

Introduction to the 1979 notes on "Archaeological Research at the Turkey Pen Site"

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These notes were hastily prepared in December, 1979, at the request of the US Attorney who was prosecuting the first court case brought under the Archaeological Resources Protection Act, which had been passed in October, 1979. Early in 1980, I testified as an expert witness at the trial (in Salt Lake City) of Casey Shumway, who was accused of digging at the Turkey Pen site in the late fall of 1979 in violation of the new law. A very large area of the site's extensive dry midden was dug over. My notes and eventual testimony primarily reflected my concern as an archaeologist for the damage that this massive looting episode had done to the site's archaeological contexts and research potential. I did not organize my notes or testimony around the specific terms of the law, which defined "archaeological resources" largely as a list of types of artifacts, structures, and features. The ARPA regulations, which brought into legal consideration questions of damage to archaeological contexts and destruction of research value, were not published until 1984. I did not have a chance to meet with the US attorney prior to going on the stand and in any case, he did not seem well prepared to make the case on the basis of the definitions in the actual language of the law.

Dan Martin (1987) describes the case, as follows:

The United States vs. Lyman and Shumway

In this case, defendants Darrell Lyman and Casey Shumway were charged with illegal looting of the Turkey Pen Ruin, San Juan County, Utah (Fike, 1980: 33). The men were observed by BLM rangers while digging in an extensive midden area. Shumway escaped, but Lyman was apprehended and charged under ARPA. A plea of guilty was entered in court and Lyman was fined \$1,500, half suspended, plus two years probation (Fike, 1980: 33). Lyman's testimony indicated Shumway as his accomplice. Shumway was then apprehended and similarly charged. At trial, he pled not-guilty. Shumway's case was dismissed when the Judge ruled that since "midden" was not included in the list of terms covering archaeological materials, a "no-choice" verdict of not guilty was required (Fike, 1980: 34). Despite the fact that Shumway was not convicted under ARPA, he was found guilty under Title 18 (Depredation of Government Property) and sentenced to three years probation (Fike, 1980: 34).

Martin 1987:48-49

In 1985, Dee Green and Herrick Hanks summarized several ARPA cases brought to trial before the law's regulations had been finalized including the Turkey Pen case. They noted that the key issue in the Shumway trial revolved around the term "midden", which was not one of the types of archaeological resource actually listed in the law. Although evidence was also presented about some of the artifact types that were included in the law,

...the jury never made the proper connection. This occurred both because these items were introduced at the end of the government's case and because the archeologists who testified failed to focus on these items as being the archaeological resource.

My recollection (which may or may not be accurate) is that the defense lawyer took pains to present Mr. Shumway as a nice church-going young man, and deplored the fact that the government was prosecuting him for disturbing materials that the archaeologists admitted had been discarded as trash by the ancient inhabitants of the site. Despite this argument, the jury deliberated for nine hours, so they clearly took ARPA and the charges against Mr. Shumway seriously.

As Martin notes, although Shumway was not convicted of an ARPA offense, he was convicted of Depredation [sic--actually, "Destruction"] of Government Property. My recollection is that this conviction was later overturned on appeal because the appeals judge ruled that if Shumway could not be convicted under the primary legal authority (ARPA), he could not be convicted of the same offense under a secondary authority. However, I could not find a published account of this that I could cite.

As you can see, these pre-trial notes, rather than being a kind of legal brief, which was what was needed, were a broad-ranging survey of the history of archaeological research at the Turkey Pen site, and the importance of its dry midden deposits for ongoing and future research. My predictions in 1979 about the site's archaeological research potential have been borne out by several important studies subsequently done on materials recovered from a single test pit excavated in the midden by RG Matson in 1972 (Matson 2014, 2015).

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Notes

Prepared for BLM prior to Shumway
ARPA Trial (held in 1980)

December 15, 1979

ARCHAEOLOGICAL RESEARCH AT THE TURKEY PEN SITE*
GRAND GULCH PRIMITIVE AREA, SAN JUAN COUNTY, UTAH

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Work Prior to A.D. 1900

Graffiti on the shelter wall indicate that the early archaeological "explorers," Charles McLoyd and C.C. Graham, dug here in 1892 and possibly in 1891. Richard Wetherill (1896-97^a) also indicates that McLoyd had preceded him at the site. Nelson (1920b) suggests they may have worked in Grand Gulch as early as 1890. McLoyd and Graham had evidently received their "basic training" under Wetherill at Mesa Verde before setting out on their own to dig in southeastern Utah (Daniels 1976). Although they published a catalog of their southeast Utah collections (McLoyd and Graham 1894) and in it made some interesting observations about the archaeology of the sites there, ^(Moseley 1966) they did not document the collections as to site, or in most cases, even to drainage. McLoyd and Graham's principal motivations appear to have been the sale of collections. Parts of these collections found their way to the American Museum of Natural History in New York and probably to the University Museum in Philadelphia, but it appears unlikely that it will ever be possible to identify artifacts from the Turkey Pen site specifically, if any do remain in these museum collections.

