

MUSEUM OF NORTHERN ARIZONA

Bulletin 30



**TWO ARCHAEOLOGICAL STUDIES
IN NORTHERN ARIZONA**

**The Pueblo Ecology Study:
Hail and Farewell
and
A Brief Survey
Through the Grand Canyon of the Colorado River**

by

Walter W. Taylor

**Published by the Northern Arizona Society
of Science and Art, Inc.**

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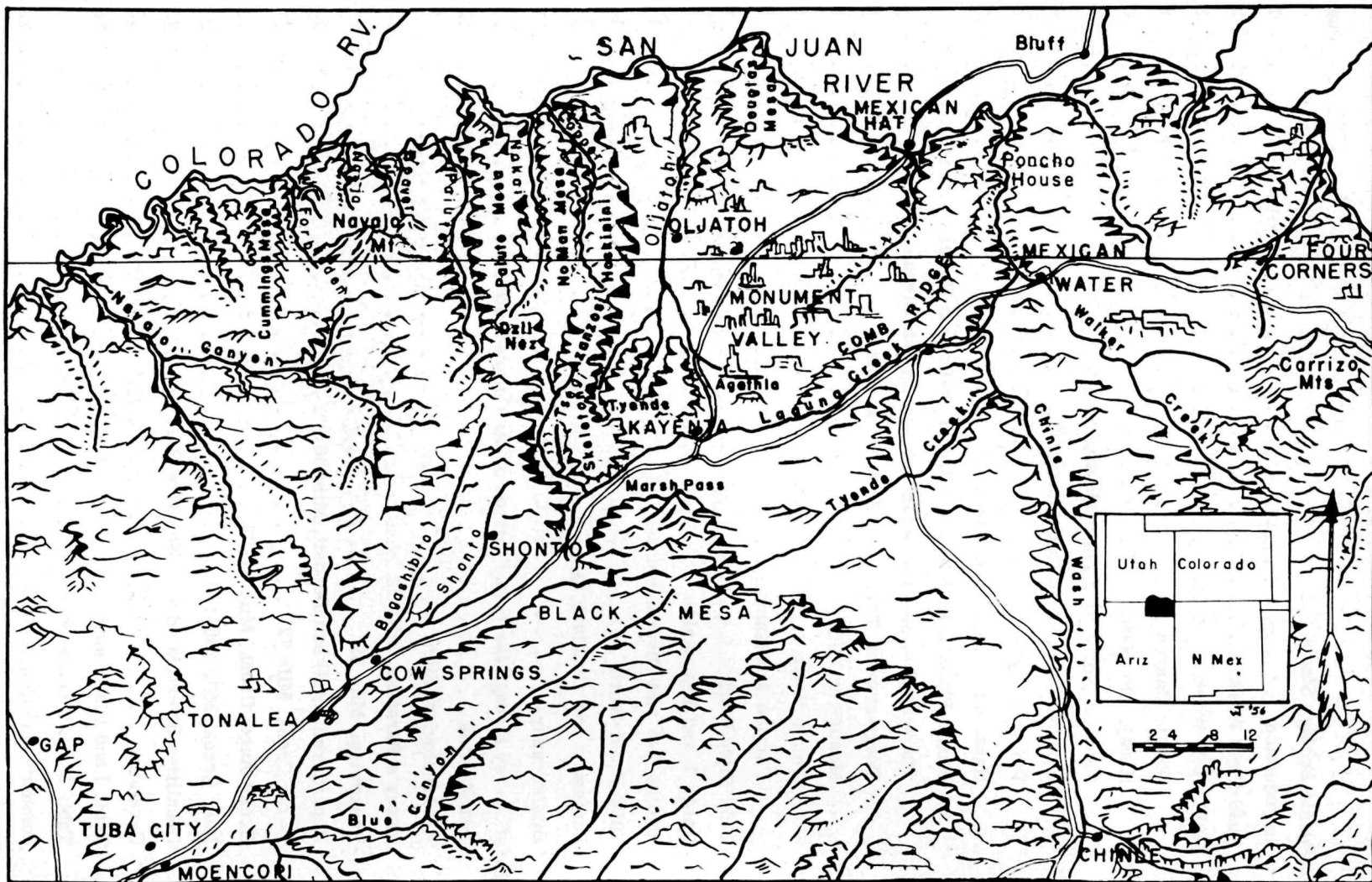
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THE PUEBLO ECOLOGY STUDY: HAIL AND FAREWELL

Walter W. Taylor¹

INTRODUCTION

This will be a report on the life and death of an archaeological project. It is offered for several reasons: to place on record certain empirical data, to focus attention on certain culture-historical problems in northern Arizona, to present an example of the development of an archaeological problem couched in cultural (rather than taxonomic) terms, and, not the least important of all, to demonstrate the rather frightening fact that the supply of archaeological data, even in the Southwest, is not inexhaustible but that, indeed, it has apparently been already exhausted as far as one important problem is concerned.

The Pueblo Ecology Study was a project initiated under the Southwest Archaeological Fund, Smithsonian Institution. Its purpose was to learn whether the alleged Great Drought of 1276 to 1299 A.D. affected the Anasazi culture of northeastern Arizona, and if so, in what way. This problem was the outgrowth of previous archaeological work (in Coahuila, Mexico) which had produced a considerable body of evidence on just such a culture-environment relationship. Our attack upon similar aspects of northern Pueblo culture was designed to provide comparative data in the hope of reaching some broader conclusions on the reactions of at least two cultures to environmental change, specifically in regard to increasing aridity.

But our first task was to find out whether or not there had actually been any Great Drought at all. Gladwin had recently published his doubts as to its existence (n.d.), and he had received very little concrete, published rebuttal. Furthermore, when not ignoring each other completely, the parties to the drought-or-not argument seemed content to rest their respective cases upon the tree-ring record alone. But what did the other evidence show? Our Mexican studies had shown that there is a great deal to be learned about natural environment and climate through detailed analysis of the cultural and natural debris found in aboriginal sites: from the bird and mammal bones, the shells, and plant remains. But no such evidence had been brought to bear on the Southwestern problem. It seemed time to broaden the base of discussion.

Our task, therefore, was first to determine the existence or nonexistence of a drought during the end of the thirteenth century, just preceding the abandonment of the northern Pueblo area. If our work demonstrated that there had not been such a drought, it would call forth a needed and healthful revision of Southwestern culture-history, as well as a re-examination of some of our ideas on cultural process pertaining, among other things, to population movements, cultural relationships, and aboriginal acculturation. On the other hand, if the existence of a drought could be demonstrated, then our task would be to learn just how, if at all, this drought had affected the Pueblo culture(s): what segments of the cultural whole showed change — of what sort and of what intensity and, if possible, why.

From our Mexican data we had inferred, with reasonable confidence, that certain cultural reactions had been due to the pressures on an increasingly marginal subsistence caused by progressive desiccation. Were the same factors and results involved in the case of the Anasazi? Our Mexican cultures had been relatively unelaborated and isolated, while those of the Anasazi groups had been much more developed and culturally interrelated. Had these differences had any effect on the cultural responses of the two groups? The climatic shift in Mexico, from our available data, had been relatively slow, while that

1. Collaborator, U.S. National Museum. Published by permission of the Secretary of the Smithsonian Institution. In the preparation of both these papers I have had the co-operation of the Museum of Northern Arizona and its staff. I wish to thank Dr. Harold S. Colton for his personal help and for putting at my disposal the splendid facilities of the Museum.

in the Southwest, assuming the tree-ring record to be essentially correct, had been sudden. Could we discover cultural differences attributable to the differing tempos of desiccation? Furthermore, once these lines of investigation had been carried out and some inferences made upon such basic matters, our next task was to inquire as to *why*, given the cultures and environments revealed by our excavations, the people reacted as they did. Here we would be leaving the strict confines of archaeological ethnography and history and entering into those of broader anthropological topics.

These were some of the problems and approaches which we envisioned when we started the Pueblo Ecology Study. It was very plain to us then that few conclusive results could come out of this first attack. But as erstwhile students of algebra, we recognized that complete solutions of equations with so few common factors and so many unknowns can never properly be expected, particularly when only two equations are available. But we were willing to attack the Mexican and Pueblo equations with the hope and expectation of reducing the number of their unknowns and of providing simpler and more comparable data with which to attack future equations when they should be developed.

Our problem, therefore, was a cultural one, and the approach thereto would have to be conjunctive, rather than strictly taxonomic. But there were other decisions to be made. The Great Drought had been identified in several districts of the northern sector of the Southwest, and we had to decide which of these would receive our first attention. In the first place, we had to have adequate information on environmental topics: flora, fauna, physiography, climatology, geology, and natural resources in general. Since most of the Southwestern areas are reasonably on a par in this respect, this criterion was not of much help in deciding our point of initial attack. On the other hand, to be assured the floral and faunal data in quantities sufficient for our purposes, we required archaeological deposits that were both dry and extensive. This immediately eliminated most of the ruins throughout the Southwest: the so-called open sites. Beyond this, practical considerations of finance eliminated those open sites, comparable to Pueblo Bonito and Aztec, which might be expected to yield perishable floral and faunal materials. Thus the prospects were narrowed to sheltered sites and, for the epoch of the Great Drought in the northern Southwest, this meant cliffhouses — and this in turn meant Mesa Verde, Canyon de Chelly, or Kayenta.

In our conception of the problem and in our approach to it, one of the prime requisites was a most detailed and extensive cultural interpretation of the excavated materials. When the time came to convert the empirical facts of archaeological field work into inferences about culture, culture change, responses to environmental and human pressures, and the whys and wherefores of a mass of conjoined cultural and environmental data, we would need every possible assistance, particularly from the archaeological and ethnographic sources. Therefore, our ultimate choice of the Kayenta region for our first field work was due (1) to the assumption that the modern Hopi, at least in part, are the cultural descendants of peoples once living in that region, and (2) to the existence of a large literature on Hopi culture, to which we could turn for assistance in our task of interpretation. On the other hand, the cultural descendants of both Mesa Verde and Canyon de Chelly people are subjects of much controversy based on very little concrete knowledge — although for these very reasons they are of interest and importance in themselves. But we needed help, not controversy, and so we chose the region which had the largest and most accepted endpoint in modern ethnography and began our work in the so-called Kayenta culture of northeastern Arizona.

Our problem, then, was to find a Kayenta cliffhouse with enough depth of dry deposit to give us our needed quantities of cultural and natural material. In addition, the occupation not only must have continued through the period of the Great Drought, but, for best results, also must have provided enough deposits from the years before the drought to give us a control of "normal," non-drought culture. This meant that we were looking for a site with occupation dates from, say, 1150 or possibly 1200 to around 1300 A.D.

We also recognized that the site would have to be undisturbed enough to provide the necessarily large sample with all associations intact. In regard to this, we were fully aware of prospective difficulties. The crucial deposits, those of the 25 drought years just before abandonment, would have been the first to suffer any disturbance. But even in undisturbed sites, these crucial deposits could not be expected with any certainty. In the first place, neither talus rubbish nor the trod-upon deposits of courts and passageways

would provide the material: the former because of abnormal stratigraphy and loss of perishable objects, the latter because the crucial top layers of the last years would have been thin and consequently much disturbed by aboriginal activity. Finally, deposits in isolated niches and crevices could not be counted upon to hold enough of value for quantitative studies, even if they were not suspect from the point of view of stratigraphy and continuous sequence.

Almost the only promising localities were rooms filled with rubbish, wherein there had been a concentration of disposal and thus a considerable depth of protected deposit representing the final years of occupation. But here again, we could not expect to fulfill our needs at every hand. In cliffhouses built on narrow ledges where space was at a premium and from which trash could be thrown with ease out upon the talus slope, the reduction of *lebensraum* by the filling of rooms would be rare indeed. We needed, therefore, to find a relatively large site in a large cave or shelter, in which there had been plenty of expansion space and where refuse had accumulated in quantity within the dry occupation zone itself.

1949 FIELD WORK

And so with these rather detailed and rigid specifications, in the fall of 1949, our first field work was undertaken in the Navajo National Monument, which includes the famous Tsegi and Dogoszhi canyons. Betatakin, Kiet Siel, Scaffold House, Bat Woman House, Twin caves, and Turkey Cave were visited and appraised.² From our observations and from conversations with the people best acquainted with the area, it was immediately apparent that nothing in the Monument would fill the bill. The possibility that dry materials in quantity remained at either Betatakin or Kiet Siel was negligible, even if these ruins had been available for excavation. Scaffold House, which appeared relatively undisturbed and of promising size and cultural complex, is open to the elements and offers no hope of dry deposits deriving from the latest occupation. Turkey Cave does not contain deposits of the late, just pre-abandonment, occupation. The other large sites of the latest occupation are situated on high, narrow ledges, and their deposits are, and always have been, shallow. Throughout the Monument, the cliffhouse remains which once existed, especially those from the latest occupation, have long since been churned into meaningless chaos by curious and callous "explorers."

