Archeological Survey
of the Big Sandy Reservoir Area, Southwestern Wyoming

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John L. Champe
# CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF FIGURES</td>
<td>viii</td>
</tr>
<tr>
<td>LIST OF PLATES</td>
<td>viii</td>
</tr>
<tr>
<td>PREFACE</td>
<td>ix</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>xi</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Geographic Setting</td>
<td>1</td>
</tr>
<tr>
<td>History of Area</td>
<td>5</td>
</tr>
<tr>
<td>History of Archeological Work</td>
<td>6</td>
</tr>
<tr>
<td>The Big Sandy Reservoir Area</td>
<td>8</td>
</tr>
<tr>
<td>SUMMARY OF WORK ACCOMPLISHED</td>
<td>10</td>
</tr>
<tr>
<td>Methods of Investigation</td>
<td>10</td>
</tr>
<tr>
<td>Work Accomplished</td>
<td>10</td>
</tr>
<tr>
<td>NOTE ON CHRONOLOGY</td>
<td>13</td>
</tr>
<tr>
<td>RECONNAISSANCE UNITS</td>
<td>16</td>
</tr>
<tr>
<td>Summary Statement</td>
<td>16</td>
</tr>
<tr>
<td>Reconnaissance Unit 1</td>
<td>18</td>
</tr>
<tr>
<td>Reconnaissance Unit 2</td>
<td>19</td>
</tr>
<tr>
<td>Reconnaissance Unit 3</td>
<td>20</td>
</tr>
<tr>
<td>Reconnaissance Unit 4</td>
<td>22</td>
</tr>
<tr>
<td>Reconnaissance Unit 5</td>
<td>24</td>
</tr>
<tr>
<td>Reconnaissance Unit 6</td>
<td>26</td>
</tr>
</tbody>
</table>

iii
<table>
<thead>
<tr>
<th>SITES</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>48SU1</td>
<td>28</td>
</tr>
<tr>
<td>48SU2</td>
<td>28</td>
</tr>
<tr>
<td>48SU3</td>
<td>30</td>
</tr>
<tr>
<td>48SU4</td>
<td>31</td>
</tr>
<tr>
<td>48SU5</td>
<td>31</td>
</tr>
<tr>
<td>History of Work</td>
<td>32</td>
</tr>
<tr>
<td>Stratigraphy</td>
<td>33</td>
</tr>
<tr>
<td>The Artifacts</td>
<td>33</td>
</tr>
<tr>
<td>The Excavations</td>
<td>35</td>
</tr>
<tr>
<td>Area A</td>
<td>35</td>
</tr>
<tr>
<td>Area B</td>
<td>36</td>
</tr>
<tr>
<td>Fireplaces</td>
<td>38</td>
</tr>
<tr>
<td>Feature 102</td>
<td>38</td>
</tr>
<tr>
<td>Feature 109</td>
<td>39</td>
</tr>
<tr>
<td>Feature 123</td>
<td>40</td>
</tr>
<tr>
<td>Feature 139</td>
<td>41</td>
</tr>
<tr>
<td>Feature 163</td>
<td>41</td>
</tr>
<tr>
<td>Burned Areas</td>
<td>43</td>
</tr>
<tr>
<td>Test Pit</td>
<td>43</td>
</tr>
<tr>
<td>Summary and Discussion of 48SU5</td>
<td>43</td>
</tr>
<tr>
<td>48SU6</td>
<td>45</td>
</tr>
<tr>
<td>48SU7</td>
<td>46</td>
</tr>
<tr>
<td>48SU102</td>
<td>47</td>
</tr>
<tr>
<td>48SW1</td>
<td>48</td>
</tr>
<tr>
<td>48SW2</td>
<td>48</td>
</tr>
<tr>
<td>Classification</td>
<td>48SW3.</td>
</tr>
<tr>
<td>Classification</td>
<td>48SW4.</td>
</tr>
<tr>
<td>Classification</td>
<td>48SW6.</td>
</tr>
<tr>
<td>Classification</td>
<td>48SW104.</td>
</tr>
</tbody>
</table>

**DISCUSSION OF RECONNAISSANCE AREAS AND SITES.**

**THE ARTIFACTS**

<p>| Classification |.Materials. | 54 |
| Distribution | 55 |
| Fragments Modified By Use. | 55 |
| Bifacial Blocks. | 56 |
| Flakes | 56 |
| Discussion. | 56 |
| Fragments With Prepared Edges. | 56 |
| Unifacial Retouch: Flake Scrapers | 57 |
| Bifacial Retouch: Flake Knives. | 57 |
| Cores. | 57 |
| Choppers Without Specially Prepared Edges. | 58 |
| Choppers Made From Cores | 58 |
| Flake Choppers | 58 |
| Slab Chopper | 59 |
| Discussion. | 59 |
| Choppers With Specially Prepared Edges | 59 |
| Knives | 60 |
| Pointed Tip, Rounded Base. | 60 |
| Rounded At Both Ends | 60 |</p>
<table>
<thead>
<tr>
<th>Item</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small Knives</td>
<td>60</td>
</tr>
<tr>
<td>Slender, Thick Knives</td>
<td>60</td>
</tr>
<tr>
<td>Unclassified</td>
<td>61</td>
</tr>
<tr>
<td>Discussion</td>
<td>61</td>
</tr>
<tr>
<td>Discussion of Choppers, Cores, and Knives</td>
<td>61</td>
</tr>
<tr>
<td>Scrapers</td>
<td>62</td>
</tr>
<tr>
<td>End Scrapers</td>
<td>63</td>
</tr>
<tr>
<td>Side Scrapers</td>
<td>63</td>
</tr>
<tr>
<td>End-and-Side Scrapers</td>
<td>63</td>
</tr>
<tr>
<td>Discussion</td>
<td>63</td>
</tr>
<tr>
<td>Pointed Unifacials</td>
<td>64</td>
</tr>
<tr>
<td>Points</td>
<td>64</td>
</tr>
<tr>
<td>Plain Lanceolate, Convex Base (Strong NAb1)</td>
<td>65</td>
</tr>
<tr>
<td>Lanceolate, Straight Sides, Concave Base</td>
<td>65</td>
</tr>
<tr>
<td>Triangular, Straight Base, Side Notched (Strong NBal)</td>
<td>65</td>
</tr>
<tr>
<td>Triangular, Straight Base, Side and Base Notched</td>
<td>66</td>
</tr>
<tr>
<td>Plain Shoulder, Straight Stem, Concave Base</td>
<td>66</td>
</tr>
<tr>
<td>Plain Shoulder, Expanding Stem, Concave Base (Strong Sca3)</td>
<td>67</td>
</tr>
<tr>
<td>Plain Shoulder, Straight Stem, Convex Base (Strong Sba)</td>
<td>68</td>
</tr>
<tr>
<td>Expanding Stem, Shouldered, Straight or Convex Base (Strong Sca1, Sca2)</td>
<td>68</td>
</tr>
<tr>
<td>Expanding Stem, Barbed, Convex Base (Strong Scbl)</td>
<td>68</td>
</tr>
<tr>
<td>Point Fragments</td>
<td>69</td>
</tr>
</tbody>
</table>
THE ARTIFACTS continued

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discussion of Points.</td>
<td>69</td>
</tr>
<tr>
<td>Grinding Slabs</td>
<td>71</td>
</tr>
<tr>
<td>Mullers</td>
<td>72</td>
</tr>
<tr>
<td>Subrectangular Outline, Subrectangular Cross Section</td>
<td>72</td>
</tr>
<tr>
<td>Irregular in Outline</td>
<td>72</td>
</tr>
<tr>
<td>Wedge-shaped</td>
<td>73</td>
</tr>
<tr>
<td>Discussion of Grinding Slabs and Mullers</td>
<td>73</td>
</tr>
<tr>
<td>Problematical Specimen: Possible Grooved Hammerstone</td>
<td>77</td>
</tr>
<tr>
<td>Articles of White Manufacture</td>
<td>78</td>
</tr>
<tr>
<td>Discussion of Artifacts</td>
<td>79</td>
</tr>
<tr>
<td>DISCUSSION AND CONCLUSIONS</td>
<td>81</td>
</tr>
<tr>
<td>REFERENCES CITED</td>
<td>88</td>
</tr>
<tr>
<td>PLATES</td>
<td>93</td>
</tr>
</tbody>
</table>
FIGURES

1. Map of Wyoming, Showing the Big Sandy Reservoir and Other Places Mentioned in the Text 2
2. Map of the Big Sandy Reservoir Area, Showing Reconnaissance Units and Sites 15
3. Site 48SU5, Area A: Plan of Excavations 37
4. Site 48SU5, Area A: Cross Section of Hearth, Feature 139 42

PLATES
(The plates are grouped at the back)

I. Scenes in the Big Sandy Reservoir Area. 95
II. Site 48SU5. 97
III. Site 48SU5: Fireplaces in Area A. 99
IV. Surface Sites in the Reservoir Area. 101
V. Choppers and a Core. 103
VI. Knives. 105
VII. Scrapers and Points. 107
VIII. Points. 109
IX. Grinding Implements and Problematical Specimen. 111
X. Cross Sections of Specimens Shown in Plate IX. 113
This report describes the results of an archeological salvage project carried out by the University of Nebraska State Museum in the Big Sandy Reservoir area, southwestern Wyoming, in the Summer of 1953. It is designed as a contribution to studies of the prehistory of western Wyoming, an area which as yet is little known archeologically.

The Big Sandy archeological project was necessitated by the building of the Big Sandy Dam by the U.S. Bureau of Reclamation and the subsequent filling of the Big Sandy Reservoir. The archeological project was undertaken as a part of the Inter-Agency Archeological Salvage Program, a cooperative plan being carried on by the Smithsonian Institution; the National Park Service and the Bureau of Reclamation, Department of the Interior; the Corps of Engineers, Department of the Army; and numerous State and local agencies. The Salvage Program was formulated through a series of interbureau agreements for the purpose of recovering archeological and paleontological remains which otherwise would be lost as a result of the numerous projects for flood control, irrigation, hydroelectric power, and navigation improvements in the river basins of the United States. The National Park Service has served as liaison between the various agencies and also has had responsibility for budgeting
costs of the Federal part of the program from funds provided in the annual Department of the Interior appropriations. Through cooperative agreements with the National Park Service, Federal funds have been made available as well to State and local agencies to supplement their own resources and aid them in the contributions to the program.

The Big Sandy archeological project was initiated by the National Park Service and the Smithsonian Institution, after notification by the Bureau of Reclamation of the building of the Big Sandy Dam. The major work was done in 1953 by the University of Nebraska State Museum, through a cooperative agreement with the National Park Service and with the active cooperation of the Smithsonian Institution and the Bureau of Reclamation. The final report has been prepared and published under the auspices of the University of Nebraska Laboratory of Anthropology. The Big Sandy archeological project thus has been, in the fullest sense, a cooperative inter-agency enterprise.

The reader wishing to gain a summary picture of the Big Sandy archeological project and its results without going through the detailed technical sections of this report, may do so by reading the Introduction, Summary of Work Accomplished, Summary Statement at the beginning of the section on Reconnaissance Units, Discussion of Reconnaissance Units and Sites, and the Discussion and Conclusions.
ACKNOWLEDGEMENTS

It was as Curator of Anthropology at the University of Nebraska State Museum that I carried out the Big Sandy field project in 1953. Dr. C. Bertrand Schultz, Director of the Museum, carried the administrative load in arranging for our cooperative agreement with the Park Service, and later in seeing to it that the requests from the Big Sandy Field Party, out on the desert eight hundred miles away, were attended to quickly. I am grateful to him and to his Technical Assistant, Miss Mary Louise Hanson, for this constant strong administrative support.

The agreement between the Museum and the National Park Service, which made the Big Sandy project possible, was effected through the efforts of a number of persons on the staff of the latter organization, in particular Dr. Gordon C. Baldwin, then Archeologist, and Mr. Merrill Mattes, Historian, at the Region Two office in Omaha, and Dr. John M. Corbett, Archeologist at the Headquarters of the Park Service in Washington. It is a pleasure to acknowledge the friendly support of these gentlemen and their organization.

I am especially grateful to the personnel of the Bureau of Reclamation who provided assistance, advice, and material aid, and made us at home in the Eden Valley. Mr. Russell C. Borden, Resident Engineer at the Bureau of Reclamation Camp at Farson, merits special mention for his readiness with help, advice, hospitality, and friendship. Mr. Palmer B. DeLong, Area Engineer at the Upper Green River Area office in Rock
Springs, Wyoming, gave our work strong support, and Mr. Hensley of the same office also assisted us.

Residents of the Eden Valley gave us a great deal of help. John Coppes of Farson made available his intimate knowledge of the area and escorted us on a number of tours to sites which otherwise would have been impossible to find. He and Mrs. Coppes extended us many kindnesses which we remember with gratitude. Information on sites and details on collections also were provided by John Hendreschke, Keith Webster, and Guy Payton, all of Farson; Mr. and Mrs. James K. Harrower of Pinedale, whose pleasant home and hospitality will not soon be forgotten; and Mr. Borden and others on the Bureau of Reclamation staff. Much of this information is to be reported in a later paper on archeological evidences in the Bridger Basin outside the Big Sandy Reservoir area.