Richard Wetherill made two expeditions to Grand Gulch and nearby canyons of southeastern Utah in the 1890's. Since his field notes from the winter of 1893-94 have apparently been lost, it is impossible to tell whether or not he worked at the Turkey Pen site. His notes from the winter of 1896-97 are still on file at the American Museum of Natural History; these suggest that his work that season may have been his first at the site. Keller et al. ⁽¹⁹⁷⁴⁾ have a useful discussion of Wetherill's work in Grand Gulch, including that at Turkey Pen. Some further comments are in order, however. In particular, it seems appropriate to quote Wetherill's brief notes in full (the comments in parentheses are mine):

Cave No. 4 (Wetherill's designation for Turkey Pen) is 700 feet long, 150 feet high, 100 feet deep, has large boulders in front on north end (evidently the downstream or west end of the site--Wetherill often had trouble with his directions).

^{a and b} *A variety of site designations has been given, including Cave No. 4 (Wetherill 1896-97); AMNH No. 70 (Nelson 1920--Cartier Expedition); GG69-34 (Lipe survey of 1969); NA 12,651 and 42Sa3714 (Keller "Clean-up" study of 1974); and GG 3.1 (Lipe architecture and tree-ring study of 1974).

Small cliff houses or rooms along the cliff in the south end. Pot Holes (here, Wetherill is referring to the probable Basket-maker II cists at the upstream end of the shelter) in the extreme south end. Cliff house in cliff 20 feet above lower cave in north end. (Here, he is probably referring to the wall at the access point to the upper ledge.) Pot holes (the cists) had all been worked. As also the estufa (an old name for kiva). The debris seemed too much for us to work in the limited time we had. Also too filthy as it was composed almost entirely of desicated (sic) turkey droppings. We worked down into them to a depth of 7 feet--and did not come to the bottom. The rooms had been worked by McLoyd--and the pictographs on cliff near the estufa photographed by B.T.B. Hyde in the summer of 1894. There remains considerable surface here yet to work out. The upper row of houses were thoroughly cleaned (but probably not by Wetherill). This cave overlooked a fine little narrow valley.

(Wetherill 1896-97)^a

The visit by B.T.B. Hyde that Wetherill refers to was apparently an "inspection" or sightseeing trip made by Hyde, who was Wetherill's financial backer for much of the southeast Utah work. Undoubtedly Richard or one of the other Wetherill brothers was along as a guide, but there is no record of any digging having been done on this trip.

Although Wetherill made simple sketch maps of the locations of his excavations in several of the sites "worked" in the winter of 1896-97, he did not provide one for Turkey Pen. His field catalog, however, lists the specimens that were removed, their depths below surface, and the location of the excavation (e.g., room number, or descriptions such as "debris in center of cave." Most of the artifacts appear to have come from excavations in the main midden area. There are some hints that some of the items attributed to rooms may have come from midden below the room floors. Although Wetherill claims the party did not spend much time in this site, their excavations were fairly "productive." The field catalog lists 18 "Cliff Dweller" and eight "Basket Maker" sandals; six brushes of yucca; three hide bags or pouches, one having a knit lining; several pottery vessels; three bone tools; several pieces of arrow shaft; several projectile points and other flaked stone tools; a "man's sock," presumably knit of cordage; a ceramic pipe; a "knitting needle;" a human burial; several wooden implements; a feather and rush (cattail? reed cane?) hair ornament; and a piece of tanned hide. Most

(Wetherill 1896-97b)^a

of these items are presumably still in the American Museum of Natural History in New York, where the 1896-97 collection was deposited by Wetherill and the Hydes. (The 1893-94 collection is also housed there).