Our start had not been auspicious. Nevertheless, we hoped that such conditions would obtain only in the well-frequented canyons of the Tsegi system and in the environs of Kayenta and Marsh Pass. We felt that if we searched in the more remote areas, particularly around Navajo Mountain and in the rough country south of Monument Valley, a suitable and undisturbed site would surely be found. It was with this view that the work of 1951 was planned.

1951 FIELD WORK

A survey was conducted for three months this season by William Y. Adams, then a graduate student in anthropology at the University of California, Berkeley. His assigned objective was to search the canyons around Navajo Mountain, specifically in the area between Oljeto (Moonlight) Wash on the east and Navajo Canyon on the west, and from the San Juan and Colorado Rivers on the north to the Tuba City-Kayenta road on the south. He was instructed to record and describe only those sites which gave promise of fulfilling our special requirements — all others were to be noted only insofar as doing so involved no extra work or time.³ On the other hand, areas searched without yielding suitable sites were to be negatively reported. No sherd collections were to be made, although on-the-spot identifications were to be recorded.

In evaluating the results of this work, it should be remembered that the area is very

2. I wish to thank Dale S. King of the U.S. National Park Service for his help in making this work possible. The late Jimmy Brewer should also be mentioned as one whose aid and interest greatly furthered our project.

3. Adams had specific instructions to watch for possible Basket Maker sites. However, in his field work he was able to locate only one, and this was small and doubtful and is not worth reporting upon at this time.

large, the terrain some of the roughest in the Southwest, and the problems of movement and subsistence for the field man extremely difficult. One man cannot be expected to cover more than an infinitesimal fraction of the region in three months. There is every reason to believe that a great number of sites were missed and that the results are far from one hundred per cent indicative. However, it is to be expected that by following leads obtained through continual questioning of long-resident inhabitants, both Navajo and white, and by search in the areas topographically and environmentally most likely to contain former Anasazi occupation, a valid and representative sample could be obtained. More will be said on this subject later.

The following data are taken from Adams's final report. The abstracts are designed to give a general picture of what he found, without elaborating upon the cultural details. My own comments and appraisal of his findings will be reserved for the Summary and Conclusions at the end of this report.

Navajo Canyon. This canyon system is probably the most elaborate in the Navajo country. Adams got into only one spur in its most northeastern sector, some 10 miles from the main canyon and due south of Navajo Mountain. Shelters in the base of the Navajo sandstone contain many cliffhouses, of which he recorded five as potentially suitable for our purposes (PE 1 to 5; NA 4203 to 4207). Of these, three had been described in print (PE 1 and 3 by West in 1927; PE 5 by Morss in 1931, although there is some doubt about this). All of these sites except PE 4 had been so vandalized as to be worthless for anything but salvage excavation. Adams did not recommend PE 4 for excavation because of its poor preservation. It is significant that Adams says that there are "at least ten [late Pueblo III open sites in the sandy canyon bottoms] for every cliff dwelling."

Navajo Mountain. The eroded slopes and adjoining flats surrounding this prominent geographic feature on its south and east were extensively surveyed by Adams. He found "hundreds of open sites" but less than half a dozen cliffhouses. Of the latter only one, PE 7 (Na 4209), was numbered and described, and this was of no value to us because of weathering and vandalism. Another small cliffhouse, notable only for its remoteness, was located about 1500 to 2000 feet above the flats on the southwest side of Navajo Mountain itself; Shonto Black-on-white (Pueblo II) sherds were found immediately below it.

Referring to open sites, Adams says that nowhere in the area of the Kayenta culture are habitation sites more numerous than on the detrital slopes and flats on the south and east of Navajo Mountain. Remains assignable both to Developmental and to Great Pueblo cultures are common. With a few notable exceptions, however, the sites are small, and few or no architectural remains are visible. Along the water courses there are occasional rectangular, rock-edged terraces which, together with the "reservoirs" (Kidder and Guernsey 1919:64) that Adams identifies as check dams, suggest agricultural practices reminiscent of those in the Arizona Strip north of the Colorado River (Hall 1942; Taylor, *A Brief Survey through the Grand Canyon of the Colorado River*). Of the larger sites, the most outstanding is known locally as Kin Tlichee (Morss 1931: 11, 15; Fewkes 1911:pl. 22). Except for being larger and built around a court or plaza, it is very similar to Ruin A and other such ruins in Marsh Pass (Kidder and Guernsey 1919:61-62). Adams notes at least half a dozen other ruins of this type on the southern and eastern slopes of the mountain, and he reports that Byron Cummings once said that the largest Kayenta ruin of all lies beneath the present Navajo Mountain Community School located in this same region.

Canyons North of Navajo Mountain. Adams spent three days in this region walking around the skirts of the mountain and into the short canyons which drain into the San Juan, specifically Beaver, Junction, and Nasja. During this trip he saw surface sites, although not as many as on the south and east slopes. He found only one small, looted Pueblo III cliffhouse (in Surprise Valley at the head of Nasja Canyon), despite the fact that there were many caves and shelters suitable for occupation. This absence of cliffhouses is corroborated by the findings of Kluckhohn (1933) and the Rainbow Bridge-Monument Valley Expeditions (Beals, Brainerd, and Smith 1945:3).

Canyons West of Navajo Mountain. This area has been the scene of much exploration, particularly as the result of the search for, and visits to, the famous Rainbow Bridge (Bernheimer 1929; Kluckhohn 1927; Morss 1931; Steward 1941; Beals, Brainerd, and Smith 1945). For many years, also, the guests at Rainbow Lodge have been conducted on

pack trips throughout this region. These operations have brought to light no large cliff-houses and have shown that occupation was sparse and evidently temporary, possibly because of the scarcity of arable land. Furthermore, the small ruins that do exist have been subjected to continuous vandalism until today there is nothing left for conscientious archaeological work.

Paiute Canyon. The nature of the rocks into which this canyon has been cut makes possible few sheltered locations; the canyon is not very hospitable to human occupation, a fact which is attested by the scant, modern Navajo population in all but its uppermost reaches. PE 6 (NA 4208) is the only site "of any importance" known to Adams or the local residents. It lies in Rabbitbrush Canyon, a small western branch very near the upper limits of the Paiute system. However, since it is only 50 feet below the rim and more accessible to it than to the canyon floor some 1000 feet below, it is quite surely associated with the occupation of the slopes of Navajo Mountain, not with the unoccupied canyon below. The site is small, wet, vandalized, and of no use for our purposes. Survey of the lower 12 miles of Paiute Canyon and the adjacent portions of the San Juan River Canyon disclosed not a single site. A reconnaissance for about 3 miles above PE 6 along the rim of Rabbitbrush Canyon likewise produced no sign of ruins. The upper segments of the main Paiute Canyon are much more favorable for occupation and today support a sizable Navajo settlement in summer; although Gladwin reports finding 75 sites here (Beals, Brainerd, and Smith 1945:3), apparently none was large; Adams did not have the time to relocate any of them.

Nakai and Copper Canyons. Geologically and topographically, Nakai and Copper Canyons are similar to lower Paiute Canyon, with sloping walls of Chinle shale and very little arable land or even wild vegetation. However, the upper tributaries of Nakai creek have cut back into the scarp of Dzil Nez to form an enormous, bifurcated canyon known as Begashibiko (Cow Canyon). Here the Rainbow Bridge-Monument Valley Expedition described some ruins (Hargrave 1935:38-39; Beals, Brainerd, and Smith 1945:3), and the Wetherills are also known to have visited the place. Local residents say that there are quite a number of ruins, but all of them are said to be small except the one which Adams recorded as PE 10 (possibly already recorded as NA 2637). This ruin lies on two ledges, one above the other. The lower section has been dug quite a little, possibly by Cummings and the Wetherills. The upper ledge, however, is at present unattainable without much well-planned effort and, for this reason, may still retain undisturbed deposits, although they could not be extensive.

In the same side canyon and about a half mile north of PE 10 is a site which, although it is not to our special purpose, is significant for the over-all picture of aboriginal occupation of the region. It is a large (30 to 40 rooms) Pueblo II to early Pueblo III cliff-house. It appeared to have considerable dry refuse and to have been only slightly disturbed. This site will be referred to again in the Summary and Conclusions.

Shonto Plateau, Dzil Nez, and the Inter-Canyon Mesas. The Shonto Plateau and its northern and highest point, Dzil Nez (Tall Mountain), form the divide between the canyons around Navajo Mountain and those of the Tsegi and Shonto drainages. Although for the most part Adams's work was confined to the deeper canyons in which large cliffhouses might be expected, he was also able to make some observations on the mesa tops. He found the pattern of occupation there to be similar to that on the slopes and flats around the south and east sides of Navajo Mountain. The same terrain—sandy and sparsely wooded ridges with shallow and less rugged canyons—is dotted with numerous small sherd areas and a few fair-sized surface pueblos formed of rectangular units. Although not so plentiful as around Navajo Mountain, surface ruins are never completely lacking in the areas observed.

The mesas or spurs which lie between the canyons draining to the north, east, and south from the highland of Shonto Plateau also exhibit the same occupation pattern. Starting with Paiute Mesa, between Paiute and Nakai Canyons, and following around to No Man, Hoskinini, Azansosi, Skeleton, Tyende, and lower Shonto Mesas, one finds open sites of late Kayenta culture, specifically Pueblo II and III, apparently right up until the abandonment.

The Scarps of Monitor, Azansosi, and Tyende Mesas. In previous years, as well as in 1951, Adams had made brief trips into the short canyons which scallop the edges of these

geographical features. He found no site which would serve our special purpose, and the ruins he did find had been vandalized in degrees ranging from moderate to complete.

Tsegi-ot-sosi, Tsegi, and Shonto Canyons. Although the first two of these canyons have long been known as favored spots for aboriginal occupation, Adams found nothing in the first to help us and, in the second, our 1949 work had been unrewarding. As for Shonto Canyon, caves and shelters are rather few and what few cliffhouses have been located are small. However, both the bottom and the rim of the canyon abound in open sites, some of them very large.

* * * * *

The following three areas, in which some work was done during the 1951 season, are actually outside the geographical limits set for that year's survey. However, they are adjacent to our set limits and are culturally pertinent to our problem. Furthermore, in performing the work in each case we were following definite leads given us by previous visitors to the specific sites. The data are presented here for the sake of completeness.

Monument Valley. This area was the object of only very limited reconnaissance. However, certain oral information was obtained, and this is passed on here for what it may be worth and with the necessary reservations. Local informants say that there are no large sites anywhere in the Valley proper. Open sites are said to be numerous on Douglas Mesa, which is immediately south of the San Juan River and north of Monument Valley. It is claimed that there are no sites at all in the canyon of the San Juan River at this point. Adams's own field work resulted in the finding of one small and very much vandalized late Pueblo III cliffhouse in an erosion remnant along the eastern edge of the Valley. He also located a few others, "of pure Kayenta culture" but quite small, in the north face of Comb Ridge.

Chinle Wash. Throughout its lower courses, this wash has so scoured and eroded the land for miles around as to render it virtually uninhabitable. Evidences of aboriginal occupation are confined to the immediate reaches of the wash itself. Although there are some large ruins among these, the later and largest ones appear to be predominantly or wholly of Mesa Verde culture, while only the early and smaller ones are of the Kayenta complex. Furthermore, although the largest one of all, Poncho House, probably still contains a considerable amount of undisturbed dry deposit, most of the other sites are exposed to the weather to such a degree as to make them very doubtful prospects. Although shamefully vandalized, Poncho House is still a magnificent ruin and would repay salvage excavation. But for the purposes of our project, its Mesa Verde affiliations during the final, crucial years before abandonment were deciding and eliminating factors.

Carrizo Mountains. In this area no reconnaissance at large was done. Adams was guided to one ruin about which we had had excitingly promising reports, and he located another by following directions of a local Navajo. The first site, called Tsegi-ho-chong and numbered PE 8 (NA 4229), was visited twice by Adams and once by me. It is a fabulous site and, from evidence at present available to us, was undoubtedly the best preserved large ruin on the Navajo Reservation. I say "was" advisedly, because after our visits the person who guided Adams to it returned and vandalized it to an extent as yet unknown — we can only hope not irreparably! Its occupation seems to have been from Pueblo I to Pueblo III, but the latter period is represented by a very thin accumulation of Mesa Verde materials (as apparent in the one small "pot-hole" existing when we visited the site). Its architecture also shows its Mesa Verde affiliations. For our purposes, then, PE 8 would not serve, although for a more general problem or if we should change our focus to Mesa Verde, it would undoubtedly be well worth further and closer assessment. The site PE 9 (NA 4230) lies below PE 8 in the same canyon; it is considerably smaller, very much vandalized, and offers us nothing for our problem.