The Missouri Basin Project of the River Basin Surveys, Smithsonian Institution, put at our disposal field equipment which played a major part in the effectiveness of our reconnaissance. This equipment included one vehicle, two tents, two cameras, and surveying instruments. Later, during the preparation of the final report the final plates were prepared for reproduction and the specimens and notes from the work of the Missouri Basin Project at Big Sandy in 1952 were turned over to me. I am most grateful to Mr. Robert L. Stephenson, Chief of the Project, and Mr. Q. Hubert Smith, Archeologist in Charge, for these courtesies. These men and their staff have been a heartening source of cooperation and support throughout our
field work. Also I am indebted to Dr. Frank H. H. Roberts, Jr., Director of the River Basin Surveys, for permission to use material from the preliminary appraisal report of the archeological resources of the Big Sandy Reservoir by George Metcalf, which is cited frequently in the present report.

This report has been prepared under the auspices of the Laboratory of Anthropology of the University of Nebraska, and I am grateful to Dr. John L. Champe, Chairman of the Department of Anthropology, for the use of the facilities of the laboratory and for his advice and help. A number of students in the Department handled the cataloging of the specimens, in particular Thomas M. Newman, W. Raymond Wood, and Laurence E. Ackland. I am indebted further to Wood for his skill and patience in the preparation of the figures, and to Thomas Reed for assistance in artifact photography. Messrs. Roger T. Grange, Jr., and Raymond S. Price, Jr., of the Nebraska State Historical Society, kindly identified the artifacts of White manufacture in the Big Sandy collection. Mrs. Kay M. Readinger, Secretary of the Department of Anthropology, checked several drafts for stylistic consistency, and coped patiently, and not always successfully, with the author's arbitrary and frequently irrational notions as to what constitutes good literary style. My wife, Beth Ogden Davis, assisted in most of the proofreading and gave substantial advice on matters of style. I am especially grateful to Mr. Franklin Fenenga of the University of Nebraska State Museum and Mr. Richard P. Wheeler of the River Basin Surveys, who gave a good deal of their time in
reading and criticising this paper in draft form. Dr. John M. Roberts of the Department of Anthropology also has provided constant intellectual stimulus and critical comment. To all of these persons I render thanks, for to their assistance and encouragement is due most of the merit this report possesses. Its flaws are my own responsibility.

Finally, my profound gratitude goes to my assistants in the field, James Christensen, Thomas M. Newman, and David M. Gradwohl, for their part in carrying out our reconnaissance successfully. The pleasure of the companionship of these men made up for the difficulties of the field work.

E. MOTT DAVIS

Lincoln, Nebraska
February, 1956
INTRODUCTION

This paper reports an archeological survey in the Big Sandy Reservoir area and its environs in Sublette and Sweetwater Counties, southwestern Wyoming, carried on between July 30 and August 14, 1953, by a field party of the University of Nebraska State Museum, through a cooperative agreement with the National Park Service. The field party consisted of James Christensen, David M. Gradwohl, and Thomas M. Newman, all students at the University of Nebraska, and the writer. The survey was requested by the National Park Service to determine whether the imminent filling of the Big Sandy Reservoir would result in the destruction of significant archeological evidence, and, if so, to salvage as much as possible of that evidence. This report describes the archeological manifestations in the reservoir area and analyzes the data obtained from them in terms of their relevance to the problem of reconstructing the culture history of Wyoming and neighboring area.

GEOGRAPHIC SETTING

The Big Sandy Reservoir area is in the Bridger Basin, a desert area in southwestern Wyoming (Fig. 1). The Bridger

1. A more complete description of the geographic setting of this area may be found in Moss 1951, 17-28, from which the present material is abstracted.
Fig. 1. Map of Wyoming, Showing the Big Sandy Reservoir and Other Places Mentioned in the Text.
Basin, the western part of the Wyoming Basin, forms the drainage of the upper section of the Green River, the major northern tributary of the Colorado. The Green River flows southward through the Bridger Basin, leaving it via Flaming Gorge and the Ladore Canyon through the Uinta Mountains.

The Bridger Basin is a broad desert bordered on the south, west, north, and northeast by high mountain ranges. As the only ready access from the east is through South Pass, which leads through the southern end of the Wind River Range from the valley of the Sweetwater, a tributary of the North Platte River, South Pass is thus an avenue of contact with the Great Plains. The Bridger Basin is high, over 6,000 feet above sea level, and receives only a few inches of rainfall a year. Infrequent permanent streams, supplied by scattered springs and the snows of the mountains, make their way across the desert and into the Green River. Vegetation is sparse, consisting mainly of sagebrush, with less frequent rabbit brush, greasewood, and cactus. The floodplains of the permanent streams are grass-covered and support occasional willows.

The present report is concerned with the northeastern part of the Bridger Basin, the drainage of Big Sandy Creek. Big Sandy flows southwestward out of the southern Wind River Range for some sixty miles before being joined by Little Sandy and Pacific Creeks near the town of Farson. About eighty miles from its source, Big Sandy flows into the Green River.

This area is a sagebrush-covered sandy desert, the floral zone being classed as the Transition Zone between the warmer
and drier Upper Sonoran Zone and the cooler and more moist Canadian Zone of the lower mountain slopes. This is one of the driest areas in Wyoming, the average annual precipitation at Eden, five miles south of Farson, being 7.05 inches. There is slightly more precipitation in summer than in winter. Temperatures are cool, the mean annual temperature at Eden being 37°F. Winters are long and severe; summers are relatively short. The growing season averages eighty-nine days, from mid-June to early September.

This is a good grazing country for sheep, and formerly was frequented by bison and elk. Today antelope are common, as are jackrabbits, cottontails, and sage grouse. There are some waterfowl along the streams.

Although the water supply is meager, besides springs occurring here and there in the desert, there are Big and Little Sandy and Pacific Creeks, perennial streams fed by the snows of the Wind River Range. These creeks meander in valleys thirty to fifty feet below the surrounding desert. Hunters acquainted with the locations of springs and creeks would not want for water or for game. It seems certain that such an area, despite its relative aridity, frequently would attract parties of hunters.
HISTORY OF AREA

This area formerly was occupied by the Shoshoni (Kroeber 1939, 188, Map 1a). It first became well known to Whites when the emigrants began to move along the Oregon Trail, which traversed South Pass and crossed the Big Sandy a short distance south of the present location of the Big Sandy Dam. Local people find many relics of the covered wagon trains along the ruts of the Trail, still clearly visible across the desert.

In the early 1900's an irrigation system, the Eden Valley project, was set up in the area between Big and Little Sandy Creeks. After the diversion of water from both creeks into a reservoir, the Eden Valley Reservoir, and the construction of irrigation canals, the desert was made to yield good crops of grain.

The Bureau of Reclamation laid plans to expand the Eden Valley project after World War II. The Big Sandy Dam, built on the Big Sandy about ten miles north of Farson, was completed late in 1952 and the Big Sandy Reservoir began to fill in the Spring of 1953. The normal irrigation pool level of the reservoir is 6757 feet above sea level, but after the reservoir had filled only partially in the Summer of 1953, requirements of the irrigation project necessitated that much of the water be drawn out, and the level went down to dead storage at 6720 feet. These events naturally affected the archeological reconnaissance which took place in the late summer of the same year.
HISTORY OF ARCHEOLOGICAL WORK

The Bridger Basin as a whole has received relatively little archeological attention, but some work has been done which indicates that the area merits intensive reconnaissance. In the 1930's Renaud (1936, 1938) reported on the "Black's Fork Culture," a series of surface finds along Black's Fork, a major tributary of the Green River in the southern part of the Basin. The significance of these finds remains problematical, although the patination of the artifacts may be an indication of some antiquity (Roberts 1940, 96-97; Wormington 1949, 117-118, 153).

In the early 1940's the University of Pennsylvania Museum and the University of Nebraska State Museum investigated the Finley or Eden Valley site (48SW5), about seven miles southeast of Farson (Howard 1943; Moss 1951). This was the first instance in which Scottsbluff and Eden points, the latter named for this locality, were found under conditions of stratigraphic control. After World War II John R. Moss carried on an extensive physiographic study of the Big Sandy valley and of glacial evidences in the southern Wind River Range in order to date the Finley site geologically. He concluded that the occupation of the site took place during a brief time of glacial readvance, the Temple Lake substage, which he correlated with the retreat of the Mankato glacier in the Middle West (Moss 1951, 79-81; Holmes and Moss 1955, 645). It therefore appears that the human occupation of the Bridger Basin began many thousands of years ago.
In the late 1940's, Preston Holder and Joyce Wike made a brief archeological reconnaissance in the southeastern part of Bridger Basin (Preston Holder, personal communication). The results of this work have not been published.

With the building of the Big Sandy Dam, the National Park Service requested the Smithsonian Institution to survey the reservoir area in order to see what archeological information might be destroyed by inundation. In May, 1952, George Metcalf and Lee Madison of the Missouri Basin Project of the River Basin Surveys, Smithsonian Institution, made a brief survey of the reservoir area and recorded twelve sites, for three of which Metcalf recommended immediate intensive salvage operations (Metcalf 1952). The University of Wyoming planned to follow up this survey with a program of intensive reconnaissance and excavation in the summer of 1953. When illness prevented Dr. William Mulloy of that institution from undertaking this project, the Park Service asked the University of Nebraska State Museum, of which the writer was then Curator of Anthropology, to do the work. Accordingly, the writer and a crew of three carried out the survey described herein. Work began on July 30, 1953, and the survey was completed on August 14. The field party also visited a number of sites outside the reservoir area, and inspected local collections.
THE BIG SANDY RESERVOIR AREA

The Big Sandy Dam, a project of the Bureau of Reclamation, U. S. Department of the Interior, is on Big Sandy Creek about ten miles upstream from its junction with Little Sandy Creek at the town of Farson. It is easy to reach by automobile, being about three miles east of U. S. Highway 187 on a gravel road. The Big Sandy Reservoir extends northward up the valley from the dam for approximately six miles. At its head is a small diversion dam built in the early 1900's to divert water into a feeder canal leading to the old Eden Valley Reservoir about eight miles to the southeast. The area covered by the Big Sandy Reservoir varies in width from about four hundred feet to two miles.

Big Sandy Creek meanders in a floodplain one to two hundred yards wide, flanked by relatively abrupt slopes twenty to forty feet high (Plate I, bottom).\(^1\) The creek is ten to twenty feet wide and from a few inches to several feet deep. Formerly it was larger, but much of its water is diverted into the Eden Reservoir Feeder Canal by the dam upstream. The floodplain supports a cover of grass, tall sagebrush, and occasional willows.

From the tops of the slopes which border the floodplain, broad sagebrush flats extend back to hillsides, in some places

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\(^1\) This description refers to the condition of the reservoir area before inundation. For consistency and clarity, this statement and subsequent descriptions of sites will be in the present tense, even though much of the area and many of the sites have since been covered by the waters of the reservoir.
nearly a mile from the creek, and forming the edges of the valley (Plate I, top). The transition from valley to surrounding desert is least distinct on the east, where the course of the Eden Reservoir Feeder Canal provides an arbitrary limit to the area under discussion. Within the valley are a few buttes, on the most prominent of which is site 48SU2, to be described in this report. The buttes and flats are remnants of a series of gravel-capped cut terraces which testify to a fluvial history of alternate down-cutting and stability, a history extending well back into the late Pleistocene (Moss 1951, 67-75; Holmes and Moss 1955).
SUMMARY OF WORK ACCOMPLISHED

METHODS OF INVESTIGATION

There were two procedures followed in surveying the reservoir area. The first consisted of visiting all the sites discovered by Metcalf and Madison in their 1952 reconnaissance, excepting those destroyed by the reservoir since their visit. The sites were inspected intensively, and excavations carried on in three of them.

The second procedure involved a systematic inspection of the whole reservoir area. This inspection was carried out in terms of six arbitrary reconnaissance units, shown on the accompanying map (Fig. 2). These were surveyed on foot by the four members of the field party, each man looking over a strip about a hundred yards wide. Through this procedure an adequate sample of the area came under direct scrutiny.

WORK ACCOMPLISHED

The entire reservoir area, excepting those parts inundated or muddy from recent inundation, was inspected on foot. One new site, 48SU102, was discovered in the course of this work. Two isolated hearths also were discovered and excavated, one in Reconnaissance Unit 3 and one in Unit 4; and three surface concentrations were found, one in each of the same two reconnaissance units, and one in Reconnaissance Unit 2.
Of the twelve sites recorded by Metcalf, five—48SU4, 48SW1, 48SW2, and 48SW4—were found to have been lost through inundation. One, 48SW6, had been destroyed by dam construction by the time Metcalf was informed of it. The remaining six sites were visited. These are sites 48SU2, 48SU3, 48SU5, 48SU6, 48SU7, and 48SW3. Minor excavations were carried on at sites 48SU6 and 48SW3, and extensive excavations at site 48SU5. A paleontological find made by workmen in the course of dam construction was recorded as 48SW104.

Six hundred forty-six artifacts were found in the course of the reconnaissance, all but twenty-four on the surface. Of this latter number, twenty were found in the loose surface sand and are tantamount to surface finds. The remaining four are of non-distinctive forms. In this report, the description and analysis of this essentially surface collection follows the discussion of the reconnaissance units and sites. The artifacts are the source of most of the information which has been obtained on the time and nature of the prehistoric occupation of the reservoir area.