Twentieth Century Work Prior to the Cedar Mesa Project

In 1920-21, Nels Nelson, Curator of American Archaeology at the American Museum, organized and led an expedition which visited a number of areas in the Southwest. The Cartier family of New York provided financial backing. The principal objective apparently was to do surveys in several areas that were poorly known to the archaeological community. As part of this expedition, the party spent several weeks in Grand Gulch and its tributaries during the fall of 1920. Nelson evidently had a secondary goal in visiting Grand Gulch. As curator, he was responsible for the McLoyd-Graham and the Wetherill collections. The Wetherill collections had been cataloged poorly when they came into the Museum, and some of the field notes had been lost. He hoped to learn more about the context from which these collections came. He evidently found the fieldwork valuable when he eventually recataloged these collections.

During the several weeks that the Cartier Expedition spent in Grand Gulch, approximately 100 sites were recorded. John Wetherill, who had worked in Grand Gulch with Richard in the 1890's, was Nelson's guide. Very little excavation was done. The survey notes and sketch maps are not extensive, but are quite good by the standards of the 1920's (Nelson 1920a). Nelson also prepared a brief "Outline history of early explorations" (in Grand Gulch), which is useful, although I think not entirely accurate. He mentions some probable 19th century work in the area in addition to that of McLoyd, Graham, and Wetherill. Unfortunately, Nelson did not publish on his Grand Gulch work. In those days, publication was usually confined to the results of excavation, and survey was considered a mere preliminary.

Nelson's notes on Turkey Pen (his AMNH 70) are brief but are reasonably accurate. He provides a sketch map as well. He notes that "much digging evident, but chance for work," indicating that he saw the potential for further excavation at the site.

There are scattered references and acknowledgments of visits to Grand Gulch by professional archaeologists during the period between 1920 and the start of the Cedar Mesa Project in the late 1960's (see Keller et al. 1974 for some accounts of these), but insofar as can be determined, these resulted in little excavation. Undoubtedly many amateur archaeologists and some looters also visited the area, and engaged in various amounts of surface collecting and digging. It

has been my impression, however, that the major episode of excavation in Grand Gulch was in the 1890's, and that digging since then has been less concentrated and less extensive. At the Turkey Pen site, for example, it is my impression that most of the really deep and large potholes evident prior to this summer were ones that dated to the 1890's or early 1900's. I felt that the digging of recent years had resulted in numerous, but fairly shallow, disturbances. This was a subjective assessment based on my reading of the degree of filling in and smoothing over of the outline of the pits. That assessment has changed, of course, now that really major vandalism has occurred this year.

The Cedar Mesa Project

Initial Survey Work

The beginning of the Cedar Mesa Project was a reconnaissance of parts of Grand Gulch and adjacent mesa tops by Lipe in 1967. Turkey Pen was not visited at that time. In 1969 and 1970, under the sponsorship of the National Geographic Society, Lipe conducted several excavations of Basketmaker II and III open sites on Cedar Mesa, systematically surveyed a portion of same, and did fairly systematic surveys of portions of Grand Gulch proper. The Turkey Pen site was recorded under the field number GG69-34 during the summer of 1969. A very small surface collection was made at that time, and the notes indicate that the site was assessed as having multiple occupations and being a good candidate for excavation. The goals of the 1969-70 work were 1) to gain a better understanding of the Basketmaker II occupation of the region, with emphasis on the little known open sites of the mesa top, and 2) to locate as many as possible of the sheltered sites excavated in by Richard Wetherill in 1896-97. Turkey Pen was, of course, one of these.

The 1972 Test Pit

Research in the Cedar Mesa-Grand Gulch region in the period 1972-75 was jointly directed by W.D. Lipe (then at the Museum of Northern Arizona) and by R.G. Matson (University of British Columbia), with funding support from the National Science Foundation. The objective of this project was to develop an understanding of prehistoric human adaptation in this region. The primary means of research was interpretation of site types and settlement patterns, with surface survey and collection as the primary means of data gathering. Limited test excavations were planned 1) to obtain tree-ring and other samples for dating; 2) to recover pollen samples and other biological specimens as indicators of past environments and past subsistence practices; and 3) to better define certain types of architectural features that had poor surface expressions. Goals of the project are spelled out in the NSF proposals (Lipe and Matson 1971b; 1974), and partial results are available in several reports and publications (e.g. Lipe and Matson 1971a; Matson and Lipe 1975;

Lipe and Matson 1975; Agenbroad 1975; Salkin 1975; Keller, Ahlstrom and Hartman 1974; Camilli 1975; Matson and Lipe 1977a and 1977b; Lipe, Matson and Powers 1977; Lipe 1978; West 1978). In addition, a progress report on the 1972-73 work is provided in the 1974 grant renewal application (Lipe and Matson 1974).