1952 FIELD WORK

With results from the nuclear area so meager and foreboding, it was with little optimism that we began to plan our next step in the Pueblo Ecology Study. We had hopes, however, that in the region south of Monument Valley, in the rugged country between it and Cane Wash, or in the short canyons on either side of Comb Ridge, we might find a site with the requisite characteristics. The work of Kidder and Guernsey in Comb Ridge and in the

western embayments of Monument Valley had revealed a few small Pueblo III cliffhouses, the existence of which gave at least some promise of larger sites in the vicinity. Our next move was plotted for this general region.

During the summer of 1952, I received word that a field party of the United States Geological Survey, working in the region toward which our attention was being directed, had located, in the course of two years of intensive geological mapping, more than 100 archaeological sites and was anxious to have an opinion as to their dates and cultural affiliations. Needless to say, this was a fine bit of luck and the offer of help and co-operation was gratefully and eagerly accepted.⁴

Our work was necessarily brief — in fact, because of unforeseen circumstances, time in the field was eventually reduced to five days. Nevertheless, because of the thoroughness with which the geologists had covered the region and the meticulousness of their field recording techniques, the coverage of the area was equivalent to many months of intensive archaeological reconnaissance. As with Adams's work, there can be no doubt that sites were missed, but certainly no large site was missed in the area mapped by the geologists.

Since our time was to be short, we had to have a definite plan. All sites had been located on aerial photographs, and from these we laid out daily trips designed to reach the most promising ruins by routes which would pass by the greatest number of sites. With the exception of the few that we were forced to miss because of the sudden rising of Laguna Creek on our last day, we reached all sites that, from the geologists' notes, gave any promise. Thus we visited 41 sites, of which 18 were given Museum of Northern Arizona numbers and from 17 of which we made sherd collections. From those visited but not numbered, descriptive notes and exact locations on aerial photos were made. There were 63 sites which we did not visit because their original descriptions did not sound promising; these were nevertheless located on the aerial photos. The following tables and their accompanying explanations present the empirical data obtained from the 41 sites visited.

TABLE 1 AND DISCUSSION

The sherds listed merely under the various wares are those whose more specific identifications are uncertain but whose ware affiliations cannot be doubted. However, since those under Tusayan White Ware have cultural or chronological significance in many instances, some discussion of them will be in order. At site NA 5445, one of these is definitely of Pueblo III design style, possibly late, thus influencing the assignment of one of its components to Ceramic Group 9 (Table 2); the presence of Tsegi Orange and Moenkopi Corrugated is also consistent with this allocation. Site NA 5446 presents a peculiar ceramic complex; of the specifically unassignable sherds listed under Tusayan White Ware, five bear a very heavy-lined design, two display medium heavy lines, four are definitely Pueblo II style of unknown category, while five are Pueblo I-II intergrades, having lines midway in heaviness between the two styles with crude pendant dots. Site NA 5447 produced seven untypable sherds of Pueblo II style, one sherd with iron paint typical of the eastern Anasazi area, one sherd which, except for its interior slip, is very like Lino Black-on-gray; the one sherd of Shonto Black-on-white has exterior corrugating in the Moenkopi style. At site NA 5449, ten of these sherds have a Pueblo II style of design. The Shonto Black-on-white sherd from site NA 5452 has a Tusayan Corrugated exterior; two of the untyped are rather fine-lined Pueblo I-II intergrades, while one of the sherds listed under Kana-a Black-on-white is unusual in that it is painted on both interior and exterior and has a Type B rim (Colton and Hargrave 1937:10). At site NA 5455, one sherd is Shonto-like in that it has Moenkopi corrugations on the exterior and a "polka dot"-and-line design on the interior. A word should be said about the "unnamed style of design" listed at the bottom of the Tusayan White Ware column. The design consists of a series of rather long lines, of medium but quite certainly Pueblo II width, pendant from a base line or "bar"; although more information is needed, its consistency and frequency strongly suggest that it is indeed a definite style of design and attributable to the Pueblo II culture complex.

4. It was due primarily to the foresight and energy of Irving J. Witkind, Party Chief, U.S. Geological Survey, that this work was accomplished. To him and to Richard Claus, who worked in the field with me, go appreciative thanks for their help.

Table 1
SHERD ANALYSIS BY SITE

U.S. GEOLOGICAL SURVEY SITE-NUMBER	W 344	C 50	J4 W72	F 33	P 19	F 39	F 45a	F 45b	H 28	C 48	C 21	T 10	D 17	D 17	J 10	W 345	W 343	
MUSEUM OF NORTHERN ARIZONA SITE-NUMBER	NA 4161	NA 4162	NA 5441	NA 5445	NA 5446	NA 5447	NA 5448	NA 5449	NA 5450	NA 5451	NA 5452	NA 5453	NA 5454a	NA 5454b	NA 5455	NA 5457	NA 5458	
TUSAYAN WHITE WARE	1	3	10	2	17	11	1	11	4	7	2	1	1	3	3	1		78
LINO B/G														4				4
KANA-A B/W		1	3				3		1	16	6	19		8	3	18		78
BLACK MESA B/W					2	4			2	9	8			1		2		28
SHONTO B/W		1				1					1							3
DOGOSZHI B/W	1	1	1			4		10	2	5	7				1		1	33
SOSI B/W	10	9	8		7	8	1	14	2	10	6	4	7	1	3	22	8	120
FLAGSTAFF B/W									3			5						8
TUSAYAN B/W												4						4
BETATAKIN B/W												1						1
KAYENTA B/W												1						1
UNNAMED STYLE B/W			1		2	2				2	2			1				10
																		368
SAN JUAN RED WARE					3					1								4
DEADMANS B/R	3		10		21			8		18	23		6			2	1	92
ABAJO R/O	1		1											5		1	1	9
BLUFF B/R					1							1						2
SAND TEMPERED RED WARE, Middleton Red Series		6					2									1	1	10
SAND TEMPERED ORANGE WARE San Juan ?					1				1									2
																		119
TSEGI ORANGE WARE			8			9		9	4			7	2		2	3	1	45
MEDICINE B/R								1				1						2
TUSAYAN B/R	10		6	2		8		8	7	16	4	10			3	4		78
CITADEL POLY.		1	8	2		8		1	9	1	1	5				5		41
TUSAYAN POLY.				2		2			8			16				1		29
KIETSIEL POLY.												1						1
TSEGI ORANGE				2		1		1	3	1		7			5	3		23
TSEGI B/O												3				2		5
TSEGI R/O									1									1
																		225
TUSAYAN GRAY WARE SC.			5		2	2	0	1	0	1	1	0	1	0	2	0	1	15
" " " FL.			10		6	2	26	4	3	13	3	10	4	12	7	3	4	107
" " " ?	5	13																18
LINO GRAY, ALL FL.						1	2					1						4
KANA-A GRAY SC.			1		0		0			0	1		0	0		1		3
" " " FL.			0		11		1			7	4		5	1		0		29
" " " ?		2																2
TUSAYAN CORR. SC.			0	0	0	0	0	1	0	0	0	0	0	1	0	2	0	4
" " " FL.			5	1	5	3	1	7	3	11	7	1	3	2	6	5	3	63
" " " ?	9	20																29
MOENKOPI CORR. SC.			0	0	0	0		0	0		0	0			0	3	0	3
" " " FL.			3	5	3	5		5	3		3	4			2	3	4	40
" " " ?	6	4																10
																		327
MISCELLANEOUS TYPES																		
PUEBLO I, B/G, Afin. Arizona strip ?					3													3
MESA VERDE-LIKE B/W		2																2
MOGOLLON-LIKE SMUDGED		1																1
																		6
	46	64	80	16	84	70	37	81	55	119	79	101	30	39	37	82	25	1045

In this table, I have separated the red wares into two groups. As Colton has pointed out in his discussion of this topic (1952:87), there is throughout these wares a remarkably similar series of design styles, while the materials and techniques of manufacture are just as remarkably dichotomized. During the present work and that of the brief Grand Canyon survey (Taylor, *A Brief Survey through the Grand Canyon of the Colorado River*), it became increasingly apparent that lumping these wares, as Reed (1944:5-7) and Colton (1946:22-23) had formerly done, did not clarify their cultural significance but rather obscured any that they might actually have had. The consistency of difference, in paste and temper and slip, seems entirely sufficient grounds for separation, and the similarity of design style only serves to accentuate the basic distinctiveness.

In the present state of our knowledge, there are not the data with which to attack this problem of the culture history of San Juan Red Ware and Tsegi Orange Ware. However, I do believe that the crux of the matter, at least in any start upon the problem, lies in an understanding of the type known as Deadmans Black-on-red and in information on the appearance of sherd-tempered red ware, i.e., Tsegi Orange Ware, in the northern part of the Southwest. The problem also involves the relationships between the Mogollon wares and the sand-rock-tempered types of the Four Corners region: Abajo Red-on-orange, Bluff and/or La Plata Black-on-red, Deadmans Black-on-red. For one thing, there is something peculiar about Deadmans Black-on-red as now defined. Its distribution is strange: common around Flagstaff, scarce in the Tsegi and Navajo Mountain areas, common again in the Comb Ridge and Monument Valley regions and north of the Colorado River (Taylor, *A Brief Survey through the Grand Canyon of the Colorado River*). There are puzzling things about its chronology: it is relatively early around Flagstaff and is generally considered to be diagnostic of Pueblo I times and culture, but north of the Colorado River it seems to be associated with Pueblo II and even some early Pueblo III types. Even its specifications, as now defined, are variable: in color, as Brew has pointed out (1946:296), and possibly in paste and temper, in which during my own comparative studies I felt I could distinguish consistent differences, although there was not time to pursue this problem. It is quite possible that, under the designation of Deadmans Black-on-red, we are actually dealing with two or more culturally significant pottery traditions, not just one. All of these implied questions have bearing upon the beginning of red ware in the Anasazi area, specifically the relationships between Deadmans Black-on-red and Abajo Red-on-orange and the Mogollon and Sinagua wares. They also have bearing upon the inauguration of sherd temper in the red wares of the northern Southwest, the transferal and subsequent parallel development of design styles between two distinct traditions of pottery manufacture, San Juan Red Ware and Tsegi Orange Ware. In all of these problems, there are strictly cultural as well as culture-historical implications, and the realization of these, of course, will require the conjoining of many more aspects of the various cultural wholes.

In typing the sherds of Tusayan Gray Ware, only those which consisted of a rim without neck-banding were designated as Lino Gray, and only those with both rim and neck-banding were listed as Kana-a Gray. All other noncorrugated sherds fulfilling the specifications for the ware were called merely Tusayan Gray Ware. This practice undoubtedly warped the figures, but there is no other empirical way to identify these types: body sherds of all Tusayan Gray Ware types run identical ranges, at least as far as our present taxonomic discriminations are concerned.

In our collections of Tusayan Gray Ware from the Comb Ridge-Monument Valley area, we found both scraped and floated interiors. The former are relatively smooth, do not have tempering materials extruding from the surface, and appear to have been scraped, as evidenced by series of unmistakable striations made when the pot was rather dry. The floated specimens have much extruded temper, around and between and sometimes even over which there is a definite scum of clay (of course fired when the pot was fired) in the form of a float; it does not seem to have been applied as a wash or slip, although more detailed tests would have to be performed to determine this point. This difference between floated and scraped interiors has already been noted in my work on the ceramics from the Grand Canyon survey (Taylor, *A Brief Survey through the Grand Canyon of the Colorado River*). It was discovered that scraping was by far the dominant technique but that, insofar as the floating technique was used at all, it was more common

on sherds identified as Moenkopi Corrugated than on Tusayan Corrugated sherds. This fact led me to postulate a chronological significance for the difference, because Moenkopi Corrugated is generally conceded to be somewhat later than Tusayan Corrugated. Although this may still be the case, I believe that the present analysis has broadened the perspective and, while not necessarily altering the previous conclusions, has changed their significance both culturally and chronologically.