Information derived from the survey indicates that there have been small groups of people stopping briefly in the Big Sandy Reservoir area at least since the first few millennia before Christ. These people camped in the valley of the Big Sandy to hunt and to make artifacts from local materials. Archeological evidences giving specific information about these groups were relatively scanty within the reservoir area itself, but there are indications that much could be learned from a
study of sites in the surrounding countryside. In any case, the survey produced enough new evidence regarding the nature of prehistoric manifestations in this archeologically little known part of Wyoming to warrant description in some detail. However, relatively little historical evidence of a really conclusive nature came to light, and it is felt that no serious scientific loss has resulted from the destruction of archeological data by the filling of the Big Sandy Reservoir. This region appears to have had a long history of occupation by man, but fortunately no definitive manifestations of that history appear to have been destroyed by the Big Sandy project.
NOTE ON CHRONOLOGY

The time of occupation of the sites in the Big Sandy Reservoir area may be inferred from the presence of certain artifact forms which have been tentatively dated in near-by regions. In the present paper the chronological significance of artifact forms is discussed in terms of Mulloy's sequence of Early, Middle, and Late Prehistoric Periods in the Northwestern Plains and his identification of certain artifact forms as characterizing each period (Mulloy 1952; 1954a, 62 ff.). Mulloy's formulation has not yet been demonstrated adequately by published field evidence, but it is the only consistent chronological framework yet proposed for the Northwestern Plains and it has been derived empirically from field data. It is felt therefore to constitute a strong enough hypothesis to be used here as a basis for discussion.

Certain assumptions concerning absolute chronology are made in this paper which merit explanation, although they are not critical to any of the problems brought up herein. For purposes of discussion it is assumed that the Middle Prehistoric Period falls within the first three millennia before Christ,

1. In this paper the term "Northwestern Plains" is used to refer to that portion of the Great Plains lying between the 100th Meridian on the east, the Rocky Mountains on the west, the South Platte River on the south, and the Canada-United States boundary on the north.
and that the Late Prehistoric Period falls within the Christian era. This inference is based in part on the writer's feeling that there is a probable chronological correspondence between Mulloy's Early, Middle, and Late Prehistoric Periods of the Northwestern Plains, and Champe's Early Lithic, Intermediate Lithic, and Ceramic Periods, respectively, of the Central Plains (Champe 1946, 83-92). Signal Butte and Ash Hollow Cave are key sites in both regional sequences and serve to tie the two series of periods together. Information on absolute chronology in these sequences derives from tree-ring dates from Ash Hollow Cave (Champe 1946, 23-33, 46-57, 83-97) and radiocarbon dates from Signal Butte I, the McKean site, and the Shoshoni Basin (Mulloy 1954a, 64-65). More detailed examination of this problem is irrelevant to the purpose of this report, although it is a matter of importance in the study of the human history of the Great Plains as a whole.
Fig. 2. Map of the Big Sandy Reservoir Area, Showing Reconnaissance Units and Sites.
RECONNAISSANCE UNITS

This section is devoted to a description of the six reconnaissance units as they were observed in the 1953 survey. There also will be reference, in passing, to workshop and occupation sites which lie within and adjacent to these reconnaissance units. The sites are described in the section following this one.

The reconnaissance units have been given site numbers according to the uniform site designation system used by the University of Nebraska, the Smithsonian Institution, and many other organizations, and the field notes for these units have been filed according to the site number. For convenience in the present discussion, however, the reconnaissance units are designated by the numbers 1 through 6, since they are not in actuality archeological sites.

The accompanying map of the reservoir area (Fig. 2) shows the locations of the reconnaissance units and sites described on the following pages.

SUMMARY STATEMENT

The part of the reservoir area on the western side of the creek is made up of Reconnaissance Units 3, 4, and 6. Reconnaissance Unit 3, at the northwestern end of the reservoir area, extends from the Eden Reservoir Diversion Dam at the
head of the reservoir area southwestward as far as the large butte on which is located site 48SU2, an occupation and workshop site. Reconnaissance Unit 4 extends from the butte southwestward about 8500 feet; and Unit 6 comprises the remaining area. Most of the area of these three reconnaissance units is made up of wide sagebrush-covered sandy flats upon which cultural manifestations are sparse. However, a few concentrations of cultural material were found on these flats. One is site 48SU3, an occupation site near the diversion dam. There is also a chipping station near by, called Feature 11 of Reconnaissance Unit 3. At the edge of the terrace overlooking the floodplain, north of the large butte, is an area called Feature 2 of Reconnaissance Unit 3, which contained a number of artifacts and a fireplace. Just south of the butte another surface concentration, Feature 5 of Reconnaissance Unit 4, contained a few artifacts. Near by is a low ridge on which is site 48SU102, a workshop area. Near the southern end of Reconnaissance Unit 4 is Feature 4, an isolated hemispherical fireplace filled with burned cobbles. A similar fireplace and a workshop area make up site 48SW3, at the meeting place of Reconnaissance Units 4 and 6.

Along the southwestern edge of the valley are slopes covered with cobbles of quartzite and sandstone. Scattered here and there on these slopes, especially in Reconnaissance Unit 6 not far from the Big Sandy Dam, are evidences of workshop activity in the form of choppers and flakes. However, no real workshop concentrations were observed except for a small
one in site 48SW3.

The part of the reservoir area on the eastern side of the creek is made up of Reconnaissance Units 1, 2, and 5. Reconnaissance Unit 1 extends downstream from the Eden Reservoir Diversion Dam about 7000 feet, and contains no cultural manifestations. Reconnaissance Units 2 and 5, making up the rest of this side of the reservoir area, consist almost entirely of sagebrush-covered flats. Three occupation sites, 48SU5, 48SU6, and 48SU7, are at the edge of the flats overlooking the floodplain within Reconnaissance Unit 2. 48SU5, described in a later section, is the most informative site in the reservoir area. Also found in Unit 2 was a minor surface concentration of artifacts and chips, Feature 5. No other significant cultural evidences were found in Reconnaissance Units 2 and 5.

Detailed descriptions of the six reconnaissance units follow.

RECONNAISSANCE UNIT 1

This reconnaissance unit, given the site number 48SU106, comprises the floodplain on the northeast side of Big Sandy Creek, extending from the diversion dam at the head of the reservoir area downstream approximately 7000 feet. This is a narrow strip of floodplain between Big Sandy Creek and the Eden Reservoir Feeder Canal, consisting of marshy meadows, grassy sagebrush flats, sandy flats, and two oxbow lakes. About half the area will be inundated by the waters of the reservoir at maximum storage.
This reconnaissance unit was inspected on August 14, 1953. The heavy grass cover over most of the area made surface inspection difficult. No cultural manifestations were found.

RECONNAISSANCE UNIT 2

This reconnaissance unit, given site number 48SU101, is on the northeast side of Big Sandy Creek. It is made up of the area from 15,500 feet to 22,000 feet northwest of the Big Sandy Dam between the creek and the Eden Reservoir Feeder Canal. It consists of rolling sagebrush flats extending from the Feeder Canal southwestward to the edge of the floodplain, where the flats fall away in sandstone cliffs some forty feet high. Below is a relatively narrow strip of grassy floodplain with some tall sagebrush.

This area is in range, and most of it will not be inundated by the reservoir. It is likely, however, that there will be slumping when the reservoir rises against the soft sandstone cliffs. Within this reconnaissance unit are sites 48SU5, 48SU6, and 48SU7, which are described later.

The reconnaissance unit was inspected on August 11, 1953. In addition to the fireplaces noted in the descriptions of sites 48SU6 and 48SU7, a concentration of stone chips and artifacts and a number of bone fragments were found. The concentration, Feature 5, was on the sagebrush flat, and contained an irregular muller and nine modified flakes, as well as a number of incidental flakes.
Total artifacts from Reconnaissance Unit 2 are nineteen in number: ten modified fragments, one flake scraper, four flake knives, one chopper, two knives with pointed tip and rounded base (Plate V, a), and the muller already mentioned (Plate IX, m).

RECONNAISSANCE UNIT 3

Unit 3, assigned site number 48SU104, is on the southwest side of Big Sandy Creek, across from Units 1 and 2. It extends downstream slightly over two miles from the feeder canal dam at the head of the reservoir area to the butte site, 48SU2. Maximum width, at the southeastern end, is about a mile.

This area is made up mainly of a wide rolling sagebrush-covered flat, thirty to forty feet above stream level, with a line of low hills bordering it on the southwest. The hills swing westward about 2000 feet from the southeastern end of the reconnaissance unit; northward from this point the boundary of Unit 3 is arbitrary. In the direction of the creek, the flat ends in steep gravelly slopes and in places in slaty cliffs, which drop to the floodplain. The floodplain, a minimum of 500 feet in width, consists of grassy meadows and sagebrush flats. This area, excepting the floodplain, probably will not be affected by the reservoir.

The area was surveyed on August 12, 1953. The flats are devoid almost entirely of cultural manifestations. The slopes and hills at the southwest side, and the slopes bordering the floodplain, are scattered with cobbles and other stones.
Occasional chipping stations were noted on the hills, and choppers found there, but very few such spots were found elsewhere.

Site 48SU3, described later, is at the northwestern end of Unit 3. About 200 yards west of this site at a chipping station, called Feature 11, many flakes of quartzite and oolitic sandstone were lying on the surface, but no artifacts were found.

At the southeastern corner of the unit an area, called Feature 2, contained artifacts and a fireplace. This area extended for 400 feet along the top of the slopes above the floodplain, and was 300 feet wide. Artifacts were found scattered in the area, and a fireplace, Feature 3, was at the southeastern end. Two test pits were dug, revealing a hard-packed limey sand just below the loose surface sand. No cultural evidences were found in these pits.

The fireplace was excavated. It showed on the surface as a roughly circular area of charcoal-stained earth and stones. Some of the fireplace fill appeared to have been eroded away by wind, leaving many stones protruding at the surface. The fireplace was bowl-shaped, 5 ft. in length, 4.2 ft. in width, and 0.4 ft. in maximum depth. The fill within it consisted of charcoal-stained gravelly earth, considerable charcoal, and approximately seventy small rocks about two inches in diameter. Many of these rocks were fragments of cobbles. Fragments of shale also were found throughout the fill, both in large and in small pieces. There were a
few large stones, 0.6 to 0.8 ft. in diameter. No intentional arrangement of the stones was observed. No artifacts or bones were found in the hearth or in immediate association.

The twenty-two artifacts found in the area, Feature 2, were as follows: twelve modified fragments, eight of which were flake scrapers; two flakes with prepared edges, one uni-facially retouched and one bifacially; one irregular core; one small knife; two unclassified knives; two knife fragments; one pointed unifacial; and one unidentifiable point fragment. This area, Feature 2, evidently represents a camping place. It is approximately west across the creek from 48SU5 and may share whatever the favorable attributes were that made 48SU5 a popular camping spot.

Total artifacts from Reconnaissance Unit 3, including those from Feature 2, number seventy-seven, of which forty-one are modified fragments and thirty-six are intentionally prepared. The thirty-six prepared specimens are: nine flake scrapers, one flake knife, eight choppers, two cores, two small knives (Plate VI, k), two unclassified knives, six knife fragments, one end scraper (Plate VII, e), one side scraper (Plate VII, b), one pointed unifacial, one crude Duncan point (Plate VIII, p), one shouldered point with expanding stem and straight base, and one point fragment.

RECONNAISSANCE UNIT 4

Unit 4, which has been given site number 48SU103, is on the southwest side of Big Sandy Creek (Plate I, top). It
extends from the butte site, 48SU2, and from Reconnaissance Unit 3, southeastward about 8500 feet to a point where the bordering slopes approach the creek. Maximum width, at the northwestern end, is about 4200 feet. Site 48SU102, described later, lies within Unit 4.

This area corresponds closely in appearance to Unit 3. Most of it is a wide sagebrush-covered flat, bordered by hills on the southwest, and by steep slopes dropping to the floodplain on the northeast. Numerous gullies extend back into the flat from the floodplain. At the time of the reconnaissance in 1953, the floodplain had been inundated and then partially re-exposed. Most of Unit 4 will be flooded by the reservoir.

This reconnaissance unit was inspected on August 8, 9, and 12, 1953. The floodplain and adjacent slopes, which had recently emerged from the waters of the receding reservoir at the time of the survey, were largely devoid of cultural material. Near the southern end of the unit, however, a bowl-shaped fireplace, Feature 4, was found in the sand of one of the steep bordering slopes. This hearth showed on the surface as a small grouping of carbon-stained cobbles. Upon excavation it was found to be hemispherical, one foot in diameter and about a foot deep, filled with carbon-stained earth and about fifty cobbles averaging 0.3 ft. in diameter. There were no other cultural evidences near by.

Elsewhere on the flats thirty-two artifacts were found. Twenty of these were modified flakes. In addition there were five flake scrapers, one flake knife, three choppers, two
rounded end fragments of knives, and one point fragment (Plate VII, 1).

One concentration of artifacts, Feature 5, was found on the surface near the northern end of the unit. In addition to a few flakes, this concentration included four flake scrapers, two point fragments, one quartzite chopper, and a sandstone slab chopper. A number of test pits were dug in and around the area where the artifacts were found. The loose surface sand was about one-half foot deep and was underlain by a partially cemented brown sand. No cultural evidences were found in the tests.