One of the sites that was tested was Turkey Pen. In the summer of 1972, R.G. Matson and a crew of three spent three days digging a test pit into the Turkey Pen midden deposit. With reference to the goals of the testing program mentioned above, this test was directed specifically toward obtaining dates and toward obtaining samples for paleoenvironmental and paleosubsistence reconstruction.

Matson's test pit was sunk into an obviously disturbed area which had apparent undisturbed midden showing on its southwest edge. He sought to clean out the old looter's pit, to clean a section of undisturbed midden, and then to remove, one stratum at a time, a 50 cm. square column of undisturbed midden for further analysis in the lab. As the test excavation proceeded, it became clear that the old looter's pit had partially cleared and destroyed a more or less circular-plan masonry-walled structure, presumably a pithouse. There had been no surface evidence of this structure. The section of undisturbed midden that was targeted for removal was therefore just outside the southwest wall of this structure. Presumably the structure had been built in a pit dug through this midden. It seemed unlikely that the midden had accumulated outside the wall of the pit structure. The column of midden that was removed appeared undisturbed, except for some minor evidence of rodent disturbance within several strata. The column extended from the surface to a depth of approximately 140 cm. The fill below that level still contained some ash and organic material, but was looser and cleaner than that found higher up in the column. Excavation was halted and the column samples removed down to the 140 cm. level because time was limited and because the looseness of the fill below this level made it difficult to maintain the integrity of the column.

In general, the column seemed to contain more organic debris, charcoal, ash, and material of human origin in the upper layers than in the lower ones (see attached profile). Some of the upper layers are very well compacted, as if from heavy trampling of sediments containing moist organic materials. The variability in the strata may reflect differing intensities of occupation, of location of main living areas, of contributions of sediments from the roof of the shelter or from outside; of soft sand available for mixing with anthropogenic deposits, etc. It is also possible that some of the layers were emplaced as backdirt from aboriginal excavations such as the one that was made for the pithouse encountered in the test.