In the Comb Ridge-Monument Valley collections, the relations between scraped and floated interiors of Tusayan Gray Ware were found to be the reverse of those in the Grand Canyon collections: floating is the dominant technique, while the incidence of floating and scraping in Moenkopi and in Tusayan Corrugated is virtually identical. There is the further fact that all of the few Lino Gray sherds displayed floated interiors and that a check of a more extensive sample of Lino Gray from the type collections of the Museum of Northern Arizona also showed only floating. It is significant that this floating technique was used on the interiors of Lino Black-on-gray bowls to provide a smoother surface upon which to paint the decorative designs. Furthermore, although a few sherds of Kana-a Gray were scraped, most were floated. These data change the picture gained from the Grand Canyon materials. The technique of floating appears to be the earliest by which the interiors of both jars and bowls were finished, and it continued dominant in the eastern area. The practice of scraping the interiors of jars seems to have come in with the development of so-called Pueblo I ceramics, specifically with Kana-a Gray. At this time, the decorated bowls began to be slipped, rather than floated, to provide the smooth surface. Therefore, the interior floating found to the north and west across the Colorado River, if indeed it had any connection with the more easterly examples, must be viewed as a survival of an old technique, not as a late development, which its association predominantly with Moenkopi Corrugated once seemed to indicate. Why it is so scarce, why it appears more on Moenkopi than on Tusayan, and the very validity of this hypothesis, based as it is on meager data, all demand much more information from the field and existent collections. But one thing is very apparent: more refined analyses of Tusayan Gray Ware and of utility pottery in general seem to offer possibilities for cultural and culture-historical inferences not usually conceded these aesthetically unexciting products.

In reviewing Table 1 as a whole, several things deserve mention. San Juan Red Ware gives the impression of being intrusive, and this is so despite the appearance of Deadmans Black-on-red in nine sites and in considerable numbers. Also, even if this is so, there seems to be surprisingly little trade ware in these sites, assuming, of course, that the types of the three other wares listed are indigenous. We know that a great number of these types have been found in the northwest in the Arizona Strip, but there seems to have been remarkably little ceramic trade in the opposite direction. Furthermore, although the Comb Ridge-Monument Valley area is adjacent to the territory generally thought to have been occupied by Mesa Verde culture, we note very little evidence of eastern ceramics. These facts constitute problems.

Finally, we note that the concentration of occupation in the recorded sites occurs during the time when Pueblo I and Pueblo II ceramic complexes were in vogue. It is entirely possible that earlier remains existed but have been covered by alluvial and aeolian deposits. The scarcity of late Pueblo III ceramics presents a more complex, and certainly a more pertinent, problem. What was happening at these sites while the mosquito bar black-on-whites and elaborate polychromes were being made in Tsegi Canyon less than fifty miles to the west? There are undoubtedly many possibilities, but two immediately come to mind: (1) that the area was abandoned before the development of these very late types, and (2) that these types were restricted, local products not made by the people living outside the immediate Tsegi area. The second possibility is supported by some established facts: scarcity of the late, elaborate ceramics in sites around Navajo Mountain and on the mesa-top sites surrounding the Tsegi suggests an even more stringent localization and removes some of the uniqueness from the Monument Valley-Comb Ridge case; the evidence that little pottery of any sort was traded into the Comb Ridge-Monument Valley area would account for the scarcity of such late and localized Tsegi types.

TABLES 2-5 AND DISCUSSION

In the listing of sites in Table 2, Museum of Northern Arizona numbers have been given for those sites from which sherd collections were made. The remaining sites, from which ceramic details were recorded in field notes but from which no collections were taken, have been listed by their U. S. Geological Survey numbers, beginning with J-12 and going to C-52.

The locations have been given from south to north. The "Comb Ridge" sites are all south of Comb Ridge or are found in the short canyons that enter it from the south. Sites listed as "Cane Wash" and those listed as "Mesa" have been determined primarily on the basis of whether the site is in a section of a canyon which debouches directly into the Wash or whether it is found a considerable way up the canyon, at a much higher altitude and relatively nearer the mesa than the Wash. The "Monument Valley" sites are from the southwestern embayments of the Valley.

The site types speak pretty well for themselves. The "walled niche" is what many archaeologists call a granary, but I do not wish to beg any uninvestigated questions by calling it such. Both the "dune" and "alluvial ridge" sites are open sites. In the case of "sites against cliffs," all have evidence of structures, with the possible exceptions of NA 5457, J 8, and C 52. NA 5446, in addition to having a very peculiar sherd complex that includes the largest representation of San Juan Red Ware, has a rather large sherd area, vestiges of slab houses, and three walled niches, one with a door.

The Pueblo periods as listed have a strictly temporal meaning, implying nothing as to architecture, subsistence, or other aspects of the cultural complex. The ceramic groups refer to those established by Colton (1953:66). The mean dates for each of these groups have been calculated by taking the mean date (to the nearest 25 years) of the overlapping segments of the ranges given for the diagnostic types within each group; thus in Group 3, Kana-a Black-on-white and Deadmans Black-on-red are given as diagnostic, the former ranging from 700 to 900 and the latter from 800 to 1060 A.D.; the ranges of these types therefore overlap from 800 to 900, the mean of which is 850 A.D., the mean date listed for the group. In this section of Table 2, the crosses within parentheses indicate that the representation of that ceramic group or component was not strong and could have been nothing more than a fleeting occupation.

A glance at this table will show that we were not very successful in locating the cliff-houses which we sought for our drought and ecology studies. Very few had been found by the geologists. When it became apparent that no large cliffhouses had been found and that in all probability none exist in the region, other sites were visited and recorded in order to secure sherd collections and datable wood. Throughout, an attempt was made to select the larger sites from the geologists' records. Under these conditions, then, there is no possible chance that a true picture of occupation pattern can have been obtained. This is unfortunate. The geologists had scoured the country and recorded the location of everything archaeological that they had seen. With this start and the subsequent findings of a trained archaeologist, there was, and still is, an extremely good opportunity to reconstruct the aboriginal occupation pattern and, with well chosen excavations, to fill this pattern with information which would be invaluable to our understanding of northern Anasazi culture and history.

The column listing the components of each site shows that 10 (30%) have one, 17 (52%) have two, and 6 (18%) have three components. The association between number of components and the location and type of site shows very little except that only one of three walled niches had multiple components and that, with this exception, all locations and types had more multiple components than single ones. Apparently favored spots were reoccupied often.

Table 3 shows the concordance between location and type of site. Although one would not expect to find cliffhouses or walled niches out in Cane Wash, the way this "location" has been defined is such that sites of these two types could actually have been found; that none were found in lower reaches of the canyons entering immediately on the wash is not necessarily or entirely a geographically controlled circumstance; some cultural or chronological factor was probably at least partly responsible. The absence of dune or alluvial ridge sites from Monument Valley is probably entirely due to the nature of our survey; there is every reason to believe that there are such sites in that area.

Table 2

SITE NUMBER	LOCATION				TYPE OF SITE					PUEBLO TIME PERIODS									COMPONENTS
	COMB RIDGE	CANE WASH	MESA	MONUMENT VALLEY	CLIFF HOUSE	WALLED NICHE	DUNE	ALLUVIAL RIDGE	AGAINST CLIFF	PUEBLO I	PUEBLO II			PUEBLO III					
										CERAMIC GROUPS									
										2	3	4	5	6	7	8	9		
										MEAN DATES									
700	850	900	975	1075	1125	1200	1250												
NA 5441	X				X					X				X				2	
NA 5442 a	X							X			X					(X)		1+1	
NA 5442 b	X							X		X								1	
NA 5444		X						X		X								1	
NA 5445			X		X									X			X	2	
NA 5446			X						X	X			X					2	
NA 5447		X						X					X		X			2	
NA 5448		X						X		X			(X)					1+1	
NA 5449		X						X				(X)	X	(X)				1+2	
NA 5450		X							X	(X)			X		X			2+1	
NA 5451		X					X				X			(X)				1+1	
NA 5452	X							X		X			X	(X)				2+1	
NA 5453	X								X	X				X		X		3	
NA 5454 a			X				X			X			X					2	
NA 5454 b			X				X			X			X					2	
NA 5455	X						X			X			X					2	
NA 4162				X	X					X			X	(X)				2+1	
NA 4161				X	X								(X)	X				1+1	
NA 5457				X					X	X			X		X			3	
NA 5458				X					X	(X)			X					1+1	
J 12		X					X						X					1	
B 4		X					X			X			X					2	
J 7	X						X			X			X					2	
J 8	X								X				X					1	
C 22	X						X			X								1	
C 24	X							X		X			X					2	
H 27			X			X				X			X					2	
H 26			X			X									X			1	
W 27			X				X			X			X					2	
C 49			X				X				X							1	
J 11	X						X						X					1	
C 51				X		X								X				1	
C 52				X					X					X				1	
	11	8	8	6	4	3	11	8	7	2	16+2	3	(2)	20+1	5+4	4+1	2	62	

Table 3

	LOCATION				
	COMB RIDGE	CANE WASH	MESA	MONUMENT VALLEY	
CLIFF HOUSE	1		1	2	4
WALLED NICHE			2	1	3
DUNE	4	3	4		11
ALLUVIAL RIDGE	4	4			8
AGAINST CLIFF	2	1	1	3	7
	11	8	8	6	33

Table 4 shows the association of location with Pueblo time-period (including ceramic groups and mean dates). Two percentages have been figured in addition to the frequencies: percentage A says that 40% of all Comb Ridge sites are of Pueblo I time-period, while 35% are of Pueblo II and 25% are of Pueblo III; percentage B says that 40% of all Pueblo I components are found in Comb Ridge, while 20% are found in Cane Wash, 25% in the mesa country and 15% in Monument Valley. The A percentages reveal, I believe, a

Table 4

	PUEBLO I			PUEBLO II			PUEBLO III			
	No.	%A	%B	No.	%A	%B	No.	%A	%B	
COMB RIDGE	8	40	40	7	35	27	3(+2)	25	31	20
CANE WASH	3(+1)	25	20	6(+2)	50	31	2(+2)	25	25	16
MESA	5	36	25	6	43	23	3	21	19	14
MONUMENT VALLEY	2(+1)	25	15	4(+1)	42	19	3(+1)	33	25	12
	20			26			16			62

progressive movement of population from south to north, i.e., from Comb Ridge to Monument Valley, from Pueblo I to Pueblo III times. The B percentages show the same progression, except that Pueblo I sites in Cane Wash are noticeably few. This fact may be explained by the aggradation cycle noted by Hack (1945:151-158) for this general region: the Pueblo I sites probably have been covered by the accumulating sediments. The notable increase of Pueblo II sites in the same area possibly reflects the cessation of active

Table 5

	PUEBLO I			PUEBLO II			PUEBLO III			
	No.	%A	%B	No.	%A	%B	No.	%A	%B	
CLIFF HOUSE	2	22	10	2(+1)	33	12	3(+1)	44	25	9
WALLED NICHE	1	25	5	1	25	4	2	50	13	4
DUNE	7	39	35	10	56	38	(1)	6	6	18
ALLUVIAL RIDGE	5	31	25	5(+2)	44	27	1(+3)	25	25	16
AGAINST CLIFF	3(+2)	33	25	5	33	19	5	33	31	15
	P I	18(+2)		P II	23(+3)		P III	11(+5)		62

aggradation and the availability of good, arable alluvial lands in the wash bottom. All these interpretations, of course, are subject to drastic revision in the face of more information and are subject to the limitations imposed by the nature of our survey work.

In Table 5 the same two percentages, A and B, have been calculated for type of site. From these figures, we note that cliffhouses appear to increase in popularity through time, that walled niches are not common in Pueblo I and II and relatively uncommon in all epochs (but these figures are probably warped by the fact that, except by chance, we did not visit sites of this type), that dune sites are not common in Pueblo III times, that in Pueblo II times there are more alluvial ridge sites but dune sites are no more popular than other locations, that sites against cliffs are about equally popular in all time periods although within the Pueblo III period a larger proportion of sites are of this type than in other periods.

1954 FIELD WORK

In view of our work of previous years, it seemed quite hopeless to continue search for our "dream site" in the Kayenta-Monument Valley region. Of the rest of the pertinent Anasazi area, Black Mesa was, and is, an almost completely unknown land, and to begin work there would entail starting virtually from scratch, archaeologically. Further south but still within the limits of our proto-Hopi, drought-area, dry-site prescription, the Jeddito and Little Colorado valleys offered little evidence of drought (Gladwin, n.d., Chap. II) and, therefore, would be only peripheral to our problem. Thus our first line of attack was effectively interdicted.