A low ridge in the northern part of the flat was strewn with cobbles and flakes. This is site 48SU102, to be described later.

On the slopes of the hills at the edge of the valley were many areas of large water-worn cobbles, mostly of quartzite. Numerous choppers and large flakes lay among these cobbles. Although no concentration of flakes worthy of the term "workshop" was observed, there were twenty-one artifacts collected: ten modified flakes, ten choppers, and one core. Doubtless people passing through here frequently availed themselves of the ready supply of raw materials for making artifacts.

RECONNAISSANCE UNIT 5

This reconnaissance unit, given site number 48SU105, is on the northeast side of Big Sandy Creek extending from the dam up the valley for about 15,000 feet. It is bordered by the
creek, the Eden Reservoir Feeder Canal, and the Big Sandy Dike which extends northeastward from the northern end of the dam. Maximum dimensions are about 16,000 feet north-south and 10,000 feet east-west. This area represents a large embayment on the left side of the valley, and consists almost entirely of a large sagebrush flat. In the northern part bluffs, promontories, and one prominent butte represent terrace remnants above the valley. At the time of reconnaissance, much of Unit 5 had been inundated and part of it had been re-exposed. Almost the entire unit eventually will be inundated by the reservoir.

The reconnaissance of Unit 5 took place on August 14, 1953. The portions recently re-emerged from the water were covered with silt and alkali, and inspection of them was not profitable. Eight artifacts were found scattered in the reconnaissance unit. They are six modified flakes, one flake scraper, and one partial barbed point with expanding stem and convex base (category SCbl; Plate VIII, f). A number of flakes and crude cores collected along the bluffs in the northern part of the area appear to be refuse from manufacture. There were no concentrations of cultural material.

The relative lack of cultural evidences in Unit 5 is no doubt due to its being made up largely of a wide sagebrush flat. The sagebrush flats in the reservoir area were little used as camping grounds except here and there at the edge of the terraces, as at Feature 2 of Reconnaissance Unit 3, which has been described earlier.
RECONNAISSANCE UNIT 6

Unit 6, assigned site number 48SW103, is on the southwest side of Big Sandy Creek, extending from the dam northwestward for about 7000 feet. It is bordered by the creek, the dam, and the hillsides at the edge of the valley. At the north end it is arbitrarily delimited where the valley edges comes near the creek; here it meets Unit 4. Here also is site 48SW3, described later. Much of Unit 6 consists of a sagebrush flat which at the time of reconnaissance had been inundated and re-exposed. Steep slopes border the area on the west and south.

The inspection of Unit 6, which took place on August 10, 1953, revealed a few flakes and thirteen artifacts scattered on the flats. These artifacts are five modified flakes, six choppers (Plate V, b), one prepared chopper, and one rounded end fragment of a knife.

The slopes at the edge of the valley were covered with cobbles, among which, choppers and flakes were frequent. Most were of quartzite and oolitic sandstone like the cobbles around them, but some of the flakes were of exotic materials. The forty-seven artifacts collected on the slopes were: sixteen modified flakes, two flake scrapers, twenty-five choppers (Plate V, a-c, e-i), one core (Plate V, d), one rounded knife (Plate VI, e), one rounded end fragment of a knife, and one side scraper.

The workshop activity manifested by the relative abundance of flakes and choppers on the slopes of Reconnaissance Unit 6 is not matched by evidences of how the choppers may have been
used, even though irregular flaking along the edges of the choppers testifies to the fact that they have been used. No fireplaces or bones were observed on these slopes, and the nature of the activities represented by the choppers remains a mystery.
SITES

In this section all the sites recorded in the two surveys of the Big Sandy Reservoir area in 1952 and 1953 are described in order of site number.

48SU1

48SU1 is on the northeast side of the valley about two miles up from the dam. It was discovered and recorded by Metcalf and Madison, who describe it in these terms: "Occupation site. Many chips and spalls. No tools or hearths" (Metcalf 1952, 10). They did not consider the site important. It was destroyed by the reservoir before the 1953 reconnaissance.

The artifacts collected by Metcalf and Madison are nine modified flakes and one flake scraper.

48SU2

48SU2 is a site located on the top of the most prominent butte in the reservoir area, on the southwest side of the creek about three miles up from the dam. It lies at the junction of Reconnaissance Units 3 and 4, directly across the creek from 48SU5. The site was discovered and recorded by Metcalf and Madison in 1952. They describe it in these terms: "Occupation site. No hearths. Tools scarce" (Metcalf 1952, 10).
In the 1953 survey, 48SU2 was inspected intensively. The butte is flat-topped, rising some sixty feet above the surrounding sagebrush flat. The top is littered with pieces of weathered slate and quartzite cobbles. A spur extends north-eastward toward the creek, and it was this spur which Metcalf designated as 48SU2. However, in 1953 we found evidences of workshop activity scattered not only on the north spur, but on the top and all sides of the butte. Natural cobbles were common all over the butte, and the evidences of human activity consisted of workshop areas among these cobbles, with scattered flakes and cores and occasional chipped pieces. No hearths were found, and numerous test pits were unproductive, revealing only a limey hardpan less than a foot below the surface.

Seventy-one artifacts were found by the 1952 and 1953 field parties. They are: thirty-nine modified flakes, six flake scrapers, two flake knives, nine choppers, three prepared choppers (Plate V, 4, 1), one small knife (Plate VI, i), six knife fragments, one end scraper (Plate VII, d), one grinding slab, one subrectangular muller (Plate IX, k), two irregular mullers (Plate IX, d, e), and one problematical grooved stone, heavily weathered (Plate IX, g). The variety of artifacts suggests that some domestic activities other than the manufacturing of tools were going on at this site. Primarily, however, it is a workshop site where passing hunters availed themselves of the supply of quartzite cobbles for the manufacture of tools.

The only indication of possible age for the site lies in the fact that some of the specimens are so heavily sand-blasted
that their character as artifacts barely can be detected, whereas others are relatively unaltered by moving sand. In the absence of index artifacts we may only surmise from this evidence that the site has been used over a long period of time.

Most of site 48SU2 will not be inundated by the reservoir, but it may be subject to wave erosion. It does not appear to merit further investigation.

48SU3

48SU3 is a small wind-eroded area near the head of the reservoir, within the northwestern end of Reconnaissance Unit 3. Metcalf and Madison recorded a fireplace here, which they noted might be a recent one made by a sheepherder, and many spalls, scrapers, blanks, and knives (Metcalf n. d.). Our inspection of the site in 1953 was brief, as the site will not be flooded. We found evidences of occupation, but no fireplace; presumably it had been buried by moving sand.

Artifacts found in the 1952 and 1953 surveys at this site are twenty in number. They are: nine modified flakes, two flake scrapers, two choppers, one core, two prepared choppers (Plate V, k), one slender, thick knife (Plate VI, h), two knife fragments, and one grinding slab fragment (Plate IX, b). The nature of these specimens indicates that this spot had been used as a camping place. None of the artifacts supplies evidence as to the period in which the site was occupied.

A workshop area near 48SU3 already has been described in the discussion of Reconnaissance Unit 3.
48SU4

48SU4 is on the northeast side of Big Sandy Creek about one and one-half miles up from the dam. It was discovered and recorded by Metcalf and Madison in 1952, and was destroyed by the reservoir before the 1953 reconnaissance. Regarding this site, Metcalf says (1952, 8):

... this site extends for about 100 yards along the terrace on the left side of the stream ... Only one hearth was exposed and no others were found by testing.

Artifacts collected by Metcalf and Madison were seventeen in number: six modified flakes, one prepared chopper, one knife, four knife fragments, one end-and-side scraper, one barbed point with expanding base (category SCbl; Plate VIII, g), one point fragment, one subrectangular muller (Plate IX, j), and one wedge-shaped muller (Plate IX, c). The last-mentioned specimen is unique in the Big Sandy collection.

The form of point suggests a Middle Prehistoric occupation. The varied nature of the artifacts indicates, as does also the fireplace, that this was an occupation site.

48SU5

Site 48SU5, the major subject of investigation in the 1953 survey, lies on the northeast side of Big Sandy Creek about three miles above the Big Sandy Dam. It is part of a sandy sagebrush-covered flat thirty-five to forty-five feet above the level of the creek (Plate II, top). Along much of its southwest edge the flat terminates in an abrupt sandstone cliff which drops to the floodplain. Heavily eroded slopes
at each end of the cliff render the site accessible from the floodplain. The flat extends about six hundred yards back from the cliff to a marshy area which presumably results from a spring.

The cultural evidences occur in a strip about 150 feet wide along the cliff for a distance of about 1000 feet. This spot is not elevated relative to the countryside in general, nor is it sheltered. It does, however, command a view of more than a quarter mile of the floodplain and also of several square miles of the flats on the far side of the creek. This circumstance, and the possible proximity of a spring, could have made the spot favorable as a brief camping place for hunting parties.

History of Work

The site was found on May 24, 1952, by Metcalf and Madison. They collected knives, projectile points, chips, and flakes from the surface of the site. They concluded, on the basis of their superficial examination, that this locality appeared to be the richest site in the entire reservoir area.

The University of Nebraska party began investigating the site on August 1, 1953. An intensive surface check revealed flint fragments and artifacts scattered in the area described above. Very few specimens were found outside this area.

There were two spots, about 600 feet apart, in which the cultural debris was more heavily concentrated than elsewhere. Excavations were carried on in these areas, designated Areas A and B. They were not distinct topographically from the rest
of the site, and the excavations did not reveal why material was concentrated in these two spots rather than elsewhere.

Excavations at 48SU5 were carried on for eight days between August 1 and 11, 1953. A total area of 2100 square feet was excavated, 1550 square feet in Area A and 550 square feet in Area B.

Stratigraphy

48SU5 is, as already described, a sandy flat covered with clumps of sagebrush. The surface is composed of loose sand which is mixed by trampling of livestock and kept in movement by the wind. The discontinuous sagebrush cover anchors the sand in some degree and prevents its being blown for any great distance.

Excavation showed that this sand is underlain at a depth of approximately 0.5 ft. by a brown sandy hardpan which is cemented enough to render shoveling difficult. This stratum of hardpan is from 0.3 to 0.8 ft. thick, and is underlain by a very hard white caliche.

Cultural evidences occurred only in the two upper strata, the loose sand and the hardpan.

The Artifacts

One hundred forty-five artifacts were found at 48SU5. Of these, 121 were surface finds, four were found in the loose sand in Area A, sixteen in the loose sand in Area B, and four were found in situ associated with hearths in Area A. The four artifacts found in situ were, as described later, non-
diagnostic. For purposes of study it seems best to treat the assemblage as a unit, since evidence for stratigraphic differentiation is lacking. The specimens may be listed by category as follows:

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified flakes</td>
<td>46</td>
</tr>
<tr>
<td>Flake scrapers</td>
<td>10</td>
</tr>
<tr>
<td>Flake knives</td>
<td>7</td>
</tr>
<tr>
<td>Choppers</td>
<td>12</td>
</tr>
<tr>
<td>Core</td>
<td>1</td>
</tr>
<tr>
<td>Rounded knife (Plate VI, d)</td>
<td>1</td>
</tr>
<tr>
<td>Small knife</td>
<td>1</td>
</tr>
<tr>
<td>Unclassified knives</td>
<td>2</td>
</tr>
<tr>
<td>Knife fragments</td>
<td>1</td>
</tr>
<tr>
<td>End scrapers (Plate VII, c, f)</td>
<td>35</td>
</tr>
<tr>
<td>Side scraper (Plate VII, a)</td>
<td>1</td>
</tr>
<tr>
<td>End-and-side scraper</td>
<td>1</td>
</tr>
<tr>
<td>Pointed unifacial</td>
<td>1</td>
</tr>
<tr>
<td>Points</td>
<td></td>
</tr>
<tr>
<td>NAbl (Plate VIII, a, b)</td>
<td>2</td>
</tr>
<tr>
<td>McKean (Plate VIII, j)</td>
<td>2</td>
</tr>
<tr>
<td>NBal1 (Plate VIII, j, k)</td>
<td>2</td>
</tr>
<tr>
<td>NBal2 (Plate VIII, l)</td>
<td>1</td>
</tr>
<tr>
<td>Duncan (Plate VIII, m, n, o)</td>
<td>3</td>
</tr>
<tr>
<td>SCA3 (Hanna) (Plate VIII, c)</td>
<td>2</td>
</tr>
<tr>
<td>SBA (Plate VIII, d)</td>
<td>1</td>
</tr>
<tr>
<td>SCa2 (Plate VII, h)</td>
<td>1</td>
</tr>
<tr>
<td>SCb1 (Plate VII, i)</td>
<td>1</td>
</tr>
<tr>
<td>Fragments</td>
<td>6</td>
</tr>
<tr>
<td>Grinding slab fragments (Plate IX, a)</td>
<td>3</td>
</tr>
<tr>
<td>Subrectangular muller (Plate IX, i)</td>
<td>1</td>
</tr>
</tbody>
</table>

Total: 145

Striking features in this list are the large numbers of modified flakes, flake scrapers, choppers, and knife fragments. These items are standard cutting and scraping implements in the household inventory of people for whom chipped stone is the basis for cutting tools. 48SU5 seems to have been a camping place where everyday domestic activities were carried on, and was probably not a place used solely by small hunting parties made up of men only.
It already has been noted that there is a wide variety of point types at 48SU5. Indeed, every point form found in the Big Sandy Reservoir area is represented at this single site. According to the distributional evidence brought up on a later page, the presence of all these forms suggests that this site was used during the Middle and Late Prehistoric Periods. 48SU5 seems to have been a favored camping spot for many millennia.