PROFILE OF MIDDEN COLUMN,
TURKEY PEN SITE,
1972 TEST

Cm. below
Surface

-0

-20

-40

-60

-80

-100

-120

-140

Surface

A-1

A-2

A-3

A-4

A-5

A-6

B-1

B-2

B-3

B-4

B-5

C-1

a

C-2

b

c

C-4

C-5

D-1

D-2

D-3

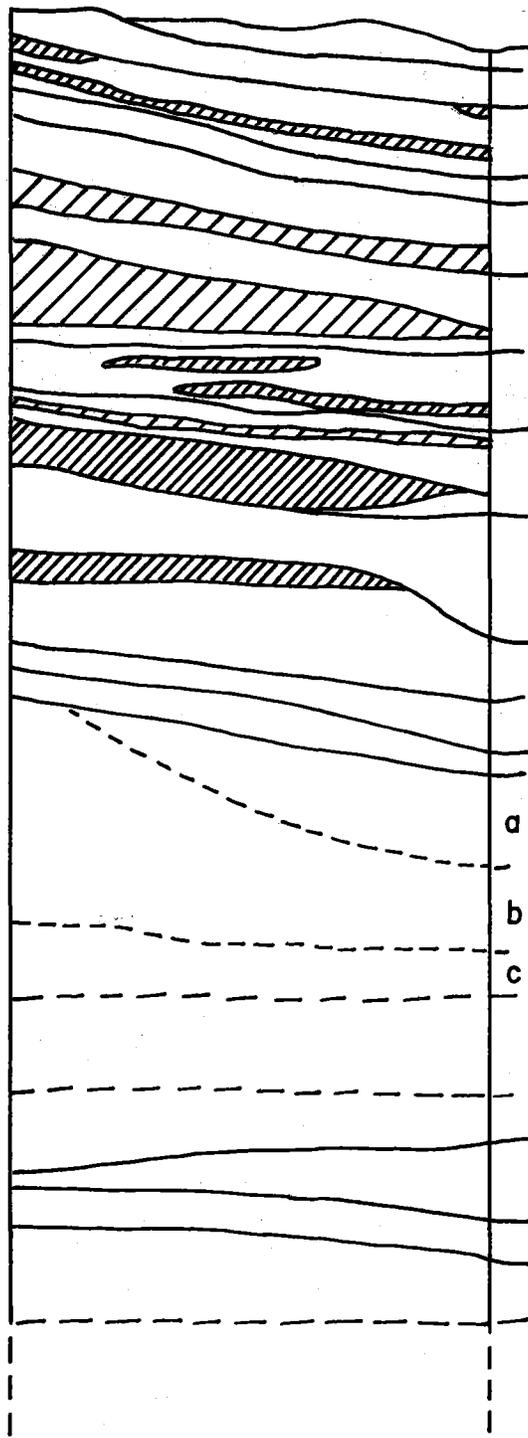
Unexcavated



Lense with high
ash, charcoal,
organic content



Lense with high
unburned organic
content

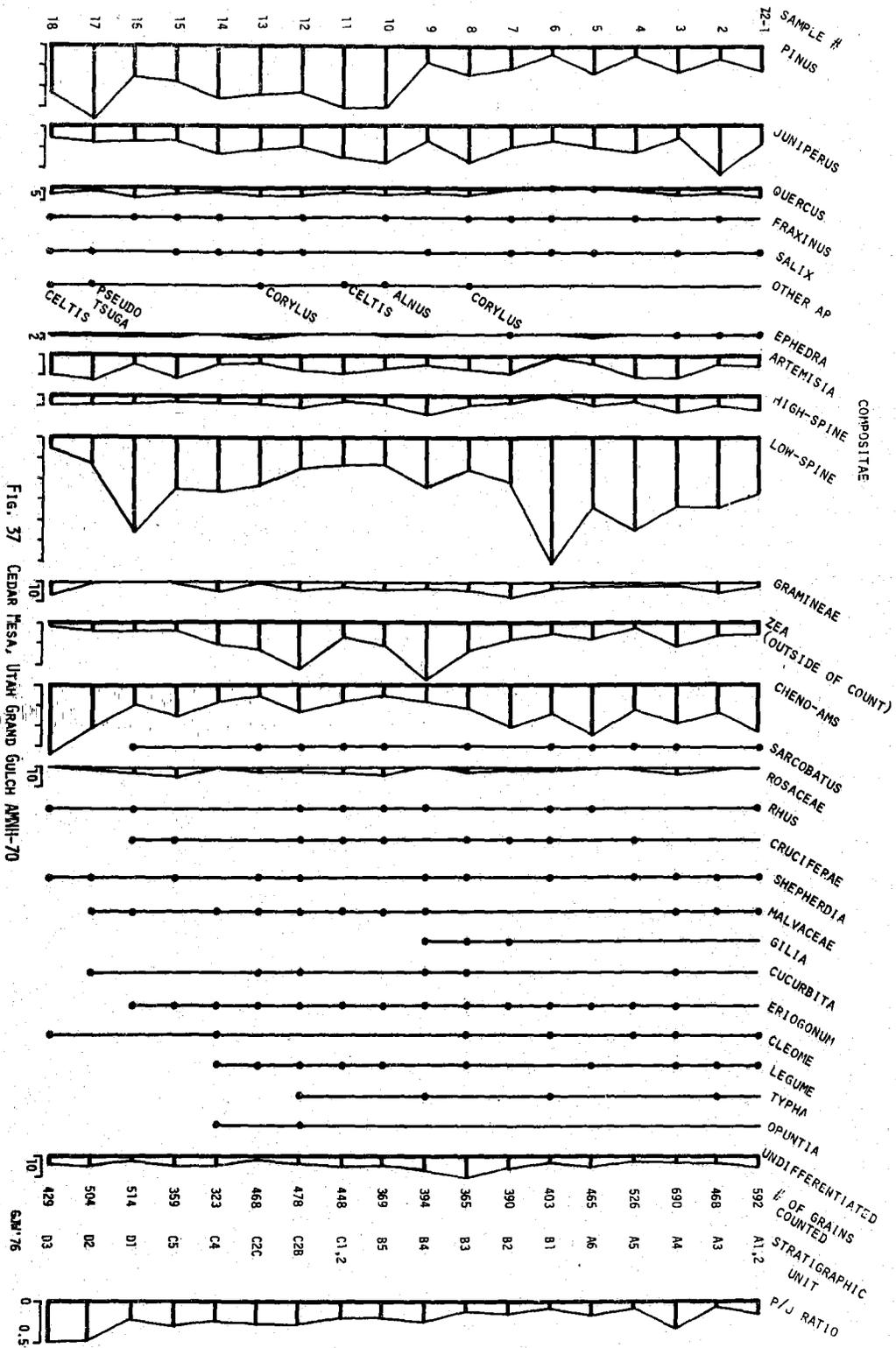


Brief Stratigraphic Description
Midden Column, Turkey Pen Site, 1972 Test Pit

<u>Unit</u>	<u>Description</u>
A-1	Compacted sand with organic inclusions; contains thin charcoal layer.
A-2	Thinly striated, compacted sand with charcoal inclusions and occasional fragments of plant material.
A-3	Grey layer with organic inclusions; less compacted than A-1 and A-2.
A-4	Pink sandy layer with few organic inclusions.
A-5	High content of loose organic material at base of layer; somewhat unstable.
A-6	Relatively thick lense of loose organic material with soft sand above and below it.
B-1	Well-compacted reddish to brown sand with several ashy and organic-rich lenses.
B-2	Upper portion relatively compact sand with well-defined organic layer; grading below to looser sand with included lenses of charcoal and organic material.
B-3	Tan sand with organic material throughout. Some rodent disturbance (?)
B-4	Upper lense grey with ash and charcoal; lower portion tan sand with some organic inclusions. Some rodent disturbance (?)
B-5	Grey sand.
C-1	Reddish sand.
C-2	Reddish sand, with organic inclusions.
C-3	Label not assigned.
C-4	Arbitrary 10 cm. unit; similar to C-2.
C-5	Reddish sand, with organic material (notes unclear)
D-1	Hard grey layer with charcoal (notes unclear)
D-2	Loose fill, organic inclusions, rocks at base of layer.
D-3	Tan sandy layer, with organic material and burned sandstone.
Unexcavated	Organic material observed; sterile level not yet reached.

Once it was back in the lab, the column and the collections made while isolating it, were given preliminary study. Portions of several strata were put through graduated screens and their contents examined. It was noted that many of the strata had an abundance of well-preserved macrofloral remains, including seeds and parts of plant stems and leaves. Both cultigens (especially maize and squash) and wild plants (especially yucca and Indian rice grass) were abundant. Animal remains, including bones, feathers, hair, and scraps of hide, were also present, although less abundant than the plant materials. Apparent human feces were also well preserved and relatively abundant, as were apparent turkey droppings, although perhaps not in the quantities estimated by Wetherill. Remains of perishable artifacts, such as cordage and fragments of textiles (including basketry) were present as well. Tests by