence of alpine forest in the region. Recovery of Pseudotsuga pollen represents transport of Douglas fir pollen from a northern forest. Sample FS 41 was collected from a subcircular pit at an elevation of 6490 ± 400 BP, with an undated subcircular pit at 310 ± 70 BP. Sample FS 14 was collected from Level 2 (19 cm below the surface). This slab-lid feature exhibited three levels. Level 1 at the base contained three flakes and some carbon. Level 2 was black, compact sandy soil, while level three produced some pine nuts and fire-cracked rock.

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an "X" under cross-polar illumination. Neither are considered diagnostic. A single Sporormiella dung fungal spore was observed in this sample, suggesting the presence of modern or historic remains. These fungal spores represent a dung fungus that becomes more abundant in Historic Period sediments following the historic introduction of grazing animals. Its increasing presence in historic samples has been noted in numerous palynological studies (Davis 1987). Sporormiella fungal spores are not confined to the dung of introduced grazers, but also occur in dung from moose, wild sheep, deer, elk, caribou, and bison. The increase of Sporormiella spores in historic sediments may relate to changing land use patterns and increase in the length of time that herds of animals occupy any given area.

SUMMARY AND CONCLUSIONS

Pollen and starch granule analysis of four samples from four sites in the Dutch John area provide evidence of a piñon-juniper woodland with an understory of sagebrush. Elevated Cheno-am frequencies in Features 6 and 2 at sites 42Da364 and 42Da617, respectively, suggest the possibility that either Cheno-ams were processed in these features or that Cheno-ams also exhibited Opuntia pollen, although it was present in a greater amount in Feature 2 at 42Da617, the lined pit. Poaceae pollen was more abundant in Feature 6 from 42Da364, an unlined pit. Starch granules were recovered in all of the samples examined. The starch record is ambiguous in three of the samples, containing starches that are noted in grass seeds and also in some roots. These general forms are not diagnostic and cannot be used to interpret foods processed in the pits. Two samples contain lamellar starches, which are typical of two t-cres of native grass seeds - Elymus (wild rye) and Agropyron (western wheatgrass). It is likely that grass seeds deteriorated in both Feature 6 at 42Da364 and Feature 2 at 42Da617, referable as a probable Apiaceae starch and suggests that a member of this family, such as bocconitou, was processed in this feature. The other exhibited characteristics not observed in Apiaceae roots. This starch granule remains unidentified, other than to say that it represents a root, but probably not a root in the Apiaceae family. Recovery of Opuntia pollen from all four samples opens the question of processing prickly pear cactus at these sites. The best confirmation of prickly pear cactus processing is examination of the fill of these features for charred cactus spines or aroids, which should be present if cactus was processed. Although the starch granule record could not confirm processing biscuit root in all of these features, it did lend credence to this interpretation for Feature 2 at 42Da617.

<table>
<thead>
<tr>
<th>Site No.</th>
<th>FS No.</th>
<th>Feature No.</th>
<th>Depth of sample</th>
<th>Feature Dimensions</th>
<th>Provenience/ Description</th>
<th>Radiocarbon Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>42Da364</td>
<td>52</td>
<td>6</td>
<td></td>
<td></td>
<td>Fill from west half of unlined hearth or roasting pit</td>
<td>1400 ± 50 BP</td>
</tr>
<tr>
<td>42Da617</td>
<td>69</td>
<td>2</td>
<td>25-35 cm bgs</td>
<td>80 cm diam 44 cm deep</td>
<td>Fill from bottom of slab-lined basin 1, a cylindrical pit</td>
<td>3130 ± 70</td>
</tr>
<tr>
<td>42Da590</td>
<td>80</td>
<td>12</td>
<td></td>
<td></td>
<td>Cultural fill from Structure One</td>
<td>5830 ± 50</td>
</tr>
<tr>
<td>42Da593</td>
<td>14</td>
<td>1</td>
<td>19-23 cm bgs</td>
<td>74 cm diam 31 cm deep</td>
<td>Level 2 fill from west half of slab-lined basin, a cylindrical pit</td>
<td>4100 ± 40 BP</td>
</tr>
</tbody>
</table>

Table A.1. Provenience data for samples from sites 42Da364, 42Da617, 42Da590, and 42Da593.