The two fragments of McKean points both were found in Area B, one on the surface and the other in the loose sand. These are the only McKean specimens from the Big Sandy Reservoir area.

Four articles of White manufacture were collected by Metcalf and Madison at 48SU5 in 1952. They are one caliber .44 cartridge shell, two caliber .45 cartridge shells, and one metal insigne from a package of cut plug tobacco. These items presumably result from the activities of Whites in this area during the past seventy years.

The Excavations

AREA A

A grid system oriented approximately N. 32° E. was set up in Area A, in which five-foot squares were numbered according to the location of the southeastern stake with relation to an imaginary origin point, e.g. square 215N/240E. Although work began in five-foot squares, it soon became more effective to work in squares ten feet on a side. Such squares were designated by a term combining the designations of their com-
ponent five-foot squares, e.g. square 210-215N/235-240E was the square between grid lines 210N, 220N, 230E, and 240E.

The initial plan was to dig five-foot test squares one to three feet deep, and to expand the excavations according to what this work revealed. It soon was found, as already explained, that the loose surface sand, about one-half foot deep, was underlain by a limey hardpan which was difficult to shovel, and this in turn by a cemented caliche. At about one foot deep, shoveling became impracticable. Most of the work was devoted to clearing the loose sand down to about one-half foot below the surface, and thus uncovering the hardpan, in a search for cultural manifestations. One five-foot square was dug to a depth of five feet to check the underlying deposits.

The excavations extended over an area of 1550 square feet (Fig. 3; Plate II, bottom). Four fireplaces and three irregular burned areas were found in the course of this work. Eight artifacts were found. Four were from the loose sand: a modified flake, a flake knife, and two choppers. The other four were found in situ associated with two of the fireplaces. They were a modified flake, a flake scraper, a knife fragment, and a grinding slab fragment. The associations are specified below, in the descriptions of the fireplaces. One red ochre stain was noted. No other cultural manifestations were detected.

AREA B

The work in Area B consisted of clearing the loose sand from the hardpan in two trenches, totalling 550 square feet. All the sand was screened. No structural features were found.
PLAN OF EXCAVATIONS

LEGEND
- Hearth
- Burned area
- Grid point
- Edge of excavation

Feature 102
Feature 160
Feature 163
Feature 109
Feature 139
Feature 123

Fig. 3
Sixteen artifacts were found on the screens. These specimens were six modified flakes, two flake scrapers, one chopper, two rounded end fragments of knives, one end scraper (Plate VII, c), one basal fragment of a probable McKean point, one stem fragment of a point (Plate VIII, d), and two fragments of grinding slabs (Plate IX, a).

FIREPLACES

Fireplaces were the only structural features found at 48Su5. There were five fireplaces, all in Area A. In addition there were two burned areas apparently representing brief fires.

Fireplaces and ill-defined burned areas represent one of the more important cultural manifestations in the reservoir area, and these examples in Area A can serve as representative of many that were found in the reconnaissance. They will therefore be described here in some detail, in order of their feature numbers.

Feature 102

In square 165-170N/290-295E. A roughly circular hearth approximately 4 ft. in diameter and 0.4 ft. deep, in the loose brown sand. This hearth appeared on the surface as an area of carbon-stained sand with a few burned rocks showing at one edge. Excavation showed it to contain carbon-stained sand and many large irregular fragments of burned soft sandstone and slate, cracked by heat. It was bowl-shaped in cross section. Underneath it stratigraphically lay loose sand,
and below that the hardpan. Other fragments of slate and stone like those in the hearth were found in the surrounding fill.

The only artifact associated with this hearth was a single modified flake with unifacial use retouch. It had been used as a scraper.

The situation of this hearth, exposed at the surface and lying on the loose sands, suggests that it is of relatively recent origin. There are no materials associated to indicate that it is the result of recent White sheepherding activity, and the single artifact, a modified flake, suggests that the makers of the hearth were Indians.

**Feature 109**

In square 200-205N/225-230E. This hearth appeared as a carbon-stained area in the hardpan after the overlying loose sand had been removed (Plate III). It did not show at the surface. It was 1.9 ft. by 2.2 ft. and was 0.5 ft. in depth. It was filled with fragments of burned and broken rock, burned earth, some ash, charcoal, and pebbles. There was no evidence that the hearth was prepared. The material seemed to have resulted from a fire having been built here, the rocks having been brought in association with it, perhaps for stone-boiling, and the whole having been trampled into the then loose sand after extinction of the fire. However, the fact that the material was not scattered but was concentrated in one spot may indicate that there was a pit here, and that the fireplace was prepared to that degree.
No artifacts or other cultural material were found in direct association with this hearth, although in the loose sand near by were found fragments of sandstone and quartzite which might represent detritus of manufacture.

Another hearth, Feature 139, was only two feet away. It is described below.

The fact that this hearth was in the hard-packed sand suggests that it was used earlier than Feature 102, which was in the loose sand overlying the hard-packed sand.

**Feature 123**

In square 200-205N/215-220E. This hearth appeared as an oblong carbon-stained area in the hard-packed sand, which was revealed when the overlying loose sand was cleared away. It did not show on the surface. One end of this hearth was destroyed before its nature as a hearth was made clear, and was not documented. The part documented was 3.2 ft. long and 2 ft. wide, and was 0.5 ft. deep. The total original length was probably not over 4 ft. It was bowl-shaped, but there was no clear sign that it had been prepared by digging. It seemed to have been created when the sand was relatively loose, so that a bowl-shaped area of carbon-stained sand much like Feature 102 was created. Later the sand became partially cemented.

Associated with this hearth were a flake scraper, the rounded end fragment of a knife, and a fragment of a grinding slab. Five feet southwest of the hearth a knife fragment was found lying at the contact of the loose sand and the hardpan. Flakes of quartzite and oolitic sandstone were found in
the surrounding sand.

This hearth was not filled with fragments of burned rock as were Features 102 and 109. The reason for the presence or absence of the irregular fragments is not clear.

**Feature 139**

In square 200-205N/225-230E, about two feet northeast of Feature 109. Like Features 132 and 109, this hearth appeared as a carbon-stained area at the surface of the hardpan when the overlying loose sand was cleared away (Plate III, top). It did not show at the original surface. It was 3.2 ft. long, 2.5 ft. wide, and 0.3 ft. deep. The cross section (Fig. 4; Plate III, bottom) showed it to be irregular but roughly bowl-shaped, and underlain by 0.1 ft. of burned earth, below that by 0.1 ft. of hardpan, which in turn was underlain by a hard white caliche. It seems likely that the area of the fireplace had been hollowed out before the building of the fire. The fireplace was filled with carbon-stained sand, small stones, some ash, and burned earth. There were no artifacts in direct association, although near by were found the objects described as being also near Feature 123.

**Feature 163**

In square 190-195N/265-270E. This fireplace appeared as a carbon-stained area at the top of the hardpan when the overlying loose sand had been cleared away. It was roughly circular, 2.5 ft. in diameter, and was irregular in profile, being a maximum of 0.5 ft. deep. It was filled with carbon-stained
Approximate level of original surface

Loose sand

Burned earth

Carbon-stained earth

Hard-packed sand

Caliche

48SU5  AREA A
CROSS SECTION OF
HEARTH, FEATURE 139

Fig. 4
earth. There were a few scattered stones and a little gravel in the fill. Feature 163 appears not to have been a prepared hearth, but only a location where a fire had burned. Near by was an irregular carbon-stained area, Feature 164, which is described below. There were no other cultural associations.

**BURNED AREAS**

In addition to the carbonaceous areas of definite shape described here as hearths, two irregular carbon-stained areas were found, Feature 164 in square 190-195N/265-270E about six feet southwest of Feature 163; and Feature 160 in square 170-175N/295-300E, extending into the next square to the east. These two features were irregular patches of carbon-stained sand in the hardpan, and were not associated with other cultural manifestations. They are presumed to represent brief fires, dating from the time before the accumulation of the overlying loose sand.

**TEST PIT**

A test pit 5 ft. square and 4.9 ft. deep was dug in Area A to determine the nature of the sediments underlying the hardpan. These sediments consisted of sands of differing degrees of consolidation, intercalated with zones of hard caliche. There were no evidences of human occupation.

**Summary and Discussion of 48SU5**

The stratigraphic section at 48SU5 consists of three strata which are, from top to bottom, loose sand, sandy hardpan, and caliche. The structural features found were five
hearth, Feature 102, was in the loose sand, and the other hearths and burned areas were at the top of the hardpan. Feature 102 therefore is later than the other hearths. This is the only direct evidence of sequence in the site.

Except for four non-distinctive artifacts found in situ associated with hearths, all the 145 artifacts from 48SU5 are essentially surface finds. The points in the collection include forms which are said to be characteristic of the Middle and Late Prehistoric Periods in the Northwestern Plains. In all likelihood, then, site 48SU5 was utilized as a camping spot by migratory groups of people over many millennia. Occupation appears to have begun when the hardpan was not yet consolidated, and to have continued through the formation of the stratum of loose sand which still is in motion today.

The abundance of artifacts and the relatively large proportion and wide variety of projectile points are features setting this site apart from all others in the reservoir area. It is not at all clear why this particular spot should have been favored as a camping place over so long a period, as it seems to have been; or why so many projectile points were discarded here, and not at other camping spots such as the similarly located sites 48SU6 and 48SU7, described later.

The fireplaces and the relative abundance of simple cutting, scraping, and chopping tools indicate that this site was occupied by people who were carrying on a number of domestic activities other than simply killing game and moving
on. The scarcity of animal bones, however, poses a problem. The number of projectile points and the flake scrapers suggest hunting and perhaps some processing of skins; but the near-absence of bones raises the question whether the fires were meant for cooking or merely for keeping hunters warm. These are problems which, in the absence of more data, must remain unsolved.

48SU6

Site 48SU6 is within Reconnaissance Unit 2. It is northwest of 48SU5, in a similar topographic situation along the top of a sandstone cliff overlooking Big Sandy Creek. Metcalf and Madison noted chips and artifacts on the surface here, and mapped the site as occupying a relatively small area. The 1953 survey extended the area of the site, since fireplaces and a workshop concentration were found in an area extending along the cliff for some 1200 feet.

Three fireplaces were excavated in 1953. They were in the loose surface sand, and were shallow and bowl-shaped, between 3 ft. and 4 ft. in diameter and less than 0.5 ft. deep. They were filled with charcoal, carbon-stained earth, burned rock fragments, and burned bone fragments. No artifacts were found in association.

One workshop area was found within the site. In it were found two knives and one muller, and several poorly defined burned areas which were revealed by skimming the surface with shovels. Since the site is not in danger of destruction, no further investigation was carried on.
Artifacts found at 48SU6 in 1952 and 1953 are fifty-seven in number: twenty-one modified flakes, seven flake scrapers, one flake knife, three choppers, one core, two prepared choppers, one slender thick knife, three unclassified knives, twelve knife fragments, one side scraper, one barbed points with expanding base (category SCbl; Plate VIII, h), two point fragments, and two subrectangular mullers (Plate IX, h, i). This site appears to have been a camping place where everyday activities such as hunting, cooking, dressing animal skins, and making stone tools, were carried on. The barbed point is a form attributed to the Middle Prehistoric Period, but the stratigraphic position of the fireplaces at the surface of the loose sand could indicate a relatively more recent time.

One caliber .44 cartridge shell was found at 48SU6 by Metcalf and Madison, signifying activity by a recent White hunter.

It is not expected that this site will be damaged by the reservoir, although it might be subject to some slumping due to wave erosion. Further investigation of the site does not seem necessary.

48SU7

Site 48SU7 is within Reconnaissance Unit 3, and is north-west of 48SU5 and 48SU6, sharing with these sites a similar topographic position overlooking the creek. Metcalf characterized it as: "Occupation site. No hearths. Tools found on surface" (Metcalf 1952, 10). In 1953 we found a few poorly defined burned areas, a number of quartzite chips, and one
muller. The material was found over a larger area than that mapped for 48SU7 by Metcalf.

Artifacts found in 1952 and 1953 are twenty-six in number: fourteen modified flakes, one flake scraper, one flake knife, one chopper, one prepared chopper, two unclassified knives, two knife fragments, two point fragments, and two irregular mullers (Plate IX, f). These artifacts, the workshop debris, and the irregular burned areas seem to testify to brief stops by groups who used this spot as a camp site and workshop. The time of occupation is not indicated.

The site will not be inundated by the reservoir. No further investigation seems warranted.

48SU102

48SU102 is a low ridge trending northwest-southeast, in the northwestern part of Reconnaissance Unit 4, a short distance south of 48SU2. It was discovered in the course of the 1953 survey. As in the case of other sloping areas along the Big Sandy, this ridge is covered with cobbles, and was used as a workshop area. Scattered among the cobbles are choppers and a very few flakes of the same quartzites and oolitic sandstones as the cobbles. No concentrations of worked material were observed. Artifacts recovered are twenty-five in number: eleven modified flakes, two flake scrapers, eleven choppers, and one slender thick knife (Plate VI, g).