James West of the University of California at Davis indicated that pollen was well preserved. Unfortunately, temporally diagnostic artifacts, including pottery, were not present. Lithic items were rare and were not temporally diagnostic. Samples of charcoal taken from the column and from the stratigraphic excavations that had been made in removing it were sent to the Laboratory of Tree-Ring Research at the University of Arizona; none of these was datable. We were reluctant to use C-14 dating because of the expense, because we had no charcoal from hearths or other features that would provide a good context, and because the time-scale we were interested in (fine discriminations within a ca. 1000-year period) was not particularly suitable to the C-14 dating method.

At this point, the study of the column was reassessed in terms of the goals of the project as a whole. We had a stratigraphic sample very rich in paleoenvironmental and subsistence information, but we had no basis for dating the various strata and hence relating them to the at least 1000-year sequence of occupations that was likely to be present at the site. The complexity of the ^{observed} midden strata, the encounter with the unexpected pithouse, and the likelihood that the underlying shelter floor had been bouldery and sandy at the time occupation started, all suggested we were dealing with a stratigraphically very complicated situation, and we did not know which parts of the sequence were represented by our column. We also estimated that it would take another \$7500 to \$10000 to complete the study of the paleoenvironmental and subsistence remains from the column, and to do a sediment analysis of the strata. And when this was done, our results would still be "floating" with respect to their place in the occupational sequence. The Turkey Pen midden had proved not only to be as rich in data as expected, it had proved to be more complex and difficult to interpret. Consequently, we decided to terminate analysis of the column, except for the pollen studies, which West had



West (1978)

already gotten well underway and needed for comparison with his sequences from the open sites (West 1978). We felt that we would be better off to put our funds into the settlement pattern studies, which were the main focus of the project, and to postpone the fuller study of the Turkey Pen midden column until a later time. Proper understanding of the data in this column appeared to require more information on its relationship to the history of occupation at the site. To obtain a better assessment of the stratigraphic context and to get good dates would require considerably more excavation and analysis than we had the time or money for; it was really a substantial research project on its own.