Our next and most obvious move was into the field of Mesa Verde culture. Tsegi-hochong and Poncho House had already been visited and, although both offer splendid possibilities for work, neither appeared to give promise of exactly what was called for by our particular problem. In the spring of 1954, therefore, I made a quick trip to Mesa Verde National Park for the purpose of looking at the cliffhouses and other sites in the hope of finding one that would be suitable for our project.⁵ The situation there turned out to be more or less what it had been at Navajo National Monument: the larger sites which would have ideally filled our bill were either excavated, vandalized, or given over to the tourist trade so as to be unavailable for complete excavation. In this locality, even the smaller cliffhouses have been so disturbed as to leave absolutely nothing to satisfy our needs.

SUMMARY AND CONCLUSIONS

And so we have come to the end of our project. But still the problem remains. Perhaps in Canyon de Chelly there is the site which we have sought, perhaps in the Mesa Verde, perhaps in the still more remote recesses of the country which we have already searched. But the law of diminishing returns has set in. The obvious places have been explored, and to probe all the remaining terrain would mean years of the most intensive kind of survey — with only the luckiest chance of finding what we need hidden and protected through the years from the elements and the destructive hand of man.

At this point, one may wonder whether the requirements of our problem did not set up impossible demands. It might be questioned whether, even under the most favorable conditions, the preservation of the vestiges of those last, crucial 25 years could rightly be expected. Was the problem drawn too fine? For myself, I do not believe that it was — on purely *a priori* grounds. For one thing, the criteria were not set up arbitrarily; they grew out of the problem itself, and the problem was important. Had there been no previous excavation of the largest cliffhouses, had there been no pothunting, or if in some corner we had been able to find, unexcavated and unpilfered, one or two ruins of even moderate size, I believe that our problem would have had its answer.

5. Don Watson, Al Lancaster, and Leland Abel, all of the U.S. National Park Service, were most co-operative, remarkably interested in another's project, and generally of invaluable assistance.

The crux of the matter lies in the tremendous and nauseating amount of vandalism perpetrated upon cliffhouses and their contents. On the premise that a suitable site did actually once exist, here is a case wherein pothunting has so abused the cultural remains as to make even the investigation, much less the solution, of an important problem a complete impossibility. Here is a strong blow against those who complacently console themselves with the idea that there are multitudes of ruins, plenty from which to obtain our much needed empirical information, the loss of one, several, or many of which is of no great account. It is frightening to realize that the northern Anasazi area may not be the only one to have come to this pass. Indeed, it seems quite certain that there are other regions, both in and out of the Southwest, which have attained this unhappy state. If the archaeologists have hopes of working on specialized cultural problems, not merely taxonomic ones, then it is later than we think.

Aside from these discomforting findings, however, our work did produce information from which can be derived some new insights and inferences into the cultural picture of the region. I shall present a few of these, but with the reservation that our data are incomplete and sparse and that my "conclusions" are based on the premise that "if the facts are as indicated, then - - -."

Probably most fundamental and far-reaching is the realization that there are more Pueblo III open sites than there are Pueblo III cliffhouses. All the data point to this conclusion: the tabulation of sites in the Tsegi by the Rainbow Bridge-Monument Valley Expeditions (Beals, Brainerd, and Smith 1945:20 ff.; Table 2); particularly Adams's work around Navajo Mountain and ours between Comb Ridge and Monument Valley; and the discoveries along the Chinle (Morss 1927). Furthermore, there appears to be no great difference, except in size and superposition, between the cliffhouses of Pueblo III and those of Pueblo II. Many cliffhouses were started in Pueblo II times (even in Pueblo I times, evidently) and continued to be occupied or used until later. Thus without a searching sherd analysis or actual excavation, the earlier occupations are often overlooked and only the latest remodeling (of Pueblo III times) impress themselves upon the archaeologists and other visitors. Finally, it seems quite apparent that Pueblo II sites were located in remote canyons away from potential agricultural lands and in locations that can be considered as "defensive" as some of the most typical Pueblo III "defensive sites." If the complete occupation pattern were known, it is quite possible that the majority of Pueblo II sites would be found in much the same locations as those of Pueblo III.

What then becomes of the hypothesis of "hostile nomads" so often referred to in Southwestern culture history? Our data point to a long standing utilization of cliffhouses and "remote" locations beginning in Pueblo I times. Furthermore, at the moment when the hostile hordes are postulated as forcing the agricultural Anasazi into defensible cliffs, the Anasazi were living certainly as much, if not more, in open, indefensible sites. Are we to believe in selective hostilities wherein the intruders forced only certain groups into the cliffs, leaving their cultural brothers unmolested in their open sites? Do we believe that hostilities also caused the Pueblo I and II peoples to occupy cliffhouses and sites on promontories at considerable distances from their fields?

I cannot believe that in these postulations we are on the right track. Too much compounding of the hypothesis and *ad hoc* reasoning are required to reconcile the facts. Nor can I believe in Morris's idea about architectural fads to account for great-house and cliffhouse construction (1939:43). The people would have had to be conveniently and eclectically modish.

There is, however, a hypothesis which by itself can account, with a minimum of tortuousness, for all the facts as presently recognized. This is that from Pueblo I times until the final abandonment of the northern Anasazi area there was a growing social cohesiveness, which, coupled with an environmental cycle of aridity, brought economic and social tensions upon a people already living in cliffhouses and often in "remote" locations under conditions of marginal subsistence. Evidence for this developing cohesiveness is plentiful in the archaeological record: a population increase from Basket Maker times onward, the developing kiva complex and unit-type pueblo, the reduction in number and increase in size of occupation sites, the construction of multiple kivas in the final phases of large pueblos. These and other facts suggest a growing social complexity throughout the entire Southwest, not merely the northern Anasazi area. And there is no need to

postulate hostile intruders to account for tensions arising in this developmental sequence, particularly since we have little or no empirical evidence for warfare virulent enough to alter so drastically the habits of a people who otherwise give every sign of having been as conservative as their descendants.

As for the evidence which we do have for defense, it seems to be rather scarce, randomly distributed, and more suited to the needs of local unrest than to those of combating a persistent and general enemy. For one thing, defensive locations and defensive works are attributed almost entirely to cliffhouse sites, while in fact there existed at the same time and in the same locality open sites without evidence of defense. If an intruder or general enemy were attacking, is it logical to suppose that his incursions would call for defense only on the part of the cliff-dwelling branch of the local population? Would not the others either move to equally defensible sites or erect comparable defenses for their open sites? If, on the other hand, such warfare as did exist were internecine, sporadic, desultory, then it can be understood why those that could erect defenses did so, while the others defended themselves and their homes without such aids.

It remains, of course, to explain why the cliffhouses were built at all, why the people moved into such places. I know of no empirical evidence which bears directly on this subject, although I believe that specifically pointed research might produce some. Purely on speculative grounds, then, invoking what collateral evidence we do have, it seems entirely possible that there was no sudden or mass movement into cliffhouses, either in Pueblo III times or at any other time. The Anasazi had long had a tradition of using caves and shelters. They had built structures in such sites since Basket Maker II times, and we find that structures in caves developed much as did those in the open. In the areas covered by our surveys, there is a great deal of evidence that Pueblo I sites and rather large Pueblo II villages were situated in shelters as well as in the open. These data, together with the evidence for Pueblo III open sites (both early and late and contemporaneous with the cliffhouses throughout the period), make it completely unnecessary to imagine any "movement" into such locations. Cliff sites developed along with open sites as the increase in population and in social complexity influenced Anasazi life and customs. I believe that a more complete and documented appraisal than has been possible here would show that we are dealing with nothing more exotic than a straight-line and quite normal biological and social development of the Anasazi people. If certain evidence for warfare and defense exists, it is, at least with our present knowledge, easy and plausible to look upon it as the result of local strife consequent on the growing pains of a robust and increasingly urban people under increasing local pressures, which were both environmental and social.

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A BRIEF SURVEY THROUGH THE GRAND CANYON OF THE COLORADO RIVER

Walter W. Taylor¹

INTRODUCTION

During the spring of 1953, I received word that several scientists from the University of Arizona were planning a boat trip down the Colorado River and were looking for an archaeologist to accompany them.² The proposal was to enter the river at Lees Ferry, at the head of Marble Canyon, to pass through the Grand Canyon and the Granite Gorge, and to leave the river at Pierce Ferry, which is about 50 miles "downstream" from the present head of Lake Mead. The trip was to be a fast one and would allow little time for field work. But since no archaeological observations had been made along much of this important but rather inaccessible stretch of nearly 300 miles, it seemed worth while to do what was possible in the permitted time, particularly since another such opportunity might be long in coming. The United States National Park Service also made a specific request for an estimate of the archaeological potential of that section of the lower Canyon which would be flooded by the proposed Bridge Canyon Dam.

The trip was accomplished in two 21-foot Chriscraft motor boats with inboard engines. These boats had been given their first test on a Canyon trip the previous summer and had demonstrated their trustworthiness in the awesome rapids and eddies of the river. Our party of ten people included two boatmen, two herpetologists and the wife of one of them, a botanist, an entomologist, a water-flow specialist from the U.S. Geological Survey, a photographer, and myself.³ We left Lees Ferry on the morning of June 6 and arrived at Pierce Ferry on the morning of June 12, the seventh day of the trip.

In assessing the following account, it should be remembered that opportunities to make special stops or lengthy reconnaissance were not available for several reasons. First of these was that the river would not permit it: safe landing places were few and, except by chance, did not coincide with archaeologically promising localities. Then the shortness of our time on the river and the need to meet a schedule of nightly landings where the boats could be safely beached and firewood found contrived to make impossible any work except along the river bank and tributary deltas. Finally, the work of the other scientists had to be considered and the few opportunities to stop shared with them. As a somewhat mitigating circumstance, however, we had the advantage of Jim Rigg's knowledge of the river: at the time of our trip, he had successfully run the river more times than any person, a total of six.

1. Collaborator in Anthropology, U.S. National Museum. Published by permission of the Secretary of the Smithsonian Institution.

2. I wish to thank Mr. E. T. Nichols, under whose guidance the trip was organized. Thanks are due also to Dr. Erik Reed and Mr. A. H. Schroeder, of the Regional Office, U.S. National Park Service, who put the opportunity in my way.

3. The personnel consisted of:

James P. Rigg, owner and boatman
Robert Rigg, boatman
E. T. Nichols, photographer
C. H. Lowe Jr., herpetologist
Fred Shannon, doctor and herpetologist
George Butler, entomologist
Leonard Fonaroff, botanist
John Baumgartner, water resources
Arlene Lowe, wife of Dr. Lowe
W. W. Taylor, archaeologist

In the following account, the river mileages are calculated from Lees Ferry downstream. This is standard practice on the river and also on the U.S. Geological Survey maps.

ARCHAEOLOGICAL SITES

Vasey's Paradise, Mile 32. This site, on the first bench and about 50 feet above the river, consists of three series of surface structures with coursed masonry walls, a bedrock mortar, and a boulder with petroglyphs. The ground immediately around two of the structures and the petroglyphs is strewn with potsherds and worked stone, mostly chert. The downstream edge of this bench is bounded by a narrow, now-dry canyon which might possibly provide access from the mesa above, i.e., from the north rim side; there seems to be no other way by which to reach this locality. Downstream some 500 yards and easily attainable from the site is an area of seep springs, a source of permanent water more potable than that of the silt-laden river. Upstream from the site are some small mesquite bushes.

At Locality 1 of this site are the outlines of four rooms, possibly five, two of which are set against a horizontal rock ledge and two of which are dug into the slope of the sandy talus. All are some 60 to 70 feet back from the edge of the ledge. The walls are of tabular limestone from the local outcroppings, laid in courses with little or no mortar, a practice probably dictated by the scarcity or absence of clay in the immediate vicinity. The rooms, where they are measurable, have dimensions of 10 x 9 and 14 x 9 feet. The walls now stand approximately 3 to 4 feet high.

Locality 2 consists of three rooms built at the mouth of a fall-out cave in the cliff behind (west) and about 50 feet above the bench. The construction is the same as at Locality 1, except that there is a series of vertical slabs at the base of the outer wall of one room. The rooms are approximately 10 x 15 and 10 x 8 feet. No cultural material was found here.

Locality 3 is directly below (east of) Locality 2 and nearly 200 yards upstream (north) of Locality 1. It consists of one, possibly two, rooms built against a large boulder some 150 feet from the river-edge of the bench. A few sherds, mostly utility types, were found here.

Locality 4 is a rather large sherd area surrounding a boulder with petroglyphs and a ledge with a bedrock mortar. It lies between Localities 1 and 3. No structure is visible. The mortar hole appears to have been developed from a solution crack in the limestone ledge, but there can be no doubt of its elaboration by man; it is roughly oval with diameters of 5 and 6 inches and a depth of about 3 inches, of which the man-made portion is about half. The petroglyphs are on the southwest-facing slope of the boulder, which is of red sandstone.