This site appears to have been primarily a workshop area where passers-by stopped to avail themselves of the cobbles for making artifacts. The modified flakes probably were
knocked off the cobbles for immediate use as cutting tools.

There is no indication as to the age of the site. It will be surrounded by the reservoir and probably will be subject to wave erosion. There seems no reason for further investigation.

48SW1

48SW1 is on the southwest side of the creek about a mile up from the dam. It was found and recorded by Metcalf and Madison in 1952, but had been destroyed by the reservoir before the 1953 survey. It is characterized by Metcalf as: "Occupation area. No hearths or tools found" (Metcalf 1952, 10). Despite this statement, the collection made by Metcalf and Madison at Big Sandy contains fifteen artifacts from this site, in addition to a number of chips. The artifacts are: six modified flakes, one flake scraper, and eight choppers.

The evidence concerning this site is too scanty for speculation as to its nature or age.

48SW2

48SW2 is on the west side of the creek about 1000 feet west of the north end of the dam. It was discovered and recorded by Metcalf and Madison in 1952, but had been destroyed by the reservoir before the 1953 reconnaissance. Metcalf describes it as: "Occupation area. Many spalls. No hearths" (Metcalf 1952, 10). There are twelve artifacts in the collection from this site: three modified flakes, two flake scrapers, three choppers, two knife fragments, one Hanna point with
expanding stem and concave base (category SCa-3; Plate VII, g), and one barbed point with expanding stem (category SCbl; Plate VIII, e). A .30-30 cartridge shell also was found at this site, indicating recent White hunting activity. The stone artifacts indicate that 48SW2 is an occupation site, and the point forms suggest a Middle Prehistoric time of occupation.

48SW3

Site 48SW3 is located on the southwest side of the valley about a mile up from the dam, at a point where the hillsides bordering the valley come close to the creek. Most of the site consists of sandy slopes descending to the floodplain. The site lies between Reconnaissance Units 4 and 6.

The site was discovered and recorded in 1952, at which time Metcalf noted it as: "Camp site. Two or three poor hearths" (Metcalf 1952, 10). In 1953 one hearth and a workshop area were found. The hearth was bowl-shaped, 2 ft. in diameter and 0.5 ft. deep, and was filled with carbon-stained earth and about fifty small water-worn cobbles. There were no associated artifacts. This fireplace is like another found not far away near the south end of Reconnaissance Unit 4 (p. 23), and is unlike any of the other fireplaces found in the reservoir area. Both of these hearths were distinctly bowl-shaped and contained a large number of cobbles rather than fragmented rocks. These attributes appear to make up a distinct fireplace type as far as this reservoir area goes.

The workshop was on the cobble-covered slope near the fireplace, and contained a few flakes, several choppers, and
a few crude knives.

Artifacts collected in 1952 and 1953 are seventeen in number: three modified flakes, three flake scrapers, six choppers, one prepared chopper, one knife with rounded base (Plate VI, c), two unclassified knives, and one knife fragment. The nature of these specimens indicates that the site was an occupation site and workshop area. There is no indication as to the time that the site was occupied.

The site will be destroyed by the reservoir.

48SW4

Site 48SW4 is on the northeast side of the creek about a mile up from the dam. It is at the edge of a terrace above 48SW1. The site was discovered and recorded by Metcalf and Madison in 1952, but was destroyed by the reservoir before the 1953 reconnaissance. About this site, Metcalf (1952, 8) says:

Situated on the immediate edge of the terrace overlooking the creek, it is bordered on the east by a small tributary stream. The site appears to extend for some hundred yards along the terrace edge. Seven hearths were exposed in a road which crosses the site or at points where a bulldozer had removed the sagebrush. Excavation of one of these revealed a basin-shaped depression filled with stones.

Artifacts collected by Metcalf and Madison were four in number: a prepared chopper, a rounded knife (Plate VI, f), an unclassified knife, and a knife fragment.

The site appears to have been an occupation site, but in view of the scanty evidence speculation as to its nature and age is not warranted.
48SW6

Before the 1952 reconnaissance, workmen working on the dam uncovered a burial. They reported the circumstances to Metcalf, who designated this find 48SW6. The burial was on the south side of the creek west of the south end of the dam, and is said to have been that of an individual in a seated position, about four and one-half to five feet below the surface. No artifacts were noted in association. The site was destroyed in the course of dam construction.

48SW104

In 1951 or 1952 earth-moving operations at approximately the same location as 48SW6 uncovered fossil bones twenty-four feet below the surface in a borrow pit. A few of the bones were recovered by Mr. Keith Webster of Farson, who kindly presented them to the writer for transmittal to the Museum. They represent the distal end of a tibia, an astragalus, and a calcaneus, all of an ungulate. Mr. Webster described the section at this locality from memory as follows, beginning at the surface: four feet of "dirt"; twenty feet of sand, the bones being one foot from the bottom of this sand; green shaley clay, which is the local bedrock. This find has been designated 48SW104.
DISCUSSION OF RECONNAISSANCE AREAS AND SITES

The archeological manifestations in the Big Sandy Reservoir area have been described in terms of six reconnaissance units and fourteen sites. The reconnaissance units are arbitrary divisions of the area, delimited to permit orderly recording of the information which did not pertain to specific sites.

Other than scattered finds of artifacts on the wide flats, the archeological manifestations can be categorized as being of two sorts: workshop evidences on the cobbled hillsides bordering the valley on the west, and camping places at the edge of the terraces overlooking the floodplain. There is no direct evidence that certain sites are older than others, although artifact forms suggest that there may have been a sequence of occupation. This problem of sequence is examined in the artifact analysis which follows this section.

One distinctive form of fireplace was noted among the numerous fireplaces observed. It was represented by two cobble-filled hemispherical hearths, one in site 48SW3 and the other designated as Feature 4 in Reconnaissance Unit 4. All other fireplaces were either irregular carbon-stained areas or were shallow basin-shaped hearths not always distinct in appearance from the irregular areas. Metcalf noted in his 1952 reconnaissance that two types of fireplaces were to be
found in the reservoir area, a smaller straight-sided form and a larger basin-shaped form (Metcalf 1952, 5). It is possible that the cobble-filled hemispherical form observed in 1953 is the same as Metcalf's straight-sided type and that the irregular and basin-shaped fireplaces represent his basin-shaped type. Metcalf thought it likely that the basin-shaped form was more recent (Metcalf 1952, 6), but no evidence was observed by the writer's party indicating relative age of fireplace forms. Evidence also was lacking which might suggest functional reasons for variations in shape.

The primary reason that no very informative sites exist in the reservoir area lies in the fact that there is no spot in the entire area where local topography favors deposition of sand. Instead, everywhere a shallow stratum of shifting sand overlies a hardpan, and this condition seems to have existed for many thousands of years. Nowhere does nature favor the formation of superimposed strata in a good camping spot, circumstances which might enable us to unravel a story of sequential occupation.
THE ARTIFACTS

Six hundred forty-eight specimens identifiable as artifacts were found in the course of the Big Sandy reconnaissance. All are of stone; no bone artifacts were found. Of the total, 631 are of chipped stone and the remaining seventeen are of rough or pecked stone.

CLASSIFICATION

The chipped artifacts have been divided into major categories of modified fragments, choppers, cores, knives, scrapers, and points. Rough stone artifacts are classed as grinding slabs and mullers. These categories are designed to facilitate description and comparison, and are not felt necessarily to have culture-historical significance of themselves. The absence of direct evidence of sequence in the data from the reservoir area, and the relative lack of archaeological field work in this part of Wyoming, make it difficult to discuss the possible temporal significance or cultural relationships of many of these descriptive categories. In some cases, however, comparative studies are informative and are included below in the discussion of the category.

MATERIALS

Most of the specimens are made of quartzite and oolitic sandstone, two materials occurring in the form of cobbles
which are found in great abundance on the slopes bordering the valley of the Big Sandy, especially on the west side. Other materials, which include flint, jasper, chert, chalcedony, moss agate, siltstone, petrified wood, and obsidian, are very infrequent in the collection.

**DISTRIBUTION**

A tabulation of the artifact categories by provenience reveals relatively few significant correlations of categories with localities. For the most part, those correlations which do occur appear to represent the nature of the activities being carried on. They do not appear to signify the occurrence of different cultural complexes. There are, for instance, a great many choppers from Reconnaissance Unit 6 and a large number of modified flakes from sites 48SU2, 48SU5, and 48SU6, circumstances which seem to be more than mere accidents of collection. The number and variety of artifacts from site 48SU5 also is striking; in this case sequent occupation may be the cause. These and other less significant clusterings of artifact categories are discussed in appropriate sections later in this report. For the most part the artifacts found in the Big Sandy Reservoir area are not distributed in any significant geographical patterns.

**FRAGMENTS MODIFIED BY USE**

These specimens, 278 in number, appear to represent debris from the manufacture of other tools, used because of having sharp edges. Some of the flakes may have been struck off...
intentionally to create a sharp-edged tool without further modification. All specimens show irregular chipping along an edge or edges, sufficient to indicate that the piece has been used for cutting, chopping, or scraping.

**BIFACIAL BLOCKS**

These twenty-nine specimens have been used for cutting or chopping; in a few cases they show signs of hammering.

**FLAKES**

These specimens, 249 in number, range in maximum diameter from 25 mm. to 75 mm. More than two-thirds (172) show unifacial use retouch and are presumed to have been used as scrapers; the remainder (77) show bifacial use retouch presumed to result from use in cutting and chopping.

**Discussion**

The largest collections of this category come from 48SU2, 48SU5, 48SU6, and the flats of Reconnaissance Units 4 and 6. These artifacts presumably were everyday crude cutting and scraping tools used once or twice and discarded. Their relative abundance in these localities doubtless indicates that these sites and areas were used as camping places.

**FRAGMENTS WITH PREPARED EDGES**

There are seventy-one irregular specimens in this category. They are presumed to be debris of manufacture which have been given intentionally prepared edges as evidenced by regular secondary retouch. Maximum dimensions range from
35 mm. to 85 mm.; thickness from 5 mm. to 30 mm.

UNIFACIAL RETOUCH: FLAKE SCRAPERS

Fifty-four blocks and flakes, mostly large flakes, have been retouched unifacially. In most cases the retouch is by pressure flaking and is regular, and is designed to create a steep edge for scraping. Preponderantly the cutting edge is on a long side of the implement, but the outline of these specimens usually is so irregular that one scarcely can apply the term "side-scraper." In a few cases the retouch is less regular and is by percussion. In these cases the implement seems designed as a unifacial chopper.

BIFACIAL RETOUCH: FLAKE KNIVES

Seventeen fragments show regular bifacial percussion flaking creating a cutting or chopping edge.

CORES

Seven specimens are classed as cores, in the sense of being percussion-flaked blocks showing no signs of use. Three have regular outlines and may represent an intermediate stage in the roughing out of a core tool. Four are irregular in shape and may represent waste cores, left after flakes from which to make flake tools were knocked off (Plate V, d).

It might be expected that workshop areas such as were noted along the hillsides of Reconnaissance Units 3, 4, and 6, and site 48SU102, would be found to contain numbers of cores. However, nearly all the core-like specimens found in these areas turned out to have irregular use retouch along
the edges and therefore have been classed as choppers.

CHOPPERS WITHOUT SPECIALLY PREPARED EDGES

One hundred ten specimens have been wholly or partially percussion flaked to produce edged tools, which have been used without further modification. In most cases the outline is regular, either by design or because of the regular outline of the original cobble which has been modified only enough to produce a cutting edge. All show signs of use in the form of fine irregular chipping of one or more edges. Maximum dimensions range from 53 mm. to 160 mm.; thickness from 11 mm. to 95 mm.

CHOPPERS MADE FROM CORES

Eighty-eight specimens are choppers made from cores (Plate V, a, b, c, e, f). Of these, seventy-three have more than half the original cobble surface removed by percussion flaking. These specimens are large and thick, half of them over 100 mm. long. Fifteen specimens retain more than half the original cobble surface. Most of them are between 80 mm. and 100 mm. in maximum dimension.

FLAKE CHOPPERS

Twenty-one specimens are flake choppers, in which one face is a single fracture surface (Plate V, g, h, i). The other face may be entirely percussion flaked, or may be flaked only at the cutting edge. They range from 53 mm. to 95 mm. in maximum dimension, and from 11 mm. to 15 mm. in thickness.
SLAB CHOPPER

One unique specimen is a slab chopper; a hard sandstone slab, oval in outline, its dimensions being 172 x 110 x 12 mm. The edges have been percussion flaked for use in chopping. This specimen was found in Reconnaissance Unit 4, in the artifact concentration called Feature 5.

Discussion

There is an especially large number of choppers from the hillsides at the edge of the valley in Reconnaissance Unit 6, where twenty-five specimens were collected. As noted in the discussion of this unit (pp. 26-27), this is a heavily cobbled area which constitutes a logical spot for a workshop; the cobbles could be used both for hammers and for raw material. That such activities did go on is indicated by the fact that many flakes were lying among the cobbles. It is not easy to explain how the choppers, once made, were used, although all of them do show signs of use. Very few other artifacts were found on these hillsides, and no fireplaces or other signs of occupation were observed. Similar circumstances were noted in the hill slopes bordering the valley in Reconnaissance Units 3 and 4, although the number of artifacts found was not as great as in Unit 6.