The only aspect of this study that was completed was the pollen analysis (West 1978). Results are summarized in the attached table. Pollen is relatively abundant and relatively well-preserved in all the strata, and there is some variability among the strata. According to West, the pollen spectra from Turkey Pen resemble those from the open sites he studied in a general way. That is, the pollen profiles from all the archaeological sites resemble those from disturbed areas more than any other type of environment in the area. He feels that the pollen records from the sites showed primarily the disturbance and succession of vegetation in the vicinity of the site, and probably also to some extent, the plants brought into the sites by their occupants. He feels that these two factors would mask effects of regional vegetation change brought about by climatic change, unless such climatic changes were of major proportions, and he sees no evidence for this. Consequently, the pollen record, used in conjunction with the data from macrofloral remains in the site, may be more useful as indicators of cultural practices than of climate. In either case, further interpretation of the data awaits temporal and stratigraphic placement of the Turkey Pen column.

The 1974 Surface Clean-up Study

In the late spring and early summer of 1974, under a contract between the Bureau of Land Management and the Museum of Northern Arizona, several sites in the Grand Gulch drainage were subjected to a "surface clean-up" of prehistoric materials that had been exposed by digging, foot traffic, and natural erosion. This project was under the general direction of W.D. Lipe, with Don Keller as field director. The goal of this project was to systematically collect surface artifactual material, and especially, human bone. These materials were gradually being removed by visitors; they were also thought to be an invitation to further digging. Also called for was an assessment of the remaining research potential of the sites. The results of the study were submitted to the Bureau late in 1974 (Keller, Ahlstrom, and Hartman 1974).

Turkey Pen was one of the sites subjected to surface clean-up. It was mapped,

surface artifacts were systematically collected and proveniences recorded, and looters' pits were numbered and mapped. This study provides a base line against which further digging and vandalism of the midden can be measured. Analysis of the collections and other data from the site supported the earlier inference that this site is likely to have evidence of the full temporal range of Anasazi occupations in the Grand Gulch-Cedar Mesa region. It was assessed as having a very high potential for future research focussed on study of the deposits in the midden.

1974 Dendrochronology-Architecture Study

In the fall of 1974, with National Science Foundation support, the Cedar Mesa Project undertook a special study of Pueblo architecture in portions of the Grand Gulch and McLoyds Canyon drainages. It was felt that a surficial study of the well-preserved buildings and building sequences in the canyons would provide data useful in better understanding the less-well preserved Pueblo structures of the mesa top. It would also help document the Pueblo occupation of the canyons, which were thought to have received greater emphasis by the Anasazi as final abandonment of the area approached, i.e., in the A.D. 1200's.

Turkey Pen was one of the sites studied. Copies of the detailed maps and architectural drawings that resulted are enclosed. The data from this study are being analyzed by Margaret Powers as part of a doctoral dissertation she is preparing. At Turkey Pen, the architectural evidence of building, rebuilding, and remodelling indicated that the Turkey Pen site had been used rather intensively by the later Pueblo peoples, probably during several generations. Because cottonwood (which does not date) was commonly used as building timber at the site, not many dendrochronological dates were obtained; wood from only five structures proved datable. The 16 dates that were obtained, however, indicate that building or remodelling of Pueblo structures here took place in the late 1100's and perhaps earlier, and continued through the mid-1200's. The variable pattern of dates from one structure (Feature M--the "cliff kiva" on the upper ledge) suggested that this structure had been built in the mid-1200's and that many of its roof beams had been scavenged from remodelled or abandoned structures, probably from the lower level of the site. The pattern of dates from nearby Pueblo sites suggested that there was a fairly heavy building episode in the late 1000's and early 1100's, with some decline in beam cutting during the late 1100's and a resurgence in the early to middle 1200's.

Other Recent Studies

In 1975, Benson undertook a survey of part of the Owl Creek drainage to obtain material for the doctoral dissertation she is now writing. In 1976, Lipe did a sampling survey of portions of the Grand Gulch-Cedar Mesa region for the Bureau of

Land Management to provide them with information to be used in assessing proposed additions to the Primitive Area. There also have been several limited surveys associated with proposed energy or energy-related developments in the area. None of these projects has resulted in further study of the Turkey Pen site, although the continued accumulation of data helps provide ^{an understanding of} the cultural and environmental context in which this site functioned.