Potsherds were collected from this site in two lots. Study showed no significant differences between them, and they were therefore lumped into a single series.

The site at Vasey's Paradise offers little or nothing for excavation. The occupation seems to have been short-lived and/or intermittent, and, in addition, the nature of the terrain would prevent accumulation or preservation of any appreciable amount of cultural debris. There would have been no opportunity for agriculture, and the only clue to aboriginal subsistence at this spot is found in the bedrock mortar and the presence of the lone mesquite bush. In view of what we know of Southwestern ethnology, fishing is not likely to have been the inducement which brought the people to this spot. We must conclude that the existence of a dependable supply of fresh, clear water is the only logical reason for aboriginal occupation of Vasey's Paradise.

Nankoweap, Mile 52. Here the river takes a turn to the east at the point where two streams, Little and Big Nankoweap, have formed deltas and floodplains among three alluvial ridges which extend down from the north-rim side of the canyon. Here we found three localities of aboriginal occupation and one which seems to be of recent, probably white, derivation.

Locality 1 is on the tip of a large sand dune crowning the ridge north of the old channel of Little Nankoweap Creek; at the moment it is barely 10 yards from a large cove or

eddy in the river. Sherds, bits of worked chert, charred rodent bones, and charcoal are weathering out of the dune about 15 feet above the present river level. A few large rocks of non-local origin are present, but they form no recognizable pattern and show no sign of human alteration.

Locality 2 is the surface of a dune area between Big Nankoweap Creek and the alluvial ridge which bounds its floodplain on the south. There are no signs of structures, but the sharp localization of the sherd and chip area argues against detrital origin and suggests that at one time there was indeed an occupation area, possibly consisting of brush shelters or other ephemeral buildings. The sherd area is marked by an abundance of whitened limestone cobbles and many light-colored chert chips.

Locality 3 is on top of the alluvial ridge which, as stated above, borders the floodplain of Big Nankoweap Creek. Here is a line of rocks which give the appearance of having delineated an artificial terrace. In view of what we found at Unkar Creek (see below), this is a definite possibility. However, on the ridge are structures which do not give the impression of having been associated with the other, surely aboriginal, remains; enclosures and lines of quite large rocks appear to outline corrals, traps, or houses not of Indian style. No artifacts were found around these structures.

Locality 4 consists of three series of small masonry structures, possibly granaries, high in the cliff some 400 feet above Locality 2. These sites are noted on U.S. Geological Survey maps. Group A is composed of six structures, all of coursed masonry heavily plastered over with adobe; No. 1 is relatively large and may have served as a dwelling, although this seems unlikely; the others are contiguously constructed under an overhang about 10 feet above No. 1, are much smaller (averaging about 56 inches long and only 18 to 24 inches deep), have barrel-shaped doors, stone lintels, and wooden rod sub-lintels. In No. 4 were corn husks. Group B contains two structures some 30 feet south of Group A; these are like the others, except that in one the door faces the cliff rather than outward onto the ledge; one of them would require a ladder for access — even foot-and-hand holes in the cliff would not serve. Group C comprises evidence of at least five small structures, possibly granaries, in a deep shelter some 75 feet south of Group B; vandals have almost completely destroyed these buildings; two sherds of Tusayan Corrugated were found, but these may have been imported by modern explorers.

Hearsay information on this area may be reported for what it is worth. Members of our party reported that many potsherds are to be found on the floodplain south of the ridge bordering Locality 3. Mr. Otis Marston, historian of the Grand Canyon, told me that some one had reported a "kiln" — whatever that might be — at the mouth of Little Nankoweap Creek. Dr. H. C. Bryant, Superintendent of Grand Canyon National Park, informed us that a skin boat had been found in a cave somewhere in the Nankoweap area. Finally, during our stay I made a hurried reconnaissance up the canyon of Big Nankoweap Creek for about a mile and a half without finding any indications of aboriginal occupation.

Hopi (Ceremonial) Salt Deposit, Mile 56. In the first place, it should be stated that the identification of this particular spot as the Hopi ceremonial salt deposit is tentative inasmuch as we could not confirm it by the testimony of any Hopi who has actually been there. However, several facts indicate that it is indeed the deposit, if not the exact "mine." In the first place, its location agrees with that given in the accounts of Hopi salt-gathering expeditions (Titiev 1937; Simmons 1942). In the second place, it is the only place near the banks of the Colorado River above the junction of the Little Colorado where such mineralization occurs. So states Otis Marston, who knows the immediate environs of the river better than any other man, and to whom I owe thanks for aid in finding the deposit.

It lies on the south-rim bank of the river, directly opposite the mouth of Kwagunt Creek four miles up the Colorado River from its juncture with the Little Colorado. The deposits themselves are formed by the evaporation of mineralized waters which issue from the Bright Angel shale, trickle down over previously deposited travertine, and fall from the edge of a low overhang or cliff into pools on a narrow ledge below. The water now emerges from the lower levels of the shale, but it is apparent from the travertine that they once came from the higher levels of the stratum. Today the salts are being deposited in only one spot (as far as our search revealed), which is about 75 feet above river level (gauged from approximately 35,000 second-feet of flow) and about 100 yards

from the river bank. The overhang itself is some 25 feet long and only 1 or 2 feet deep; its walls are covered with the gleaming white buds into which the salt has crystallized. Some are already hard, while the more recent ones are damp and soft and easily removed. The water tastes flat, although the deposited crystals are definitely salty.

The wall from which the waters are seeping forms one side of a small canyon, at whose head is a basin into which runoff from the bench falls about a thousand feet. Evidence of mineralization in this basin suggests the possibility of other saline deposits higher on the Grand Canyon walls. Between the presently active seep and this basin, the walls of the side canyon consist almost entirely of curtains of travertine, the results of now extinct seeps.

A brief search was made in this tributary canyon for caves, shrines, or other evidences of Hopi ceremonialism, but none was found. Marston told me that, although he had also searched on several occasions, he also had been unsuccessful. At the active seep itself, there were no signs of abstractive or ceremonial activities, recent or ancient.

The question of whether or not this is actually the Hopi ceremonial salt deposit still remains. The uniqueness and location argue that it is. Don Talayesva, a Hopi, says the deposit is in a cave which is subject to Colorado River floods and in which there is a stalagmitic basin and a quantity of sand (Titiev 1937; Simmons 1942:242 ff.). These features are not present in the seep which we found in this area. Furthermore, Talayesva's account speaks of the necessity of roping down to the deposit from the bench along which the Hopis travel from the juncture of the Little Colorado; the seep we found is easily attainable from the first bench above the river. It is perfectly possible, of course, that the Hopis travel along a higher bench, in which case it would indeed be necessary to rope down, since, as far as we could tell, only the lowest bench leads directly to the river, the tributary canyon, and the salt deposit which we found.

However, a detailed examination of Talayesva's account reveals several discrepancies that raise at least a modicum of doubt as to the accuracy of his story. In the first place, the ledge over which it is necessary to rope does not seem to be very high or completely blocking, because in one account (Titiev 1937:252-253) Talayesva says they threw their clothing and packs from above to the lower ledge and, a little later, that "...the older men clambered up to the ledge above, leaving Don to fasten the bags to the rope which they then hauled up." In other words, the older men apparently were able to scale the ledge without the aid of ropes, although later Don seems to have climbed the rope to rejoin the older men on the ledge. This certainly is confused and possibly inconsistent. Furthermore, this account speaks several times of "the ridge from which they were to gather salt," yet it also speaks of the flood which deposited sand and washed out the two horns of salt from the cave. At this point on the river, there is nothing that can be called a "ridge" which could also have been flooded by river waters. The account of travel down the Little Colorado to the main river is also puzzling. Talayesva says that they traveled downstream from Salt Trail Canyon and came to the Blue Springs, while actually these springs lie upstream from that canyon, not between it and the main river (Titiev 1937:250). In the story given to Simmons (1942:238), the Hopi describes looking down Salt Trail Canyon and seeing "the Little Colorado River shining from the bottom"; above the Blue Springs, the Little Colorado carries no water except when floods fill it with dull, red-brown liquid mud, hardly shining. So, in each instance, he seems to imply that Salt Trail Canyon is below the springs, as it actually is.

Whatever the solution to these puzzles eventually turns out to be, it is quite certain that the true Hopi salt deposit must lie in this immediate vicinity and must be a part of the same seep system issuing from the Bright Angel shale. More thorough reconnaissance in the area would certainly resolve many of the present enigmas. For a chemical and (brief) cultural analysis of these salt deposits, see my paper in *Plateau* (October, 1954).

Unkar Creek, Mile 72. This is the only site seen on the trip, which gave promise of value for excavation and detailed study. It lies on the ridge which delimits the north edge of the floodplain of Unkar Creek. The ridge runs WNW to ESE from the red sandstone cliffs of the canyon walls, and the surface of its upper portions is covered with coarse red sand. Its lower portions, however, appear to have been developed on limestone, and

the color contrast between the two areas is most obvious. Furthermore, the vegetation on the lower, limestone sector consists of a heavy growth of catclaw and prickly pear with some mesquite, while the upper portions are almost bare of any plant life except occasional bunches of coarse grass and stunted prickly pear in favored spots.

On the upper, sandstone part are the remains of several series of surface structures. Their walls are both vertical slab and coursed masonry and are barely visible above the surface. There is also a small (about 35 x 20 feet) semicircular terrace which seems to have been a house platform rather than an agricultural structure. The masonry itself is predominantly sandstone, although there are occasional blocks of limestone. Among these structures, no evidence of vandalism was observed, except that two cist-like circles had been dug out; these are attached to two larger (dwelling?) structures but are said to have produced no cultural material.

On the lower, limestone portion of the ridge, there is an extensive and quite intricate system of agricultural terraces and wing dams, the latter constructed to conduct, from garden plot to garden plot, the runoff from the higher elevations of the ridge. The plots measure about 15 x 20 and 6 x 12 feet. It is perfectly apparent that water was guided through a series of these plots lying in vertical steps, at the end of which a wing dam forced the water into another series, often lying at some distance to one side. Although generically these vestiges of agricultural practice are similar to others recorded for this region (Hall 1942; Judd 1926), the details of this ladder-plot and wing-dam system do not seem to have been previously recorded. It is interesting to note that this agricultural area was virtually lacking in surface potsherds, in marked contrast to the abundance found in the sandstone area of house ruins.

Bright Angel Creek, Mile 87-88. At this point, John Wesley Powell and his men, on the first trip through the Grand Canyon, found traces of aboriginal occupation (Bradley 1869; Powell 1869; Dellenbaugh 1908). Thus a definite search on our part was called for, and, after some fruitless wandering, I found the ruins. They are immediately beside the present-day trail that leads from the north end of the suspension bridge. In fact, stones from the aboriginal structures have been used to shore up the edge of the trail itself. There appear to be the remains of three coursed masonry buildings, one of which was approximately 25 feet on one side. Chert chips are plentiful, and a fragment of a unfaced mano of purple sandstone was also found. There were sherds among the ruins and on the talus below them. At that stage of water (about 30,000 second-feet) the site lies about 20 feet above the river. Because of the restricted nature of the canyon at this point, it is inconceivable that any agricultural pursuits could have been carried on in the vicinity.

Deer Creek, Mile 136-137. This site consists of three localities in one embayment of the south wall and a fourth in a ledge about a mile further downstream. The first three are directly opposite Deer Creek Falls and Surprise Valley. The embayment is large, with a sloping floor which is too steep for agriculture and shows no signs of terraces. Locality 1 is a long, shallow shelter, some 100 by 10 feet and about 50 feet above river level, in which is a single rectangular structure of uncoursed masonry laid without mortar; the impression is that this is a non-Puebloan, possibly modern, building, although ancient potsherds of the corrugated variety were found there. Locality 2, a somewhat deeper shelter, is higher and about 250 yards away in the south wall of the embayment; it contains traces of retaining walls, two crude masonry structures, abundant charcoal, and a small area of fire-burned rock, scorched turkey (?) bones, and ash. Cedar bast is also present in quantities, and it is estimated that the nearest attainable growth of cedar is probably 10 miles distant across the river northward. Two sherds of Kana-a Gray were found. The structures are contiguous, approximately 12 x 15 and 12 x 10, with rounded outlines and walls of upright slabs capped with a few precariously balanced horizontal slabs. It seems clear that there has been aboriginal occupation of this shelter but the present condition of the walls suggests later modification. Locality 3 is a small walled-up shelter beneath a large boulder resting on the talus slope west of, and below, Locality 2. The wall is of vertical and horizontal slabs set without mortar; there were a few corn cobs and bones of deer and turkey (?) behind the wall.