CHOPPERS WITH SPECIALLY PREPARED EDGES

Twelve specimens form a category intermediate between choppers and blades (Plate V, 1, k, l). These twelve specimens are choppers with intentionally prepared edges, as
evidenced by regular secondary percussion flaking of the edges. The primary flaking varies from coarse and irregular to relatively fine percussion flaking. The outline is regular, oval to nearly round. The specimens are relatively thick. Maximum dimensions range from 52 mm. to 120 mm.; thickness varies from 15 mm. to 44 mm.

KNIVES

These specimens (often called "blades") are well-made bifacial cutting and/or piercing tools, relatively thin, with careful primary and secondary flaking, and a prepared edge all around. Of the 105 specimens in this category, complete specimens number twenty-six and seventy-nine are fragments. The twenty-six complete specimens may be divided into the following five descriptive classes:

POINTED TIP, ROUNDED BASE

Three specimens (Plate VI, a, b, c).

ROUNDED AT BOTH ENDS

Three specimens (Plate VI, d, e, f).

SMALL KNIVES

Four specimens; maximum length is 56 mm. (Plate VI, i, j, k).

SLENDER, THICK KNIVES

Three specimens; a typical one is 80 x 38 x 20 mm. (Plate VI, g, h).
the final section of this paper.

GRINDING SLABS

Grinding slabs are sandstone slabs with one flat or concave surface produced by rubbing. In the Big Sandy collection, this category is represented by one nearly complete specimen and four fragmentary specimens (Plate IX, a, b). The nearly complete specimen is from 48SU2. It has been roughed from a sandstone slab and has not been pecked into shape. The outline is irregular and appears to have been roughly parallel-sided with rounded ends. Maximum dimensions are estimated to have been 300 x 200 x 40 mm. The grinding surface is concave in cross-section and very slightly concave in longitudinal section, thus forming a shallow trough. This trough-like contour suggests that the grinding was done with a back-and-forth motion at right angles to the long axis of the specimen.

None of the four fragmentary pieces is complete enough to reveal the shape of the original artifact or to indicate whether the rubbed surface was produced by back-and-forth grinding or by grinding with a rotary motion. These specimens may have been slightly troughed, but their appearance makes it seem more likely that they were flat or had shallow basins. Two of these specimens were found in the loose sand of Area B in 48SU5; one is from Area A of the same site, associated with a fireplace, Feature 123; and the other specimen is from 48SU3.
MULLERS

These specimens are rounded to oval or subrectangular thick stones with one or more flat or convex grinding surfaces. They are presumed to have been held in the hand and rubbed on a grinding slab. Some writers call them "manos," but it is felt here, following Woodbury (1954, 66), that the term "mano" is best used to specify stones held in the hands and rubbed on a grinding slab with a reciprocating, i.e. back-and-forth, motion. Some of the Big Sandy mullers seem to have been used with reciprocating motion, probably with one hand, but as a group they are best designated by the general term "mullers" rather than by the specific term "manos."

There are eleven mullers in the Big Sandy collection. Ten are of sandstone and one is of granite. The length of these specimens cannot always be determined because of breakage, but appears to range from about 100 mm. to 130 mm. Width ranges from 50 mm. to 90 mm. and thickness from 25 mm. to 36 mm.

SUBRECTANGULAR OUTLINE, SUBRECTANGULAR CROSS-SECTION

Six specimens, one each from Reconnaissance Unit 2, 48SU2, 48SU4, and the surface of 48SU5, and two from 48SU6 (Plate IX, h-m). These specimens are all of sandstone and have been pecked to a fairly regular shape. There are one or two, usually two, grinding surfaces which either are nearly flat or are flat in longitudinal section and slightly convex in cross section. The latter contour of surface suggests that the stones so shaped were used with a back-and-forth rather than circular motion.
Irregular in Outline

Four specimens fall in this category, two from 48SU2 and two from 48SU7 (Plate IX, d, e, f). They are not actually "irregular" but are less regular in outline than those in the preceding category. These specimens have one, two, or three grinding surfaces, parallel or at right angles to one another. These surfaces either are flat or are flat in longitudinal section and convex in cross section. Some of these specimens are sandstone cobbles little modified except by rubbing; others have been pecked to a crudely rectangular outline.

Wedge-shaped

A specimen from 48SU4 (Plate IX, c) is made of granite and has two flat grinding surfaces at about a 30° angle to each other, producing a wedge-shaped cross section. The dimensions are 96 x 89 x 46 mm.

Discussion of Grinding Slabs and Mullers

The contour of the grinding surface on many of the mullers suggests that the stones have been used with a reciprocating motion. Correspondingly, the large grinding slab from 48SU2 has a troughed grinding surface such as would be produced by a back-and-forth grinding action. However, the smaller fragments of grinding slabs from the reservoir area do not seem to be troughed, and all grinding slabs observed by the writer from this part of the Bridger Basin, excepting the specimen from 48SU2, were bowl-shaped, as if the grinding had been done with a circular motion. The large number of "back-and-forth mullers"
is difficult to explain in the light of this seeming preponderance of bowl-shaped grinding slabs. A similar circumstance is reported from the Shoshone Basin, where Mulloy observes that the grinding slabs are bowl-shaped, whereas the mullers appear to have been used with a reciprocating motion (Mulloy 1954a, 40). Explanations of this seemingly contradictory situation are necessarily speculative, but some information bearing on the problem is available. Franklin Fenenga of the University of Nebraska State Museum has made movies of the seed-grinding patterns of certain Indian groups in the west. He observes (personal communication), "I do not believe that there is a circular motor habit associated with seed-grinding--only a to-and-fro habit with specialized tools (and corn), and a random habit with basin metates and unspecialized hand stones." This is a valuable observation, but it does not explain fully the fact that the Wyoming mullers are straight in longitudinal section and convex in cross section, since it seems unlikely that this contour could result from completely random motion. Possibly the mullers were used with a to-and-fro motion, but this motion was applied in many directions on basin, i.e. bowl-shaped, grinding slabs. Evidently more ethnographic observations oriented around this problem are needed in order that a satisfactory explanation for grinding stone forms may be phrased in terms of motor habits associated with specific seed-grinding patterns.

The culture-historical significance of the occurrence of grinding slabs and mullers in this part of Wyoming is not
clear in the present status of knowledge, and is, indeed, a subject worthy of investigation. We will review a few pertinent facts concerning the distribution of these artifact forms. In the Great Basin, grinding slabs and mullers occur in one form or another from pre-Altithermal to historic times. We are concerned here with those grinding slabs on which the grinding surface is flat or a shallow basin rather than with troughed metates, and with subrectangular and irregular mullers, as these are the forms occurring at Big Sandy. These forms are found in the several stages of the Cochise complex (Sayles and Antevs 1941) although in the most recent of those stages, the San Pedro, they are less frequent than in the earlier stages (Ibid., 24). Hunt, on the basis of a survey of the literature, says that basin grinding slabs are found on all time horizons in the southern Basin and Range province (Hunt 1953, 148), and this generalization is borne out by Wormington's summary of the archeology of the "Northern Periphery" (Wormington 1955, Part II) and by the distribution of these artifacts in the several strata at Deadman Cave (Smith 1953, 26). The historic Shoshoni used mullers and basin grinding slabs which are said to be like earlier ones except that they are smaller (Steward 1936, 42, 47), and the Paiute also used grinding slabs of this form (Wormington 1949, 105).

In the Northwestern Plains, mullers are found from Early Prehistoric to historic times, but the shapes vary and the distribution in time is not continuous. The known distribution of basin grinding slabs is more limited than that of
mullers. In the Early Prehistoric, mullers occur at Lindenmeier along with a small basin grinding slab (Roberts 1936, 32). A small grinding slab was found at the Allen site (Holder and Wike 1949, 264). Irregular mullers occur at the Ray Long site in southwestern South Dakota (Hughes 1949, 270), and part of a basin grinding slab also comes from this site (Richard P. Wheeler, personal communication). The most frequent occurrences of subrectangular mullers and basin grinding slabs in the Northwestern Plains seem to be in the Middle Prehistoric Period. This fact is indicated by the relative abundance with which they occur at Middle Prehistoric sites such as McKean (Mulloy 1954b, 449, 452) and in the Shoshone Basin (Mulloy 1954a). They are less common farther east in Signal Butte I and II (Strong 1935, 230), a phenomenon possibly tied in with an apparent emphasis there on bison hunting rather than the exploitation of wild vegetable products. There is almost no information on grinding stones in the little-reported Late Prehistoric Period of the Northwestern Plains. The mullers of historic times on the Plains, such as were used by the Omaha to grind corn while on the hunt (Fletcher and La Flesche 1911, 338), were relatively small and thin, and are unlike the ones found in the Big Sandy area.

In terms of this information it is most likely that the mullers and grinding slabs in the Big Sandy area refer to occupation in the Middle and Late Prehistoric Periods. This chronological inference supports those already made from a study of point forms.
There are at present no good evidences for direct relationship between the subrectangular mullers and basin grinding slabs of the western United States and the similar grinders of certain eastern Archaic complexes such as the Lamoka Focus (Ritchie 1944, 298, Plate 157). The scattered evidence available to date suggests that these western grinding implements are hallmarks of the arid-land seed-gathering economy which was practiced by the migratory peoples of the Great Basin for many millennia. It has been suggested above that there was an increase in frequency of these mullers and basin grinding slabs in the Northwestern Plains in the Middle Prehistoric Period. It may be, then, that such an increase reflected a greater cultural influence from the Great Basin, due possibly to relative scarcity of game in the Northwestern Plains which forced a shift to an emphasis on seed-gathering. In other words, the hypothesis is being advanced here that drier conditions in the Northwestern Plains in the Middle Prehistoric Period made that area an ecological and cultural extension of the Great Basin. Further archeological work in the Bridger Basin may well provide data bearing on this hypothesis, since it was through the breaks in the Rockies in this region that many of the influences between the Great Basin and the Northwestern Plains must have moved.

Problematical Specimen: Possible Grooved Hammerstone

This specimen, from 48SU2, is a heavily sand-blasted fine quartzite cobble bearing a strong resemblance to a grooved hammer (Plate IX, g). It is oval in outline, 90 x
60 x 33 mm. in dimensions, with one end more tapering than the other. Approximately two-thirds of the distance from the tapering end, a groove 12 mm. wide and 3 mm. deep encircles the specimen. About one-half of the specimen is weathered by sand-blasting almost as deeply as this groove, and this weathering has left a series of smaller grooves parallel to the large one, clearly the result of the structure of the rock. It is impossible to determine on the basis of this specimen alone whether the groove was made by man or was eroded by wind-blown sand. The specimen shows no evidences of battering or other signs of use, but the degree of sand-blasting to which it has been subjected might have removed any such evidences. No other artifacts like this one were found in the reservoir area, nor do local collectors report finding grooved hammers or axes in this region.

Articles of White Manufacture

There are six articles of White manufacture in the Big Sandy collection. They are not included in the artifact counts which have been given in this report. All are surface finds collected by Metcalf and Madison in 1952.

Five of the objects are cartridge shells. One, from 48SW2, is a common .30-30 shell. Two, from 48SU5 and 48SU6, are caliber .44 center fire shells, of the type used in the Winchester .44-40. The other two, both from 48SU5, are Springfield .45 shells made by the Frankfort arsenal, one an unfired center fire shell dated March, 1884, and the other an anvil primer shell dated May, 1880.
The remaining item, from 48SU5, is a horseshoe-shaped metal insigne from a package of cut plug tobacco.

These articles indicate that hunting with firearms has been going on in this area within the last seventy years. It is assumed that the game hunted was antelope, since these are the only large mammals remaining in the area. Today there is an open season on antelope in September in this part of Wyoming.

It is not felt that this information contributes materially to the subject of this report, and accordingly the articles of White manufacture have been mentioned only briefly on preceding pages and have not been included in the artifact counts.

Discussion of Artifacts

On the basis of comparisons with archeological materials in neighboring regions, the forms of projectile points and seed-grinding tools found in the Big Sandy Reservoir area suggest that the locality was occupied in the Middle and Late Prehistoric Periods. It is noteworthy, however, that these specimens are relatively few in number. The frequency of artifact categories in the collection from the reservoir area is as follows:

<table>
<thead>
<tr>
<th>Artifact Type</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified fragments</td>
<td>278</td>
</tr>
<tr>
<td>Flake scrapers and flake knives</td>
<td>71</td>
</tr>
<tr>
<td>Choppers</td>
<td>110</td>
</tr>
<tr>
<td>Cores</td>
<td>7</td>
</tr>
<tr>
<td>Prepared choppers</td>
<td>12</td>
</tr>
<tr>
<td>Knives</td>
<td>105</td>
</tr>
<tr>
<td>Scrapers</td>
<td>10</td>
</tr>
<tr>
<td>Pointed unifacials</td>
<td>2</td>
</tr>
</tbody>
</table>
By far the greater number of artifacts are simple chopping and cutting tools. Seed-grinding tools are relatively scarce, and only at 48SU5 were there appreciable numbers of projectile points. Even there the point forms suggest a wide span of time, with relatively few specimens referring to any one time of occupation.