Scientific Name | Common Name
---|---
Acer | Maple, boxelder
Juniperus | Juniper
Pinus | Pine family
Picea | Spruce
Pinus | Pine
Pseudotsuga | Douglas fir
Quercus | Oak
Salix | Willow

NON-ARBOREAL POLLEN:

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
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<tr>
<td>Asteraceae</td>
<td>Sunflower family</td>
</tr>
<tr>
<td>Artemisia</td>
<td>Sagebrush</td>
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<tr>
<td>Low-spine</td>
<td>Includes ragweed, cocklebur, etc.</td>
</tr>
<tr>
<td>High-spine</td>
<td>Includes aster, rabbitbrush, sneakweed, sunflower</td>
</tr>
<tr>
<td>Liquidambar</td>
<td>Includes dandelion and chicory</td>
</tr>
<tr>
<td>Cheno-am</td>
<td>Includes amaranth and pigweed family</td>
</tr>
<tr>
<td>Salsola</td>
<td>Greasewood</td>
</tr>
<tr>
<td>Cyperaceae</td>
<td>Sedge family</td>
</tr>
<tr>
<td>Echidra nevadensis-type</td>
<td>Mormon tea</td>
</tr>
<tr>
<td>Echidra torreyana-type</td>
<td>Mormon tea</td>
</tr>
<tr>
<td>Ericogonum</td>
<td>Wild buckwheat</td>
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<tr>
<td>Opuntia</td>
<td>Prickly pear cactus</td>
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<tr>
<td>Poaceae</td>
<td>Grass family</td>
</tr>
<tr>
<td>Pharnaceae</td>
<td>Buckthorn family</td>
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<td>Rosaceae</td>
<td>Rose family</td>
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<tr>
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<td>Globemallow</td>
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<td>Too badly damaged to identify</td>
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<td>Selaginella densa</td>
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<td>Sporormiella</td>
<td>Dung fungus</td>
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Table A.2. Pollen types observed in samples from Dutch John, Utah.
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<th>SITE NO</th>
<th>SAMPLE NO</th>
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<th>CONIFEROUS</th>
<th>DECIDUOUS</th>
<th>GRASSES</th>
<th>ABBR.</th>
<th>OTHER POLLEN</th>
<th>STARCHES</th>
<th>TOTAL POLLEN CONCENTRATION</th>
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<td>201 1370</td>
</tr>
</tbody>
</table>

**FIGURE 1. POLLEN DIAGRAM FOR FOUR SITES IN ASHLEY NATIONAL FOREST, UT**
REFERENCES CITED


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Appendix Three

PETROGRAPHIC ANALYSIS OF SELECTED CERAMICS FROM THE DUTC H JOHN LAND TRANSFER

David V. Hill

Introduction

A sample of five ceramic sherds recovered from four sites were examined through petrographic analysis. These sherds represent examples of the Fremont and Numic ceramic traditions. Petrographic analysis of the ceramic pastes indicates that some of the Fremont sherds and the single Numic sample could have been produced near the localities where they were recovered. One of the Fremont sherds represents an imported item.

Methodology

The ceramics were analyzed by the author using a Nikon Optiphot-2 petrographic microscope. The sizes of natural inclusions and tempering agents were described in terms of the Wentworth Scale, a standard method for characterizing particle sizes in sedimentology. These sizes were derived from measuring a series of grains using a graduated reticle built into one of the microscopes optics. The percentages of inclusions in the ceramics was estimated using comparative charts (Matthew et al. 1991; Terry and Chilinger 1975).