Locality 4 is an overhung ledge some 350 feet long, 20 to 30 feet in depth, and about 30 feet above the level of the river. It is completely inaccessible except by boat or by

swimming or wading a considerable distance through the river, a feat which can be performed only at extremely low water. Here are the remains of eight structures built against the back wall of the ledge. Again, as in the other localities, the masonry is not Puebloan. Structure A is 10 x 10 feet, of slabs piled one on top of another, with no mortar, to a height of about four feet. Structure A' has been vandalized, but the remaining evidence indicates that it was once a small enclosure, possibly a granary, of coursed masonry. Structures B to E are also identified as granaries, being too small to be lived in and having small doorways. B has a single upright slab abutting the ledge wall, the other masonry being coursed; its interior is plastered even against the shelter wall, and is flashed outward to the ground, possibly to make it rodent-tight. C has a few more vertical slabs, but its walls are mostly coursed; it has a doorway 24 inches high with a very well-made sill. D is almost completely demolished but seems to have been of upright slabs with no coursed masonry. E is in good condition and entirely of vertical slabs. F is a relatively large structure, some 9 x 9 feet, with a door, one vertical slab, and the rest coursed masonry without mortar. G is so fallen as to be undescrivable. No other cultural material of any sort was found.

Localities Investigated with Negative Results. Reconnaissance at nine other, more or less likely, places failed to produce evidence of aboriginal occupation. At North Canyon (Mile 20-21), a half hour was spent on the talus of the Colorado River canyon and the east side of the tributary canyon; the terrain is quite unsuited for occupation because of its sloping, barren, infertile character. At the mouth of the Little Colorado, where it enters the main stream (Mile 60-61), a half hour was spent in futile search for a site reported by Powell's party (Bradley 1869:61) and by others (H. S. Colton, personal communication). At Elves Chasm (Mile 116-117) three habitable but unused shelters were visited just upstream from the "chasm" itself; this spot is probably unreachable except by boat or possibly through the river at low water. At Tapeats Creek (Mile 133-134) we spent one hour searching up the creek for a distance of one-half to three-quarters of a mile; reports say that there are cliffhouses in this area (Dellenbaugh 1908:240; J. Baumgartner, personal communication), but in the lower reaches there appears to be no chance of occupation owing to the nature of the terrain. Surprise Valley (Mile 136-137), from its lower end at Deer Creek Falls to the Lower Spring about 1-1/2 miles upstream, we covered hurriedly in three hours; much arable land and many dry ridges and alluvial terraces make this a most promising area; nothing was found, although reports from our own party indicated that there are structures, including a possible granary, in the valley (J. Rigg and J. Baumgartner, personal communication). About 500 yards upstream from Deer Creek Locality 4 (see above) and on the same side of the river, there is a huge cave, with a mouth at least 40 feet high and 75 feet wide, which extends into the canyon wall at least 175 feet; the floor is completely dry and probably above all flood waters, but there was no sign of aboriginal or any other occupation. At Kanab Creek (Mile 143-144), the steep talus of both main and tributary canyons precludes occupation sites. In the large embayment on the south side of Lava Falls (Mile 179-180), although there are warm springs, habitable terrain, and even possibly some arable land, no sign of occupation was found in a search of more than an hour. Ten minutes were spent at Spring Creek (Mile 204-205), but no work was possible, although the place looked more promising than many others. At Diamond Creek (Mile 225-226), which is connected with the Peach Springs drainage and where there are known archaeological sites, nearly an hour's search failed to disclose aboriginal occupation either on the ridges or on the floodplain, although it should be pointed out that my time on the ridge was very limited and that evidences on the floodplain would most certainly have been destroyed long ago.

* * * * *

If one may be permitted to generalize after so hasty and restricted a survey, the archaeological potential of the near reaches of the Colorado River from Lees Ferry to Pierce Ferry may be divided into several areal segments of very unequal promise. From Paria Creek (Lees Ferry) to Nankoweap through the Marble Gorge, the canyon walls bound the river so closely as to make aboriginal subsistence, assuming the non-utilization of fish, a virtual impossibility. Even descent to the water, except in a few places, is both difficult and hazardous, and for much of this distance it is completely

impossible. Yet there is the site at Vasey's Paradise, and there are possibly other such isolated localities where, for some reason not presently apparent, the people settled, if only briefly, on the banks of the river.

From Nankoweap to Unkar Creek, the canyon is quite open, the river accessible, and a floodplain present along both the main river and its tributaries. Subsistence opportunities would be good to excellent.

From Unkar to the Bright Angel sector, the canyon again closes in. Access is difficult or impossible, and there are no places where occupation or agriculture would have been feasible.

From Bright Angel Creek to Lava Falls, the river runs through the Granite Gorge with only an occasional break into the sedimentary formations. The crystalline rocks of the river trough make for a very confined channel and for narrow and steep entrances of the tributaries which reach its shores. Many of these tributary valleys undoubtedly contain aboriginal remains in the stretches back from the main river. But along the river, even those places which could provide occupation sites and subsistence opportunities seem not to have been utilized in aboriginal times, or at least have left no obvious remains.

Downstream from Lava Falls, the canyon again opens out, and there are quite a few large tributary canyons, most of them entering from the north rim side. Powell and others have noted that the Indians occupied these valleys, and archaeological sites have been found and investigated in some of them. As we were unable to stop for long along this stretch of the river, we can say little as to the archaeological potential.

CERAMICS

Certain implications and even more problems have developed from analysis of the sherds collected during the reconnaissance. It must be borne in mind that all statements are relative to the validity of very small samples and are offered on that basis as "current status of research," not as established conclusions.

TABLE 1 AND DISCUSSION

Tusayan White Ware. The scarcity and localization of Kana-a Black-on-white is surprising but, being altogether typical specimens, these sherds are suggestive as to the cultural and/or temporal associations of the Unkar site. It may be of significance that two of these sherds were found in the area of agricultural terraces. A similar restriction of distribution is also noted for Black Mesa Black-on-white, a fact which makes its quantitative representation at Unkar all the more suggestive. Of the two Shonto Black-on-white sherds, one has corrugations of Tusayan style and Dogoszhi painting, while the other has Moenkopi corrugations and Sosi painting. It should be mentioned that despite their obvious relationships in style of design to the pottery of the Virgin and Johnson series, close neighbors to the west, both Dogoszhi and Sosi Black-on-white, in technique of manufacture, belong definitely with the Kayenta series. Furthermore, one bowl sherd from Unkar with a Sosi style of design has a marked crackle in its heavily floated interior surface; this gives it a strong resemblance to certain Mesa Verde specimens.

The quantity of Flagstaff Black-on-white probably establishes the date of the cultural climax of aboriginal occupation of the area as far as our sites demonstrate. Two sherds of this type from Nankoweap Location 1 show in their cores the results of an oxidizing firing atmosphere, although their surface colors are dark gray; this suggests uncontrolled firing conditions and/or multiple firing. Another sherd of the same type and from the same site was evidently fired in a very hot fire because its paste is highly vitrified; furthermore, no tempering material is apparent in the paste. Three Flagstaff Black-on-white bowl sherds from Unkar are decorated on both interior and exterior surfaces. All sherds listed under Slipped White Ware, with the exception of one in Sosi design from Nankoweap Location 2, are of Flagstaff style of design; the fact that these are slipped might suggest relationship to types of the Virgin series; but Flagstaff style has not, to my knowledge, been found in the Virgin area, and the pure quartz (?) temper of the present sherds throws further doubt on any western affiliations.

All sherds of Tusayan White Ware in our collection derive from bowls, except the following from jars: 1 Dogoszhi from Unkar; 12 Flagstaff (3 from Unkar, 6 from Nankoweap

Table 1
SHERD ANALYSIS BY SITE

SITE	VASEY'S PARADISE NO. 1	VASEY'S PARADISE NO. 2	NANKOWEAP NO. 1	NANKOWEAP NO. 2	UNKAR	BRIGHT ANGEL	DEER CREEK	
MUSEUM of NORTHERN ARIZONA SITE NUMBERS	NA 5456	NA 5456	NA 5596	NA 5597	NA 5599	NA 5602	NA 5600	
TUSAYAN WHITE WARE			5		11	2		18
Kana-a B/W					6			6
Black Mesa B/W				1	12			13
Shonto B/W					2			2
Dogoszhi B/W		1			6	2		9
Sosi B/W	5	2	1		7	3		18
Flagstaff B/W			8	10	25			43
								109
SLIPPED WHITE WARE								
Sand tempered			5	2				7
No (?) temper			1					1
								8
SAN JUAN RED WARE								
Deadman's B/R			9	7	8			24
Citadel Poly. style				1				1
								25
TSEGI ORANGE WARE				2	2	2		6
Medicine B/R				1	1			2
Tusayan B/R	5	7	8	1	27	1		49
Citadel Polychrome			4	1	5			10
Tusayan Polychrome				1				1
								68
TUSAYAN GRAY WARE	17	2	15	3	7	6	6	56
Tusayan Corrugated	16	11	2	6	10	3		48
Moenkopi Corrugated	11	12	17	6	23	12	7	88
								192
NORTH CREEK GRAY	2			2				4
? ? Tooled				1				1
								5
	56	35	75	45	152	31	13	407

Location 2, 3 from Nankoweap Location 1); 2 unidentified (1 from Unkar, 1 from Nankoweap Location 1). One Black Mesa Black-on-white sherd from Unkar has a hole 3 mm. in diameter drilled from its exterior to its interior surface at a point 9 mm. down from its rim. Two of the unidentified Tusayan White Ware sherds are disc shaped and their peripheries have been rubbed; possibly these are potting scrapers.

San Juan Red Ware. As stated elsewhere (*The Pueblo Ecology Study*), I believe that the distinction between the sand- or rock-tempered, unslipped red ware and the sherd-tempered, slipped red ware, both of northern Anasazi cultural affiliations, is a valid and important one (Colton 1952:87). I have used it here.

The type Deadmans Black-on-red is usually considered an early one. Yet in our collections we find it in considerable quantities, relatively speaking, associated with Flagstaff Black-on-white, and at one site (Nankoweap Location 1) it is associated with nothing earlier than Sosi Black-on-white, which is typical of the full Pueblo II cultural complex. There is, thus, the strong suspicion that in this region Deadmans Black-on-red was in use until a later date than in other areas, the Flagstaff region, for example, where its

dating was originally worked out. Work in the Monument Valley-Comb Ridge area has also emphasized the importance and some of the peculiarities of this pottery type (*The Pueblo Ecology Study*). One bowl sherd from Nankoweap Location 2 has a hole drilled 22 mm. down from its rim. There are four jar sherds (3 from Nankoweap Location 2 and 1 from Unkar).

The finding at Nankoweap Location 2 of a single sherd of red ware with a Citadel Polychrome (Tsegi Orange Ware) style of design but with a typical sand-tempered San Juan Red Ware paste is of considerable importance. The discovery of such a combination has not been unexpected (Colton, personal communication) since the design parallelism of the two wares has grown more and more apparent as information has increased through the years (Reed 1944; Colton 1946:22-23; Colton 1952:87). It is quite evident that we have here an instance of convergent design development upon two persistently distinct traditions of manufacturing technique. In the study of ceramics for the purpose of cultural and culture-historical interpretation, both style of design and technique of manufacture have their uses, but often these are not the same and turn out to be interestingly independent variables (Taylor, *The Pottery of Tel Halaf*, MS.). This fact stands to the favor of the ceramicist group known as "splitters" as opposed to the "lumpers."

Tsegi Orange Ware. When I began to work on these sherd collections, I had some very real doubts as to the identification, as "sherd temper," of those so-called "white angular fragments" found in the paste of this ware. Through the kindness of Dr. Colton, of the Museum of Northern Arizona, I was able to obtain samples of these fragments from ten of the type sherds from the Museum's type collections. These were submitted to Miss Anna O. Shepard, of the Carnegie Institution of Washington, and through her kindness and interest underwent a revealing analysis. Miss Shepard found that the particles were definitely not tuff (my own candidate) and that they "show no features that are not typical of sherd particles" (personal communication, July, 1954). That would seem effectively to quiet the doubts which have afflicted not a few of us on this score.