The frequency of the several functional categories of artifacts suggests that the people who camped along the Big Sandy did not do so primarily to get food. It seems most likely that the primary reason for stopping in this valley was the presence of two important resources: water, and raw materials for making artifacts.
DISCUSSION AND CONCLUSIONS

The surveys of the Big Sandy Reservoir area by the River Basin Surveys in 1952 and by the University of Nebraska State Museum in 1953 have produced data indicating that the area has been occupied intermittently since 2000 B.C. or before. Most of the point forms represented in the artifacts found, including the Duncan, Hanna, and McKean point types, are believed to date from the Middle Prehistoric Period of the Northwestern Plains, which began some time before 2000 B.C. The small trianguloid and notched points also found at Big Sandy indicate occupation in the Late Prehistoric Period which is believed to fall within the last two thousand years.

The nature of the sites and the forms of the artifacts found shed some light on the nature of aboriginal activities in this area. Two major types of activity may be discerned. The first is the making of tools from the abundant cobblestones on the slopes along the valley, as exemplified by finds in Reconnaissance Units 3, 4, and 6, and sites 48SU2 and 48SU102. The second is the carrying on of other everyday camping activities such as food-getting, cooking, and the processing of hides as signified by the data from 48SU5, 48SU6, and other occupation sites. It is surprising, however, that there are relatively few direct evidences of food-getting activities. Seed-grinding stones are infrequent, and projec-
tile points are relatively rare except at 48SU5. Only a very few hearths, such as those at 48SU6, had animal bones in association. The suggestion may be made that stops in the Big Sandy valley were very brief, and were occasioned primarily by the availability of water and of raw materials for artifacts. It is certain, in any case, that the relative scarcity of food would force anyone attempting to exploit this area to be organized in relatively small groups and to keep on the move. The nature of the occupation sites and their location on the terrace edges overlooking the creek adds weight to these conclusions.

We may note parenthetically that the environmental restrictions imposed on human activities in this area also are reflected by the paucity of articles of White manufacture, of which only six are included in the collection from Big Sandy, and by the fact that all but one of these articles are cartridge shells which signify hunting. White utilization of this area appears to have been limited to hunting, some use of the land for grazing, and the building of dams and canals for irrigating the Eden Valley downstream.

When the artifacts found in the reservoir area are compared with artifacts from archeological horizons in the Great Basin and the Northwestern Plains it appears that significant cultural influences moved back and forth across this region. There is no evidence at hand that this part of Wyoming was ever the location of a cultural climax. It is more likely that the historical significance of the Wyoming Basin, of
which the Bridger Basin is the western part, lay in its role as a transitional area between the Northwestern Plains and Great Basin. Its intermediate character is indicated not only by archeological correspondences with both neighboring regions, but also by the climatic and cultural fluctuations which are known to have taken place here even in recent times. A hundred years ago there was permanent snow in the Wind River Mountains, whereas this is not the case today (Moss 1951, 25). There were bison in many parts of the Wyoming Basin a century ago (Ibid., 32-34), and the High Plains equestrian hunting culture was spread as a thick overlay upon the native Shoshonean culture (Steward 1940, 475; Kroeber 1939, 82). In earlier times, ethnological and archeological evidence suggests that western Wyoming was, in effect, culturally and probably ecologically an arm of the Great Basin (Kroeber 1939, 49-50, 52; Steward 1940, 449-450). In the still more remote past, the hunters who killed bison with Eden and Scottsbluff points at the Finley site (Moss 1951, Plate I) were primarily related, in technological traditions at least, to the big game hunters of the Plains. Thus the cultural position of the Bridger Basin appears to have fluctuated, and the significance of the area seems primarily to lie in its peripheral position with respect to both the Northwestern Plains and the Great Basin, and in its function as an avenue of contact between the two culture areas.

This being the case, a profitable step in learning about mutual influences between the Northwestern Plains and the Great
Basin should be to investigate further the archeology of the Bridger Basin. There are many indications that the Bridger Basin is rich in archeological sites. In the course of the Big Sandy reconnaissance of 1953, the writer and his party visited a number of sites in the surrounding area and listed several more on the basis of information from local people. It is planned that this information will be reported in a separate paper. The data resulting from these brief investigations indicate that an intensive reconnaissance, followed by excavation, would be well rewarded with information on the prehistoric sequence in this area.

That such information will be relevant to a better understanding of events both in the Great Basin and the Northwestern Plains seems likely. It has been indicated earlier, and may profitably be reiterated here, that many gaps exist in our knowledge of the prehistory of those two regions. The sequence of Early, Middle, and Late Prehistoric Periods which has been used as a chronological framework in this paper derives, as has been pointed out, from the tentative prehistoric sequence for the Northwestern Plains which Mulloy has proposed on the basis of extensive field work in Wyoming and Montana (Mulloy 1952; 1954a, 62-65). Much of this field work has not yet been published and the sequence remains a hypothesis, albeit a strong one. It may well receive further support by definitive archeological work in the Bridger Basin.

It has been further suggested in this paper (p. 77) that the seed-gathering culture of the Great Basin strongly in-
fluenced the Northwestern Plains, probably via the Wyoming Basin, in the Middle Prehistoric Period. This seed-gathering "Desert Culture" is believed by a number of students to have persisted in the Great Basin through most of the known human occupation of that region (Smith 1952, 38, Fig. 21; Rudy 1953, 168-169; Jennings 1953, 203 ff.; Jennings and Norbeck 1955, 3). Steward, however, has sharply questioned the great antiquity and the uniformity through time of this "Desert Culture" (Steward 1955). If Steward's views are borne out, the conception of events in the Northwestern Plains suggested here will need revision. The question of the presence or absence of seed-gathering complexes in the Bridger Basin at specific times in the past has a direct bearing on this problem.

In view of these considerations it is clear that the significance of cultural events in the Bridger Basin must remain highly speculative until much more archeological work is done not only within this area but also in the two great culture areas to the east and west; and that, conversely, knowledge of events in the Bridger Basin has a bearing on our understanding of the history of both the Northwestern Plains and the Great Basin.

The reconnaissance of the Big Sandy Reservoir area has revealed that no important archeological sites have been lost through construction of the Big Sandy Dam and Reservoir. One reason for the lack of important sites in the reservoir area lies in the circumstance that since man first lived in this valley, the local processes of deposition have not
created any new deposits which might protect old cultural evidences or separate them from more recent ones. Nearly all the archeological materials met with in the course of the survey were, in effect, surface finds. Exceptions were the fireplaces beneath the loose sand at 48SU5, but the age of these fireplaces is unknown.

In summary, the reconnaissance in the Big Sandy Reservoir area has revealed a number of what are essentially surface sites. They are workshop and occupation sites of migratory hunting and gathering peoples who made very brief stops in the valley of the Big Sandy to avail themselves of the water and of the abundant local supplies of workable quartzite and oolitic sandstone from which artifacts could be made. Some of them, at least, also did a little hunting. The artifact forms indicate human activities dating from recent times back to the Middle Prehistoric Period, as far back as 2000 B.C. or before, and suggest relationships with prehistoric cultures of the Great Basin to the west and the Northwestern Plains to the east. There are evidences that the Bridger Basin, in which the Big Sandy valley is located, is to be considered ecologically and culturally intermediate with respect to these neighboring culture areas. Climatic fluctuations and resulting movement of peoples and cultures seem to have made the Bridger Basin an outlier of the Great Basin at one time and of the Northwestern Plains at another. In the present status of knowledge it is not possible to delineate the course of these events in any detail.
Further archeological work in the Bridger Basin might well be directed to the specific problem of finding occupation sites which are datable, and to the general problem of tying the history of cultural changes to the sequence of climatic shifts which have occurred in this area. Thus we may learn about the responses of hunting and gathering peoples in the Bridger Basin to the pressures of environmental change and to the streams of cultural influence flowing between two of the major culture areas of North America, the Great Plains and the Great Basin.
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PLATES

In the documentation of the artifacts illustrated, the numbers given are those in the catalog of the University of Nebraska State Museum. In the statements of provenience, the terms “flats” and “slopes” refer respectively to the wide flats above the Big Sandy floodplain and to the hill slopes bordering the valley on the southwest. All specimens are surface finds unless otherwise stated.
PLATE I

Scenes in the Big Sandy Reservoir Area

Top. Looking north across Reconnaissance Unit 4. Site 48SU2 is on the butte at the left center, just below the horizon. Big Sandy Creek is in the inner valley marked by the light line extending to the right of the butte. Site 48SU102 is on the low ridge at the end of the road, right center. Site 48SU5 is beyond it on the far side of the creek.

Bottom. The floodplain of Big Sandy Creek, muddy from recent inundation by the reservoir.
Top. Looking east across site 48SU5, which extends back from the top of the cliff. Men are working in Area B in the center of the picture.

Bottom. Looking east; work in Area A. Stains in the floor of the excavation are fireplaces, Features 109 and 139.
PLATE III

Site 48SU5: Fireplaces in Area A

Top. Features 109 and 139, fireplaces, as first uncovered.

Bottom. Features 109 and 139, cross-sectioned (see also Fig. 4).
PLATE IV

Surface Sites in the Reservoir Area

Top. A fireplace, Feature 3, in Reconnaissance Area 3. The fireplace is the slightly discolored area with a few rocks showing on the surface, about three feet to the right of the man.

Bottom. Site 48SU102, a cobble-covered ridge with evidences of workshop activity.
PLATE V
Choppers and a Core

a-i, except for d, choppers without specially prepared edges.
   a, b, c, e, f, made from cores.
   g, h, i, flake choppers.
   d, irregular core.
   j, k, l, choppers with specially prepared edges.

Catalog numbers and proveniences:
   a, A2823, Reconnaissance Unit 6, slopes.
   b, A2867, Reconnaissance Unit 6, flats.
   c, A2815, Reconnaissance Unit 6, slopes.
   d, A2845, same.
   e, A2834, same.
   j, A2814, same.
   g, A2836, same.
   h, A2837, same.
   i, A2846, same.
   j, A2305, 48SU2.
   k, A2907, 48SU3.
   l, A2311, 48SU2.
PLATE VI

Knives

a, b, c, pointed tip, rounded base.
d, e, f, rounded at both ends.
g, h, slender, thick.
i, j, k, small.

Catalog numbers and proveniences:
a, A3179, Reconnaissance Unit 2.
b, A3182, same.
c, A2793, 48SW3.
d, A2067, 48SU5.
e, A2811, Reconnaissance Unit 6, slopes.
f, A3103, 48SW4.
g, A2263, 48SU102.
h, A2917, 48SU3.
i, A2295, 48SU2.
j, A2031, 48SU5.
k, A2441, Reconnaissance Unit 3, slopes.
PLATE VII

Scrapers and Points

a, b, side scrapers.
c, d, e, f, end scrapers.
g, plain shoulder, expanding stem, concave base (SCa3).
h, expanding stem, shouldered, convex base (SCa2).
i, j, expanding stem, barbed, convex base (SCb1).

Catalog numbers and proveniences:
a, A2070, 48SU5.
b, A2513, Reconnaissance Unit 3, flats.
c, A2002, 48SU5, Area B, on screen.
d, A2375, 48SU2.
e, A2419, Reconnaissance Unit 3, flats.
f, A2054, 48SU5.
g, A3095, 48SW2.
h, A2045, 48SU5, Area B.
i, A2486, Reconnaissance Unit 4, Feature 5.
j, A2041, 48SU5.
a, b, plain lanceolate, convex base (NAb1).
c, plain shoulder, expanding stem, concave base (SCa3; Hanna point).
d, plain shoulder, straight stem, convex base (SBa).
e, f, g, h, expanding stem, barbed, convex base (SCb1).
i, lanceolate, straight sides, concave base (McKean point).
j, k, triangular, straight base, side notched (NBa1).
l, triangular, straight base, side and base notched (NBa2).
m, n, o, p, plain shoulder, straight stem, concave base (Duncan point).

Catalog numbers and proveniences:
a, A2154, 48SU5.
b, A2076, 48SU5, Area B.
c, A2150, 48SU5, Area B.
d, A1998, 48SU5, Area B, on screen.
e, A3094, 48SW2.
f, A2552, Reconnaissance Unit 5.
g, A2940, 48SU4.
h, A2948, 48SU6.
i, A2042, 48SU5, Area B.
j, A2153, 48SU5.
k, A2149, 48SU5.
l, A2043, 48SU5, Area B.
m, A2044, 48SU5, Area B.
n, A2046, 48SU5.
o, A2025, 48SU5.
p, A2418, Reconnaissance Unit 3, flats.
PLATE IX

Grinding Implements and Problematical Specimen

Inked marks indicate the lines of the cross sections which are shown in Plate X.

a, b, grinding slab fragments.
c, wedge-shaped muller.
d, e, f, irregular mullers.
g, problematical specimen; possible grooved hammerstone.
h-m, subrectangular mullers.

Catalog numbers and proveniences:
a, A1996, 48SU5, Area B, on screen.
b, A2497, 48SU3.
c, A2937, 48SU4.
d, A2371, 48SU2.
e, A2372, 48SU2.
f, A2791, 48SU7.
g, A2328, 48SU2.
h, A2967, 48SU6.
i, A2809, 48SU6.
j, A2936, 48SU4.
k, A2323, 48SU2.
l, A2161, 48SU5.
m, A3185, Reconnaissance Unit 2.
PLATE X

Cross Sections of Specimens Shown in Plate IX

c and g as seen from right; e from lower left; others from below.
PLATE X

a

b

c

d

e

f

g

h

i

j

k

l

m

10 CM.