Analysis was conducted by first going through the ceramic collection and generating a brief description of each of the sherds. A second phase was then conducted consisting of the creation of classification groups based on the similarity of the paste and temper of those sherds to one another. This process also allowed for the examination of the variability within each grouping. Additional comments about the composition of individual sherds were made at this time.

Analysis of the Ceramic Collection

Site 42Da364; FS-1-1

The paste of this sherd is a dark brown clay, medium sized fragments of sandstone, and a few thin medium-sized quartz grains. The quartz grains are dominated by quartz, with untwinned feldspars making up about 15% of the sand grains. It is likely that the sand grains represent natural inclusions in the ceramic body. The limestone fragments are medium sized grains of green hornblende are present. This sherd is an angular medium calcarenite. About 25% of the limestone fragments consist of rounded micritic grains with sparry calcite infilling between the grains. Fragments of shells are present in two of the limestone grains. One limestone fragment contains a rounded quartz grain.

Site 42Da685; FS-5-2

The paste of this sherd is a medium brown color. The paste contains 7% rounded sand grains that range continuously in size from fine to very fine. The sand is dominated by quartz, with untwinned feldspar making up about 5% of the sands. The paste also contains fragments of limestone. The limestone fragments make up about 15% of the paste and range continuously in size from medium to very coarse. The limestone is a biocalcrite, with calcite supporting ooids and sparse shell fragments. Like the previous specimen, the limestone present in this sherd represents an added tempering agent.

Site 42Da364; FS-1-5

The paste of this sherd is a medium brown color. The paste contains 7% rounded sand grains that range continuously in size from fine to very fine. The sands are dominated by quartz, with untwinned feldspar making up about 5% of the sands.

Site 42Da599; FS-1-1

The paste of this sherd is a dark brown color and is slightly birefringent. The paste contains about 15% angular fragments of a hornblende andesite porphyry. The andesite fragments range continuously in size from fine to coarse. The groundmass of plagioclase and hornblende is porphyrrhically. The hornblende is usually altered to hematite and clay minerals, often to the point of opacity. Based on the degree of weathering of the hornblende and the continuous size distribution of the rock fragments, it is likely that the andesite represents a natural constituent of the clay used in producing the parent vessel. A single medium sized fragment of quartzite is also present.

Site 42Da685; FS-5-2

The paste of this sherd is a medium brown color and appears to be free of natural inclusions. The paste contains angular fragments of crushed limestone. The limestone makes up about 25% of the paste, with the fragments ranging from fine to medium in size. The limestone is a sandy micrite, although some crystalline calcium is present as isolated grains and in a few limestone fragments.

Discussion and Conclusions

The majority of the Fremont ceramics were tempered using limestone. Limestone was observed in the Fremont ceramics from 42Da364, 42Da685, and 42Da599. The limestone is a medium brown color, and appears to be free of natural inclusions. The paste contains angular fragments of crushed limestone. The limestone makes up about 25% of the paste, with the fragments ranging from fine to medium in size. The limestone is a sandy micrite, although some crystalline calcium is present as isolated grains and in a few limestone fragments.

The fourth sherd, recovered from 42Da599 contains hornblende andesite porphyry, possibly as a natural constituent of the ceramic body. The andesite porphyry is similar to the diorite porphyry identified in Fremont ceramics from the Henry Mountains in terms of the fine-grained groundmass consisting of plagioclase and hornblende porphyrrhically. The hornblende in this sample is fine-grained groundmass of plagioclase and hornblende porphyrrhically. The hornblende in the diorite from the Henry Mountains is described as altered to opaque minerals, like those observed in the specimen from 42Da599. However, plagioclase is much more common than altered hornblende in the Henry Mountains specimens (Geib and Lyons 1993). It is possible that the differences in the amount of hornblende present is reflective of variation within the Henry Mountains source or that the specimen from 42Da599 represents a ceramic vessel made elsewhere.

The sample of Numic pottery from 42Da364 (FS-125) contains quartzite. Based on the continuous size distribution of the quartz particles, it is likely that the quartzite is a natural inclusion in the ceramic clay. Given the presence of the Uinta quartzite at site, it is quite possible that this sherd represents a product made using materials that are available at or near the site.