There is nothing unusual about either the distribution or quantities of Tsegi Orange Ware. Tusayan Black-on-red is rather common. It is noted that the distribution of Citadel Polychrome is the same as that of Flagstaff Black-on-white, its usual companion type, and also of Deadmans Black-on-red. This circumstance emphasizes the puzzle concerning the latter type. The finding of only one sherd of Tusayan Polychrome strengthens the impression that these sites were abandoned shortly after the Pueblo III cultural complex began to develop, probably very little later than 1150 A.D.

All sherds of Tsegi Orange Ware are derived from bowls except the following: 2 seed jars (1 from Vasey's Paradise and 1 from Unkar) and possibly several jar sherds from Nankoweap Location 1. From Nankoweap Location 1, a sherd of Tusayan Black-on-red shows rubbing all around, while only the "base" of a pear-shaped Citadel Polychrome sherd from Unkar is rubbed. From Unkar, there are one complete and one broken disc of Tusayan Black-on-red. One sherd of Medicine Black-on-red from Nankoweap Location 2 has a red stripe of body slip on its exterior 16 mm. below the rim; this is an unusual feature.

Tusayan Gray Ware. None of the sherds which have been identified as Tusayan Corrugated, although they display indented coils, can properly be said to be classically "exuberant." In general, the indentations are shallow and weak, and it is often a real problem to separate sherds to be designated as Tusayan from those to receive the name Moenkopi. In the tabulations, then, the two extremes of the range of variation have been given the type names, while the intergrades and uncertain sherds have been listed merely as Tusayan Gray Ware.

Not a few sherds have straight, unindented coils of a high-standing form, something like those found on Kana-a Gray vessels. However, it is quite certain that, temporally at least, these sherds do not represent true Kana-a Gray but are some variant of the Tusayan-Moenkopi Corrugated tradition, the real significance of which escapes us in the present state of our knowledge. Another varietal difference is one in which the smeared, shiplap coils of typical Moenkopi construction have been pinched up into ridges running diagonally across the planes of the coils. This is not a true indentation, which is created as the coils are set during manufacture, but is an imitation adapted to smeared coils.

Sherds of both these varieties have been listed merely under Tusayan Gray Ware, rather than under more specific names. Of the first, there were 7 at Vasey's Paradise, 2 at Deer Creek, and 1 at Unkar, the last example showing broad and Kana-a-like coils above a row of definitely indented coils. Of the second variety, 10 came from Nankoweap Location 1 and 3 from Nankoweap Location 2.

There are a (very) few sherds made of the same materials as the rest of the Tusayan Gray Ware and by the same techniques but with no remaining vestiges of construction coils and with an extremely rough and rugose surface that resembles Kiet Siel Gray. But it seems hardly probable that these sherds are to be equated temporally, or even culturally, with Kiet Siel Gray. It is more likely that they are rather extreme examples of the variation within an unstable pottery tradition which includes, most typically, Tusayan and Moenkopi Corrugated. Two sherds of this variety were found at Nankoweap Location 1 and one at Unkar.

Considerable variation is also encountered in the surface and paste color of the Tusayan Gray Ware sherds. Within our Grand Canyon collection, there are many more sherds with surface coloring of reds, tans, and buff-grays than in the usual samples from sites in the Kayenta or Chaco regions. It may be significant in this regard also that the paste of a considerable number of these sherds is vitrified, evidently by extremes of heat during firing, while in others the paste is crumbly and weak. However, we cannot assume from either of these conditions that the variable nature of the gray ware is entirely due to uncontrolled or poorly controlled firing conditions. There is also the possibility that the color variations are due to the nature of the clays from which the pots were made. Dr. Colton has shown that an increased amount of iron in the clay, even when fired in a good reducing atmosphere, will produce surface colors of increased darkness, dark gray to black in some cases, dark red to reddish black in others, depending upon the type of iron involved (personal communication). More work on this problem is required and might bring forth some important results.

Another problem concerning Tusayan Gray Ware became apparent during the course of analysis. Certain sherds showed that their interiors (all are jar forms) had been "floated" during the process of finishing the pot. It is inferred that the interiors had been rubbed with water, bringing the finer clay particles to the surface and forming a discernible deposit that covered both paste and protruding temper. This is called a float and not a slip, because it was developed by manipulation of the paste itself, not applied as a separate entity. Floating of this type is very common on the early types of Tusayan Gray Ware, particularly on Lino Gray, and was used to prepare a relatively smooth surface on the interior of Lino Black-on-gray bowls. It was also noticed that the floated sherds are harder and more brittle than others: whether from firing or from the composition of the clay is unknown at present.

The remainder of the sherds (and there do not seem to be any intergrades between these characteristic extremes) were finished by scraping, apparently when the clay was fairly dry so that striations were shallow and clean and no float was formed. Also the paste was such that few if any tempering particles extruded from the surface.*

TABLE 2 AND DISCUSSION

It is at once apparent that the floating technique was used much more in the manufacture of what is called Moenkopi Corrugated than in that of Tusayan, although the reversal at the Unkar site is puzzling and inexplicable at present. Some chronological difference may be indicated, inasmuch as Moenkopi Corrugated is generally later than Tusayan. However this may be, the two types of interior finish seem to be consistently, and thus significantly, associated with other features of Tusayan Gray Ware. More work will have to be done to derive meaning from the facts that have been set down here for the record. (For a later discussion, see *The Pueblo Ecology Study*.)

Handles were found on four sherds of this ware. All are vertical and were merely

* Since this was written, Anna Shepard's book, *Ceramics for the Archaeologist*, has appeared. In this work she illustrates in Figure 13, p. 189, what I interpret to be examples of the two finishes mentioned in this paragraph: that which I have called "floated" she identifies as "wiped" and says that it is accomplished by finishing in a plastic state by the use of the hand or a soft, yielding tool; that which I have termed "scraped" she identifies as having been finished when "leather hard" by the use of a scraping tool.

Table 2
SCRAPED AND FLOATED INTERIORS OF TUSAYAN GRAY WARE JARS

		TUSAYAN CORRUGATED	MOENKOPI CORRUGATED	TUSAYAN GRAY WARE
VASEY'S PARADISE	SC	22	17	14
	FL	5	6	5
NANKOWEAP NO. 1	SC	2	14	15
	FL	0	3	0
NANKOWEAP NO. 2	SC	6	3	3
	FL	0	3	0
UNKAR	SC	6	6	5
	FL	4	17	2
BRIGHT ANGEL	SC	1	10	5
	FL	2	2	1
DEER CREEK	SC	—	5	4
	FL	—	2	0
TOTALS	SC	37	55	46
	FL	11 or 23 %	33 or 38 %	8 or 17 %

pushed onto the vessel wall, not riveted. One is on a sherd of unidentified type from Vasey's Paradise. Three come from Unkar: one is formed by three contiguous, oval fillets, 27 mm. wide, on an unidentified sherd; one is formed of a single oval fillet, 17 mm. wide, also on an unidentified sherd; one on a Moenkopi Corrugated sherd is a strap of 22 mm. maximum width with a chevron-filled zigzag pattern incised vertically.

The examples of North Creek Gray, one a large rim sherd from Vasey's Paradise, the other a disc from Nankoweap Location 2, are typical of this southwestern Utah type. The only puzzling thing is that there are not more of them. A single specimen of tooled-surface gray ware has been tabulated under this ware, although there is considerable doubt that it really is of the same tradition. Its paste is extremely fine grained with almost no temper (although there are some very small, black particles) and is quite vitrified, brittle, and strong, looking like shale. It retains traces of the original coils which were first indented, then pinched nearly smooth, and finally tooled sharp again.

Attention should be drawn to the fact that no Cohonina or Sinagua pottery was found in our collections. In fact, foreign sherds of any sort, except those related eastward, are remarkably few. This is at variance with the situation which Hall (1942) encountered in the Walhalla Glades, which lie on the southernmost tip of the Kaibab Plateau immediately above our Nankoweap and Unkar sites. He found small amounts of Utah and Cohonina sherds, the former gradually increasing until they surpassed the Tusayan wares. The fact that our sample is very small may account for this difference, although I cannot believe that it accounts for the complete absence of northern and western sherds.

An interesting and probably significant comparison may be made between the decorated and the nondecorated or so-called utility wares in our collections from the Grand Canyon. The former show no more than the usual and expectable range of variation and are identical with specimens from the Kayenta-Monument Valley region across the

Colorado River to the east. The nondecorated wares, particularly Tusayan Gray Ware, on the other hand, show great variation. Since our Grand Canyon collections contain few or none of the early types of either decorated or nondecorated wares, it is logical to assume that neither was originated and developed in this area. We are thus dealing with an area that was quite certainly peripheral to other centers of pottery-making with longer ceramic traditions. Yet we find one series of wares very stable, while the other ware is variable. How do we explain this situation?

The very variability of Tusayan Gray Ware suggests that it was made locally in imitation of a foreign product which, for some reason, was not imported from the more nuclear area. Whether the color and texture differences can be attributed to firing or to clay characteristics does not affect this inference. The decorated wares, on the other hand, resemble so exactly the eastern wares in technique of manufacture, style of design, and range of variation that they may be considered direct imports, not local copies.

SUMMARY AND CONCLUSIONS

From this brief and hurried survey, it is concluded that there was very little aboriginal occupation of the near reaches of the Colorado River in the stretch between Lees Ferry and Lake Mead. What little there was shows relationship with the occupation of the north rim which, in turn, is closely related to the culture of the Kayenta-Monument Valley region. There seems to have been little or no cultural relation with peoples living north, west, or south—and apparently very little contact at all. The occupation of the bottom of the Canyon evidently started later than that of the rim and certainly was less intense. But it is very possible that it lasted longer and that the refuge offered by the Canyon, slight as it might have been, was utilized in the retreat which Hall has postulated for the north-rim Anasazi in the face of increasing pressure from the west (1942). Hall's view that this abandonment occurred around 1150 A.D. is well supported by the data from our sites.

Of course, any occupation of the banks of the Colorado within its canyon system must have been strongly influenced by the stringent conditions of the environment itself. Recurring floods would have dissuaded the people from any permanent settlement on the lower terraces and floodplains. And in any event, even had they lived there, their remains would long since have been washed down the river. Animal life of any sort seems to be very scarce along the water's edge: our trip failed to disclose anything larger than a rabbit, although a few tracks of deer and other animals were seen. At favored spots, there are today growths of mesquite and catclaw, redbud and willow, and in the lower sectors several kinds of desert plants which could have provided something toward aboriginal living. But in general vegetation is sparse, harsh, and far from productive. Fish are also said to be scarce.

There is little doubt that agriculture could have been, and actually was, practiced on a few favored floodplains and tributary deltas. We have the corn husks and the "granaries" at Nankoweap to support this possibility. But what about the small granary-like structures at Deer Creek? At that spot, not only was there no arable land, but the site itself is inaccessible except over or through water! Could it be possible that those structures, and by extension some of the other so-called "granaries," were made to store foodstuffs brought from the settlements on the rim? Might they have been built to protect imported food and thus to permit occupation of this barren region?

If this is logically possible, we still must find a cultural reason for occupation of the canyon bottom. What were the people doing down there? That they went there to fish goes against our ethnographic information, although conceivably customs may have changed through time. The presence of a bedrock mortar at Vasey's Paradise offers another clue, although only at Unkar are there stands of mesquite or catclaw which would support even a small population. Limited agriculture, with an opportunity to take advantage of a longer growing season in the canyon bottom, could have induced a few people to take up temporary abode. Hunting, except as a side line, would hardly draw people who could hunt on the fabulously game-rich north rim. We have little information on mineral resources or their utilization, but it seems unlikely that these factors drew people into the canyon.

Could it be possible that the occupation was entirely one of refuge from the activities of hostile neighbors? Hall has suggested that the Tusayan Ruin, on the south rim in what is now the Grand Canyon National Park, was a way-station in the abandonment of the Arizona Strip by Anasazi people. Were the sites at the bottom of the canyon, in their turn, previous way-stations in that movement? In the absence of any other reason for the occupation, this explanation seems, at the moment, to be the most acceptable one. But even here, there are factors which need explanation. For one thing, the canyon-bottom sites were occupied from Pueblo II times (Pueblo I in the case of Unkar) until early Pueblo III times. This is a long retreat! It is possible, of course, that the pressure and response were gradual, and surely there is an increase of population toward the later years of occupation. It is conceivable that in pre-pressure times there had been a sporadic and scattered occupation for special reasons such as the longer growing season, an occasional meal of mesquite, or possibly even a fish dinner. With increasing pressure, the people moved into the canyon while still earning much of their living on the rim, bringing food down to be stored in "granaries." When even this was no longer possible, the people, unable to make a complete living in the canyon and unable to return safely to the north rim, moved out completely and forever.

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