Archaeological Significance and Research Potential
of the Turkey Pen Site

Up to the time of the extensive vandalism that has occurred in 1979, my assessment of the archaeological research potential of the Turkey Pen site was identical to Keller's evaluation made in 1974 (Keller et al. 1974: 80-81). Of all the sites I have seen in the Grand Gulch area, it had the best possibility for yielding a record of continuous or frequently repeated occupation spanning the whole Basketmaker II-Pueblo III Anasazi sequence in the area; it had the largest and least disturbed dry midden, and the best potential for providing detailed information about past Anasazi subsistence practices through time. Now that the site has been recently and apparently very extensively vandalized, this potential must be reassessed.

Let me first say what I think could have been done prior to this vandalism. At the time we decided not to press on further with the analysis of our "floating" midden column, we felt that a proper test of the midden deposits would require more excavation to provide better stratigraphic context and dating information. At least several meters of midden deposit would have to be exposed, preferably by several connecting trenches, so that the deposits could be examined in three dimensions. As the stratigraphy came to be understood, we could begin to collect samples for dating and for intensive analysis. This might have to be done in several phases--first, ^{open} the deposit up, study the stratigraphy, obtain dating samples. Then a second phase of returning to the by-now better understood strata to obtain additional samples or information necessary to resolve remaining stratigraphic problems. At this time, or in a third phase, samples of the environmental/subsistence remains could be obtained, or could be selected from materials already collected in the excavations. Needless to say, materials obtained during the trenching and profile cleaning would have to be curated and analyzed to some degree, in addition to the samples specifically selected as representative of various strata. In the next phase, artifactual and ecofactual samples would be analyzed; a number of specialists would have to be "lined up" to do this. Finally, the results

would be published. Estimation of the cost of such a study would take time, careful planning, and consultation with paleoethnobotanists, etc., but I do not see how it could be done for less than \$70,000 to \$100,000. These are "top of the head" figures, of course. But I am not talking about opening up the whole site, just selected areas of the midden. My guess is more likely to be low than high.

Now that very extensive recent vandalism of the site has occurred, it is difficult to say what research potential remains. Even to find out would probably require extensive clearing of disturbed deposits and limited testing or at least profile cleaning of undisturbed deposits adjacent to the looters' pits. The requirement noted above for fairly extensive lengths of undisturbed deposit would of course be difficult to achieve to the extent that the deposit has become riddled with deep holes and trenches. Damage of this sort could not fail to add greatly to the cost of a research project such as the one I described above. Even clearing of disturbed deposits would pose problems because even though the included materials have lost most contextual information, they may retain some information as artifacts or environmental samples that can be associated with the site or an area of the site. Consequently the problems of curation and analysis would be magnified.

In all of this, I am assuming that what would be studied intensively would be a rather small amount of undisturbed midden, relative to the amount initially present. What would it have cost to have done intensive paleobotanical, paleozoological, stratigraphic, artifactual, and dating studies on the volume of midden recently disturbed? This would be difficult to estimate, and certainly could not be done without careful examination of the site and perhaps some testing. Needless to say, however, it would be a very large cost indeed. Of course, no research archaeologist would have proposed an intensive study of so large a volume of the midden, not only because of the prohibitive cost of excavation and analysis, but because it would have been desirable to leave a substantial amount for future research. In tens or hundreds of years, archaeologists and other scientists interested in the record of past events will undoubtedly have much better techniques for extracting information than we do today. Sadly, the recent vandalism has probably foreclosed many if not most of these opportunities.

Because this was, and likely still is, an important deposit, and because much of it is apparently now disturbed, it is important that ~~any~~ further scientific work that is done here be done very cautiously, with good advance planning, and with minimum impact on the remaining patches of undisturbed midden. There is no point wasting any more of it. Work here will be much more difficult than it would have been before the recent vandalism (and it would have been damned difficult then!). Excavation today may remove opportunities for future work that cannot now be foreseen. Consequently if any of the remaining undisturbed deposit

is to be excavated (and I think ^{some} / should be, before more is lost), the work must be most carefully planned and executed, and there must be funding for all phases of the research, from excavation through analysis and publication. In particular, if it appears that C-14 dating will be required to set up a time scale, there must be allowance for the costs of this. Analysis of feces, floral, and faunal remains is likely to provide the most valuable new information, but it is also very costly. A multi-disciplinary group of interested scientists must be lined up before the project starts, and they must have a chance to participate in designing the research. In any case, these are some of my thoughts on standards required for any further excavations in this midden, whether this work is proposed by the Bureau of Land Management or by an independent researcher having outside funds.

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