Additional Samples: 1999

Introduction

A sample of three sherds, one sherd each from 42Da614 and 42Da685 representing the Uintah Basin Fremont ceramic tradition. A single sherd from 42Da364 represents an example of Intermediate ware, and probably related to the Numic ceramic tradition.
Methodology

The methodology used during previous petrographic study of ceramics from the Dutch John Project was continued into the present work (Hill 1998). The sizes of natural inclusions and tempering agents were described in terms of the Wentworth Scale, a standard method for characterizing particle sizes in sedimentology. These sizes were derived from measuring a series of grains using a graduated reticle built into one of the microscope’s optics. The percentages of inclusions in the ceramics was estimated using comparative charts (Matthew et al. 1991; Terry and Chilingar 1955).

Each of the six sherds was examined and a description recorded. The sherds were compared with one another to see if any similarities could be observed between the samples.

Results of Analysis

42Da364: FS-130
The paste of this sherd is dark brown color. The paste contains abundant very fine books of brown biotite that have mostly weathered to hematite and clay minerals. A few fine sized books are also present.

The paste of the sherd has about 35% mineral grains and rock fragments of a plutonic origin. Particles range from silt sized to very coarse with the abundance being inverse with the particle size, so that only a few very coarse sized particles are present while fine particles are absent. The coarse and very coarse sized particles are a quartzite. The quartzite is characterized by a polymictic grain with a poorly sorted grain size and discontinuous extinction of the individual quartz particles. One coarse sized rich fragment is from a quartitic grain with only two thin bands of biotite between the layers of quartzite. Two coarse sized rock fragments consisted primarily of laths of orthoclase. These orthoclase laths contain poikilitic quartz. In addition to quartz and orthoclase, some plagioclase and microcline are present in the medium sized fraction, A few fragments of quartz are also present.

42Da6614: FS-1.2
The paste of this sherd is a light yellowish brown color and is slightly birefringent. The clay body contains about 10% very fine to fine sized sub-rounded quartz sand. These quartz grains are likely to be natural inclusions in the source clay. Also present are sparse flakes of brown biotite that have altered to hematite.

The sherd was tempered with limestone. The limestone present in this sherd is a poorly sorted biopolisite. The limestone fragments make up of about 10% of the ceramic matrix and range in size from medium to coarse in size. The limestone fragments contain sparse oolites, bryozoa, and foraminifera.

42Da6685: FS-X
The paste of this sherd is a medium brown color and highly birefringent. The paste contains 20% medium to coarse sized fragments of limestone. A few of the limestone grains contain fine rounded quartz sands. One limestone grain contains calcite. Sparse fine to medium sized black opaque inclusions are also present.

The limestone can be classified as a bioclastic (Folk 1962). The limestone has a very fine grained matrix and contains sparry calcite. One fragment of a poorly preserved stromatoporoid was also present.

Discussion

The discussion of the present samples will focus not only on the current sample but will also draw from data from the previous study of Dutch John ceramics.

Sample FS-X from 42Da6685 contains a very fine bioclastic. A previously thin-sectioned sherd from this site, FS-52, was tempered using a sandy micrite lacking fossils (Hill 1998). These two sherds represent different vessels that were produced using slightly different resources.

Sample FS-1 from 42Da6314 contained limestone temper that is classifiable as a biopolisite. A similar biopolisite tempered Fremont sherd was observed previously in the paste of sample FS-125 from 42Da364.

Sample FS-130 from 42Da364 contains plutonic rock fragments in a biotite-rich brown paste. Another sample from 42Da364 examined previously contained quartzite containing sparse hornblende. The presence of exposures of the Uinta quartzite in the area is suggested as a potential source of the materials observed in the paste of these two sherds. The variation in the composition is likely the result of variability within the composition of weathered exposures that serves as the source materials for these two different vessels.

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